

# FORESTRY COURSES – UNIVERSITY OF HELSINKI

Please go to <http://www.mm.helsinki.fi/english/courses.htm> for more information.

## DEPARTMENT OF FOREST ECOLOGY

### **Personal study plan (M.Sc.) (ME400) 1 credit 83675**

Timing: M.Sc. studies (4th year). (Master's Degree Programme studies, 1st year).

Responsible person: Professor of chosen specialization line

Objective: To facilitate the smooth completion of degree studies by the student while supporting his/her career aims and interests.

Contents: The student will make a personal study plan for completing the Master's degree. The aim of the personal study plan is to set study targets and plan the timing of studies while considering personal competencies, skills and goals in relation to career aims.

### **Special project (ME401) 3-8 credits 835011**

Timing: M.Sc. studies (4th-5th year). (Master's Degree Programme studies, 1st-2nd year).

Responsible person: Professor of chosen specialization line

Objective: The student will become acquainted with a special question of forest ecology.

Contents: The special project can take the form of 1) a literature review, 2) planning a company project, 3) writing a research plan, 4) a development project to solve a practical problem, or 5) a video, an exhibition, etc.

Evaluation: Professor will evaluate.

### **Special training (ME402) 3 credits 835012**

Timing: M.Sc. studies (4-5th year). (Master's Degree Programme studies, 1st-2nd year).

Responsible person: Professor of chosen specialization line

Objective: The student becomes familiar with his/her field and the demands of working life, and learns to apply theoretical knowledge to solve practical problems while learning on-the-job. The purpose of the training period is also to support career planning and promote future employment.

Contents: Training related to the department's teaching and/or field of research. Consists of practical or research-related tasks. Training may also take place abroad. The student must receive professor approval before the start of the training period.

Realisation and working methods: Training last at least 4 weeks.

Evaluation: The student writes a report on the training period and presents a letter of reference.

### **Essays (ME403) 3 credits 835013**

Timing: M.Sc. studies (5th year). (Master's Degree Programme studies, 2nd year).

Responsible person: Professor of chosen specialization line

Objective: To develop critical thinking capacities and learn to present facts and personal viewpoints clearly in written form. The student develops competencies necessary to produce fluent, grammatically correct factual text in the field of forest ecology.

Contents: Practise in fluent writing in the field of forest ecology. Two to four reports are written on subjects agreed with the professor.

Realisation and working methods: Lectures 0, practical work 0, group work 0, independent study 80 hours.

Evaluation: Professor will evaluate on a pass/fail scale. The completion of this course is a prerequisite for participating in the maturity essay.

### **Sustainable forestry (ME405) 3 credits 83677**

Timing: M.Sc. studies (4th year). (Master's Degree Programme studies, 1st year). The course is given in autumn term, II period.

Responsible person: University Lecturer

Objective: The student will acquire knowledge of the various elements and interactions related to the ecological, economical and socio-cultural sustainability of forest management. In addition, students will be acquainted with different strategical, tactical and operational solutions that have been used, and can be used, to achieve biodiversity in forest management.

Contents: The course explores the concepts and theory of sustainable forestry and the definitions of ecological, economical and socio-cultural dimensions of sustainability. Special emphasis is placed on how sustainable forestry can be implemented in practice and on the relationships and trade-offs between different dimensions of sustainability.

Realisation and working methods: Lectures 28, practical work 0, group work 24, independent study 28 hours.

Study materials and literature: Literature handed out during the course.

Evaluation: Participation, presentation of written and oral report, and final exam.

### **Field course at forest ecological methods (ME407) 4 credits 83666**

Timing: M.Sc. studies; course will be held for the first time in the summer of 2007.

Responsible person: Professor Hari

Relations to other study units: The following courses are recommended to have already been taken: ME331, ME332, ME432 and ME435.

Objective: The student will test and demonstrate principles and theories presented in the lectures. The student will also get acquainted with the newest measurement technology and the problems associated with field experiments.

Contents: By using instruments and data from SMEAR station, the students will get acquainted with forest material flows, especially the carbon cycle. In groups, the students will make a report on a topic to be agreed upon.

Realisation and working methods: Practical work 107

Evaluation: Participation

Other information: Teaching in Finnish and in English.

### **Master's degree thesis (ME500) 40 credits 835015**

Timing: M.Sc. studies (5th year). (Master's Degree Programme studies, 2nd year).

Responsible person: Professor of chosen specialization line

Contents: The student prepares a scientific thesis (on an agreed upon subject), which is primarily based on data collected by the student, but may also be based on existing data. The thesis should demonstrate readiness for scientific thought, command of necessary research methods, familiarity with the subject matter and readiness for scientific communication in one's field. The student must present an acceptable thesis plan prior to the start of thesis work.

Evaluation: Evaluation based on the opinion given by two examiners.

## **Forest Soil Science**

### **Soil formation and classification (ME310) 5 credits 83672**

Timing: The course is given in autumn term every second year (even), period I.

Responsible person: University Lecturer Starr

Objective: The objective of the course is to provide the student with the necessary background in soil formation processes and properties to understand how soil horizons and profiles are formed and used to classify soils.

Contents: The course covers soil formation factors, processes and properties, diagnostic soil properties and horizons, and the principles of pedogenic soil classification. Main emphasis is on the FAO-Unesco world soil classification system, but the US Soil Taxonomy and World Reference Base for Soil Resources systems are also introduced.

Realisation and working methods: Lectures 28, practical work 28, group work 28, independent study 51 hours.

The course is based on a series of lectures, classroom based practicals, preparation of a seminar on a relevant and agreed upon topic by each student (or group) and presented to the course, and a 1-day field excursion .

Study materials and literature:

- FAO/Unesco. 1990. Soil map of the world. Revised Legend. World Soil Resources Report 60, FAO, Rome. 119 p.
- Bridges, E.M. 1978. World Soils. (2nd Edition). Cambridge University Press. 128 p.
- Birkeland, P.W. 1999. Soils and geomorphology. (3rd edition). Oxford University Press. 372 p.
- Keys to Soil Taxonomy. SMSS. latest edition.
- The course is based on a series of lectures, a classroom based practical, a mandatory field excursion and a seminar on a relevant and agreed upon topic is to be prepared and presented by each student (or group). Soil type classification will be demonstrated in field during late spring.

Evaluation: Written examination, exercises and seminar.

### **Forest soil science literature review and evaluation (ME411) 6 credits 83683**

Timing: M.Sc. studies (5th year). (Master's Degree Programme studies, 2nd year).

Responsible person: Professor Westman

Contents: A set of texts (books and scientific articles) selected by agreement with the professor will be read, reviewed and evaluated.

Realisation and working methods: Lectures 0, practical work 0, group work 0, independent study 62 hours.

Evaluation: Examination

### **Biogeochemistry of boreal forest ecosystems and soils (ME413) 5 credits 83628**

Timing: M.Sc. studies. III period

Responsible person: University lecturer Starr, Prof. Westman

Objective: The course objective is to provide the student with a systems analysis approach to the biogeochemistry (the transformation and flow of chemical materials) of boreal forest ecosystems, primarily at the stand-scale.

Contents: The course covers: an introduction to systems analysis and modelling; derivation of nitrogen and mineral nutrient pools and flows in forest stands and catchments; processes (decomposition, weathering, litterfall, nutrient supply and uptake) affecting the flows; the central role played by the carbon and hydrological cycles; and the use of various empirical and simulation models to compliment measurements.

Realisation and working methods: Lectures 54, group work 28, independent study 53 hours. Lectures and exercises using real-world data sets from boreal forests.

Study materials and literature: Literature list and exercises handed out during the course.

Evaluation: Exercises (50 %) and course report (50%)

Other information: Formerly: Water, nutrient element, and carbon flow in boreal forest ecosystem.

### **Forest soil hydrology and water balance (ME414) 5 credits 83678**

Timing: M.Sc. studies, IV period

Responsible person: University lecturer Starr, Prof. Westman

Objective: The objective of the course is provide the student with an understanding of the eco-hydrology of forest ecosystems and soils, and the importance of the hydrological cycle in the flow of matter and many soil processes affecting forest ecosystem functioning.

Contents: The course will cover the soil hydraulic properties of both organic (peat) and upland soils, and the components of the water balance: precipitation (including snow pack formation and snowmelt), evapotranspiration, and soil water storage, water movement and flow at the stand- and small catchments-scale. The implications for nutrient supply and leaching and the potential impacts of global warming on the water balance will also be covered.

Realisation and working methods: Lectures 58, practical work 28, independent study 49 hours. Lectures will systematically cover each component of the water balance, and a series of classroom practicals and home exercises using real-world data sets and various hydrological models will be allocated during the course. A seminar on a relevant and agreed upon topic is to be prepared and presented by each student (or group).

Evaluation: Written examination, exercises and seminar.

## **Forest Tree Ecology**

### **Methodology of Forest Tree Ecology (ME431) 8 credits 83654**

Timing: M.Sc. studies (4th year). (Master's Degree Programme studies, 1st-2nd year). The course is given in spring term, in even-numbered years, IV period.

Responsible person: Professor Hari

Objective: To learn how to produce informative forest tree ecological data.

Contents: Students become acquainted with the production of informative data. The course analyses sources of error caused by sample design and measurement and how to minimise them.

Realisation and working methods: Lectures 20, practical work 60, group work 40, independent study 56 hours.

Study materials and literature: To be decided

Evaluation: Group work.

Other information: Teaching in English or in Finnish. Field exercise will be organized in August or September at Värriö Research Station.

### **Advanced literature (ME433) 6 credits 83609**

Timing: M.Sc. studies (5th year). (Master's Degree Programme studies, 2nd year).

Responsible person: Professor Hari

Contents: Readings in the theoretical background and applications of forest tree ecology.

Realisation and working methods: Lectures 0, practical work 0, group work 0, independent study 160 hours

Study materials and literature: A set of texts (books and scientific articles) selected by agreement with the professor.

Evaluation: Examination

Other information: In Finnish or in English.

## **Peatland Ecology and Forestry**

### **Ecology of peatlands (ME341) 3 credits 84118**

Timing: B.Sc. studies (2nd -3rd year). (Master's Degree Programme studies, 1st-2nd year). The course is given in autumn term in even-numbered years, I period.

Responsible person: Professor Vasander

Objective: The student will acquire in-depth knowledge of peatland ecosystem processes and the biotic and abiotic factors impacting them.

Contents: This course gives a thorough understanding of the ecology of natural and drained peatland ecosystems.

Realisation and working methods: Lectures 28, practical work 0, group work 28, independent study 53 hours.

Study materials and literature: Literature list handed out during the course.

Evaluation: Final examination.

Other information: The course includes field excursions.

### **Mires of the world (ME343) 2 credits 84120**

Timing: B.Sc. studies. (Master's Degree Programme 1st-2nd year).

Responsible person: Prof. Vasander

Contents: Special literature on the subject.

Realisation and working methods: Lectures 0, Practical work 0, Group work 0, Independent study 53 hours.

Evaluation: Examination.

### **Forest management on peatlands (ME345) 3 credits 84105**

Timing: M.Sc. studies

Responsible person: Doc. Päivänen

Contents: Information on the amelioration of peatlands: theory, technique and legislation.

Other information: Lectures in Finnish, but possible to complete course as literature exam.

### **Special literature 1 (ME441) 5 credits 84113**

Timing: M.Sc. studies (5th year). (Master's Degree Programme studies, 2nd year).

Responsible person: Professor Vasander

Objective: To deepen one's knowledge of peatland ecosystems.

Contents: Advanced information on mire ecosystems.

Realisation and working methods: Lectures 0, practical work 0, group work 0, independent study 133 hours.

Study materials and literature: Material will be selected from the following: Charman, Dan 2002. Peatlands and Environmental Change. John Wiley & Sons Ltd, Chichester. 312 s. ISBN 0-470-84410-8. Gore, A.J.P. (toim.) 1983. Ecosystems of the world. 4A. Mires: Swamp, bog, fen and moor. General studies. Elsevier Scientific Publishing Company, Amsterdam-Oxford-New York. Gore, A.J.P. (toim.) 1983. Ecosystems of the world. 4B. Mires: Swamp, bog, fen and moor. Regional studies. Elsevier Scientific Publishing Company, Amsterdam-Oxford-New York. Heathwaite, A.L. & Göttlich, Kh. 1993. Mires. Process, exploitation and conservation. John Wiley & Sons Ltd, Chichester. Joosten, H. & Clarke, D. 2002: Wise use of mires and peatlands ? Background and principles including a framework for decision-making. International Mire Conservation Group and International Peat Society. Saarijärvi Offset Oy, Saarijärvi, Finland, 2002. 303 s. ISBN 951-97744-8-3. Lugo, A.E., Brinson, M. & Brown, S. (toim.) 1990. Ecosystems of the world. 15. Forested wetlands. Elsevier Scientific Publishing Company, Amsterdam-Oxford-New York. Trettin, C.C., Jurgensen, M.F., Grigal, D.F., Gale, M.R. & Jeglum, J.K. (toim.) 1997. Northern Forested Wetlands: Ecology and Management. CRC Press, Lewis Publishers, Boca Raton-New York-London-Tokyo

Evaluation: Examination

### **Special literature 2 (ME442) 3 credits 84123**

Timing: M.Sc. studies (5th year). (Master's Degree Programme studies, 2nd year).

Responsible person: Professor Vasander

Contents: Students practise analysing, organising and critically evaluating information from scientific reports.

Realisation and working methods: Lectures 0, practical work 0, group work 0, independent study 80 hours.

Study materials and literature: A set of texts (books and scientific articles) selected by agreement with the professor

Evaluation: Examination or a critical book review on a new international publication on peatland ecology

### **Carbon and Nutrient Dynamics in Peatland Ecosystems (ME446) 5 credits 84124**

Timing: M.Sc. studies. Uneven years in August

Responsible person: Prof. Vasander, Dr. Tuittila, Doc. Laine and other teachers.

Objective: Student learns novel methods to study C and nutrient dynamics in peatlands

Contents: Processes controlling carbon and nutrient dynamics in peatland ecosystems are studied by means of field measurements and monitoring. The course consists of field demonstrations and group work including both measurements of element fluxes and handling of the data. At the end of the course a field excursion will be organised to peatland sites in the aapa mire region.

Realisation and working methods: Practical work 133 hours. Fieldcourse

It is possible to pass following courses also in English:

### **Peat geology and technology (ME443) 3 credits 84112**

Timing: M.Sc. studies (4th-5th year). (Master's Degree Programme studies, 1st-2nd year).

Responsible person: Docent Raikamo

Objective: To give information on peatland and peat geology, peat accumulation, peat properties and use.

Contents: Peat and peatland geology, peat stratigraphy, peat properties and the industrial use of peat. Includes a field excursion.

Realisation and working methods: Lectures 20, practical work 30, group work 0, independent study 30 hours

Evaluation: Participation and examination

Other information: Finnish is the primary language of instruction, but English can be used as necessary.

### **The use of peat in Finland - Matching goals and conflicts (ME444) 3 credits 84129**

Timing: M.Sc. studies (4th-5th year). (Master's Degree Programme studies, 1st-2nd year).

Responsible person: Professor Vasander

Objective: To get acquainted with the fundamental questions of peat use.

Contents: Peat use compared to peat stocks from the perspective of national and international energy and climate politics.

Realisation and working methods: Lectures 40, practical work 0, group work 20, independent study 20 hours

Study materials and literature: Literature is handed out during the course.

Evaluation: Examination

Other information: Finnish is the primary language of instruction, but English can be used as necessary.

## **Silviculture**

### **Structure, dynamics and biodiversity of boreal forests (ME222) 3 credits 83556**

Timing: B.Sc. studies (2nd year). (Master's Degree Programme studies, 1st year). The course is given in autumn term, II period.

Responsible person: University Lecturer Timo Kuuluvainen

Objective: The student will acquire basic knowledge of the natural structure and dynamics of boreal forests and their impacts on ecological biodiversity. The student will also learn to apply the knowledge in order to analyze the effects of forest management on biodiversity.

Contents: This course gives an overview of disturbances, succession and biodiversity in boreal forests on various spatial and temporal scales. Emphasis is on disturbance and successional processes as they occur in natural forests and how these dynamic processes act to maintain biological diversity. How to utilize the ecological knowledge about natural forests for ecologically sustainable forestry is also considered.

Realisation and working methods: Lectures 28, group work 30, independent study 22 hours

Study materials and literature: D.B. Lindenmayer & Franklin, J.F. Conserving Forest Biodiversity. A Comprehensive Multiscaled Approach. Island Press. Other literature handed out during the course

Evaluation: Participation, presentation of written and oral report, and final exam.

### **Advanced literature (ME422) 5 credits 83518**

Timing: M.Sc. studies (5th year). (Master's Degree Programme studies, 2nd year).

Responsible person: Professor Mäkelä

Contents: Practice in analysing, organising and critically evaluating information from scientific literature and reports.

Realisation and working methods: Lectures 0, practical work 0, group work 0, independent study 133 hours.

Study materials and literature: A set of texts (books and scientific articles) selected by agreement with the professor.

Evaluation: Examination

## **Tropical Silviculture**

### **Agriculture and forestry in developing countries (ME350) 3 credits 80053**

Timing: B.Sc. studies (3rd year), III period.

Responsible person: Prof. Luukkanen

Objective: The student will become acquainted with the basic principles of tropical production and land use systems as well as the major international agreements and policy processes relevant to tropical forests, forestry and land use.

Contents: An introduction to tropical crop, livestock and forestry production systems and an overview of international environmental agreements, principles of land-use planning, agroforestry, environmental problems, human nutrition and food security.

Realisation and working methods: Lectures 42, independent study 38 hours.

Study materials and literature: Literature is given out during the course.

Evaluation: Exam in Finnish, Swedish or English on selected exam dates of the Faculty or based on separate agreement with Prof. Luukkanen.

### **Tropical forest ecology and silviculture (ME351) 3 credits 83533**

Timing: B.Sc. studies (3rd year) III period.

Responsible person: Prof. Luukkanen

Relations to other study units: ME250 or corresponding knowledge

Objective: The student will become acquainted with the ecological basis of forest management and the silvicultural systems used in tropical forests.

Contents: General principles of the biology, evolution and genetics of tropical trees, and using selected examples, major silvicultural systems and other tree-based production ecosystems, especially in natural forests.

Realisation and working methods: Lectures 36, practical work 14, independent study 30 hours.

Study materials and literature: Literature given out during the course or the following literature:

· Lamprecht, H. 1989. Silviculture in the tropics. GTZ, Eschborn. 296 p.

· Luukkanen, O. 1984. Trooppisen metsänhoidon perusteet. Helsingin yliopiston metsänhoitotieteen laitoksen tiedonant. 49

· Evans, J. and Turnbull, J. W. 2004. Plantation Forestry in the Tropics. The role, silviculture and use of planted forests for industrial, social, environmental and agroforestry purposes. 3rd ed. Oxford University Press.

Evaluation: Exam in Finnish, Swedish or English on selected exam dates of the Faculty or based on separate agreement with Prof. Luukkanen.

Other information: Most of the lectures arranged in Gardenia.

### **Seminar: Agriculture and forestry in developing countries (ME450) 3 credits 83546**

Timing: M.Sc. studies (4th year) III period.

Responsible person: Prof. Luukkanen, University lecturer Kaarakka

Objective: The students learn to prepare and present a seminar report based on the utilisation of scientific reference material.

Contents: The students prepare and present a written 10-page report in English on forestry, agriculture, agroforestry or other relevant topic. A selection of seminar topics will be provided, but a topic can also be selected according to the participant's own interest.

Realisation and working methods: Lectures 28, independent study 52 hours.

Evaluation: Presentation of the report and participation to 80 % of the seminar sessions.

Field course: Tropical forest ecology and silviculture (ME451) 5 credits 83541

Timing: B.Sc. / M.Sc. studies, 3rd or 4th year Every second year (even).

Responsible person: Prof. Luukkanen ja University Lecturer Kaarakka

Relations to other study units: Prerequisites: ME 350, ME 351, ME 452 or corresponding knowledge

Objective: The students familiarise themselves with the basic methodologies of ecological field research and principles of socio-economic field research.

Contents: Arranged as a joint Thai-Nordic course at Kasetsart University, Bangkok, and field stations elsewhere in Thailand. Covers the ecology, management and conservation of natural and man-made production ecosystems (including agroforestry and estate crops); ecophysiology of tropical trees; tree uses, including non-wood forest products; deforestation and forest rehabilitation; and forest and land-use policy.

Realisation and working methods: Practical work 133 hours.

Evaluation: Participation and group work

Other information: This course is arranged in Thailand. Prospective participants are urged to apply personal scholarships.

### **Special topics on silviculture in developing countries (ME452) 2-3 credits 83536**

Timing: B.Sc. / M.Sc. studies, 3rd or 4th year Every second year (uneven). II period.

Responsible person: Prof. Luukkanen ja University Lecturer Kaarakka

Relations to other study units: Prerequisites: ME 350, ME 351 or corresponding knowledge

Objective: Students are introduced to ecology, development problems and culture of South-East Asia with particular reference to Thailand.

Contents: Lectures and seminars on forestry, development problems and culture in South-East Asia, especially Thailand. Aimed primarily at participants preparing themselves for the ME451 field course, but other students can also participate.

Realisation and working methods: Lectures 10, practical work 50, group work 10, independent study 56 hours

Evaluation: Participation and/or report

### **Agroforestry in the tropics and developing countries (ME454) 5 credits 83554**

Timing: M.Sc studies, (4th year) IV period.

Responsible person: MMT Elfadl

Relations to other study units: Prerequisites: ME150, ME350 or corresponding knowledge

Objective: Students familiarise themselves with and can recognise the major agroforestry systems of the tropics and developing countries.

Contents: Ecological, technical, economic and social aspects of agroforestry systems and practices in the tropics and developing countries. Analyses and synthesis of the major practices. Theoretical models and research methods of these production systems.

Realisation and working methods: Lectures 42, group work 20, independent study 71 hours.

Evaluation: Exam (after the lectures or based on separate agreement with Dr Elfadl) in English

### **Workshop: National Forest Programmes (ME455) 5 credits 83557**

Timing: M.Sc. studies, 4th or 5th year. Every second year (uneven), III period (intensive course).

Responsible person: Prof. Luukkanen

Relations to other study units: Prerequisites: ME250, ME351 or corresponding knowledge.

Objective: The students are familiarised with global environmental and forest policies and related conventions and agreements.

Contents: The major global environmental and forest policies as well as related conventions and agreements are presented. The national forest programme (NFP) processes will be analysed at the international and national level. Special attention is given to poverty reduction strategies and their linkages with forest-sector planning. The course consists of lectures and group work on individual countries and crosscutting issues.

Realisation and working methods: Lectures 40, group work 50, independent study 40 hours.

Study materials and literature: Literature and other materials given out during the course.

Evaluation: Participation, group work and exam. The course will end in a final examination that can be taken in English, Finnish, Swedish, Danish or Norwegian.

Other information: This course is arranged within the Nordic Veterinary Agricultural and Forestry University (NOVA) framework.

### **Seminar: Tropical silviculture research (ME456) 3 credits 83629**

Timing: M.Sc. studies, 4th or 5th year I period.

Responsible person: Prof. Luukkanen, University Lecturer Kaarakka

Relations to other study units: ME350, ME351, ME450, ME451 or corresponding knowledge

Objective: The students familiarise themselves with research conducted on tropical forestry at VITRI and present their own research work. Students strengthen their ability to prepare and present a scientific report.

Contents: Participants present their own research for M.Sc. / Ph.D. thesis. Students who have completed their data collection for a M.Sc. thesis are particularly urged to participate, but doctoral and other students are also welcome.

Realisation and working methods: Lectures 14, practical work 0, group work 0, independent study 66 hours.

Evaluation: Presentation of the report and participation to 80 % of the seminar sessions. Those who give a presentation in ME 456 do not need to repeat it in ME 404 (Pro Gradu seminar) coordinated by Prof. Annikki Mäkelä. Attendance in the other programme of ME 404 is, however, strongly recommended.

### **Participatory methods in sustainable management of natural resources (ME457) 5 credits 83633**

Timing: M.Sc. studies, (4th year), I period.

Responsible person: University lecturer Kaarakka

Relations to other study units: Prerequisites: ME 350, ME 351 or corresponding knowledge

Objective: Students are familiarised with participatory methods and their applications in sustainable management of forests and other natural resources in developing and developed countries.

Contents: Lectures on participation, participatory methods and approaches, stakeholder analysis, community-based management of natural resources, conflicts and conflict management. Examples and case studies of developed and developing countries are also presented. Group works on selected tasks. Field visits in the Helsinki metropolitan area on public and/or private forest management and community-based natural resources management.

Realisation and working methods: Lectures 28, practical work 20 h, group work 20 h, independent study 65 hours.

Evaluation: Group work, participation in field visits and exam. Exam, in Finnish, Swedish or English is taken after the last lecture or by agreement with Dr. Kaarakka.

### **Tropical Silviculture, advanced literature (ME458) 5 credits 830063**

Timing: M.Sc. studies, 4th or 5th year      Responsible person: Prof. Luukkanen

Objective: The student gets acquainted with a special topic/topics in tropical ecology, silviculture, agroforestry or land use.

Realisation and working methods: Independent study.

## Forest Pathology

### **Epidemiology and ecology of plant pathogens (KPAT401/ME460) 5 credits 81331**

Timing: M.Sc. studies. Autumn term, period I

Responsible person: Risto Kasanen

Relations to other study units: ME204, MPAT1, MPAT4

Objective: To understand the factors and processes behind plant disease epidemics in forest and agricultural ecosystems.

Contents: Basic epidemiology and examples. The biological background for epidemics, risk assessment, epidemiological mechanisms, modelling.

Realisation and working methods: Lectures 30, practical work 10, independent study 70 hours.

Evaluation: Examination

Other information: Previously MPAT31. The course will be given in odd-numbered years.

### **Bacteria, viruses and diagnostics of pathogens (ME461) 5 credits 81334**

Timing: M.Sc. studies

Responsible person: Risto Kasanen

Contents: Information on the identification, biology, spread and control of bacteria and viruses causing plant diseases. See also description for KPAT403.

Other information: This course is integrated from courses MPAT51 and MPAT52. Teaching in Finnish or in English.

### **Tropical forest pathology (ME462) 3 credits 81432**

Timing: M.Sc. studies. This course is given only if sufficient demand.

Responsible person: Risto Kasanen

Relations to other study units: ME260-ME461 (MPAT1-MPAT52)

Contents: Forest, agroforestry and nursery pathology in subtropical and tropical regions. Aspects of legislation and quarantine regulations in tropical forest protection.

Realisation and working methods: Lectures 18, practical work 8, independent study 54 hours.

Evaluation: Examination 90 % and project report.

Other information: Previously MPAT24.

### **Literature (ME466) 5 credits 81412**

Timing: M.Sc.

Responsible person: Risto Kasanen

Relations to other study units: ME260-ME463 (MPAT1- MPAT6)

Contents: An exam review and exam based on selected literature related to forest pathology.

Realisation and working methods: Lectures 0, practical work 0, group work 0, independent study 133.

Evaluation: Examination

Other information: Previously MPAT11. In English or in Finnish.

### **Plant-microbe interactions and molecular defence of plants (ME560) 10 credits 81332**

Timing: M.Sc. studies. II period

Responsible person: Prof. Risto Kasanen

Relations to other study units: ME206, ME361, ME460, ME463

Objective: To understand interactions between plants and their pathogens and symbionts at the molecular level.

Contents: The biology of pathogen infections, plant defence responses and symbiotic interactions at the molecular level. The course includes laboratory work sessions.

Realisation and working methods: Lectures 30, practical work 80, independent study 90 hours.

Study materials and literature: Will be given during the course.

Evaluation: Examination

Other information: Previously MPAT301. See course home page at <http://www.mm.helsinki.fi/mmsbl/Kpat/cppe/>

## Forest Zoology

### **Forest Protection and Wildlife Management (ME475) 5 credits 830062**

Timing: Master's Degree Programme studies, 1st-2nd year. The course is given in spring term, IV period.

Responsible person: Professor Heliövaara

Objective: To equip the student with a basic understanding of the various aspects of forest protection and wildlife in the boreal forest zone.

Contents: Forest protection and wildlife, basic forest pathology, basic forest zoology, basic game management, current national and international themes. Special emphasis on boreal forest ecosystems.

Realisation and working methods: Includes lectures, literature and a field trip.

Study materials and literature: Literature handed out during the course.

Evaluation: Examination

Other information: Teaching in English. The course is specifically intended for international students interested in the topic. It can also be incorporated into the degree of students in the Master's Degree Programme in Forest Sciences and Business. This course cannot be substituted for forest zoology and pathology lectures/ field exercises arranged within the courses ME101/ME105.

## DEPARTMENT OF FOREST ECONOMICS

### **Advanced Forest Economics (FEC210) 4 credits 837015**

Timing: Autumn term, period I.

Responsible person: Docent Jussi Uusivuori

Relations to other study units: Prerequisites: YE19, Y55, Y56; for students majoring in forest economics, FEC110 and FEC120 or corresponding courses.

Objective: The student becomes familiar with formal problem formulation in forest economics and understands the connection between the assumptions and the structure of a theoretical economic model and the derived theoretical results and hypotheses for empirical testing.

Contents: The rotation model for evenaged stands, age class models and the Fisherian Consumption savings model with biomass harvesting. In situ value of forest.

Realisation and working methods: Contact teaching 14, practical work 8, group work 0, independent study 85 hours

Study materials and literature: Provided in the lectures

Evaluation: Exam and assignments.

### **Economics of the Timber Industry (FECM220) 5 credits 83717**

Timing: Spring term, period IV. Offered every other year starting in 2007.

Responsible person: Professor Lauri Valsta

Relations to other study units: Prerequisites: Y75 and Y145 or corresponding courses.

Objective: The student learns managerial approaches to problems in the timber industry.

Contents: Managerial accounting and finance, investments in the timber industry, technological development.

Realisation and working methods: Lectures 20, practical work 10, group work 0, independent study 103 hours

Study materials and literature:

- Diesen, M. 1998. Economics of the Pulp and Paper Industry.
- Horngren, C. T., Bhimani, A., Datar, S. M. and Foster, G. 2002. Management and Cost Accounting. 2nd ed. Prentice Hall Europe.

Evaluation: Assignments.

### **Special Topics in Forest Economics and Management (FECM260) 37 credits 83726**

Timing: To be announced.

Responsible person: Professor Lauri Valsta

Contents: Current issues in forest economics and management to complement the student's previous studies.

Other information: Reading and conference based on an individual plan.

### **Literature (FECM270) 5 credits 83719**

Responsible person: Professor Lauri Valsta

Objective: The student will gain an in-depth understanding of the theories and problems in forest economics and management.

Contents: Literature exam (5 cr.), usually in 2 parts. Books and schedule to be agreed upon with Professor Valsta.

Realisation and working methods: Lectures 0, practical work 0, group work 0, independent study 133 hours

Study materials and literature: By agreement

Evaluation: Final exam

### **Econometrics II (FECP210) 6 credits 83041**

Timing: Autumn term, period II.

Responsible person: Professor Jari Kuuluvainen and Docent Anne Toppinen

Relations to other study units: Prerequisites: MAL 15 or corresponding course

Objective: To familiarise the student with the basic methods of econometrics in forest and agricultural economics and in valuing nonmarket benefits.

Contents: Ordinary Least Squares. A focus on cross-section and panel data econometrics in 2006. A focus on time series econometrics in 2007.

Realisation and working methods: Lectures 14, practical work 14, group work 0, independent study 132 hours

Study materials and literature:

- Pindyck, R.S. and Rubinfeld, D.L. 1997. Econometric Models & Economic Forecasts. McGrawHill cop.
- Other material provided in the lectures.

Evaluation: Exercises (20%) and final exam (80%).

### **Introduction to Methods of Social Sciences (FECP220) 6 credits 83042**

Timing: Autumn term.

Responsible person: Alvar (Sami) Berghäll

Relations to other study units: Prerequisites: Y130

Objective: The course aims to provide a comprehensive basic understanding of how modern quantitative social research is carried out and applied to forest economics.

Contents: The course begins with a course exam on the literature. Enrolees who pass this examination will do group work in pairs, and practice in carrying out a survey research project using a learning-by-doing approach. The work starts with discussion and preparation of a theoretical frame of reference and a research plan on a given case based on real data as well as familiarisation with the statistical analysis program SPSS. After the lectures each group prepares a research report (a miniature Master's thesis) under the personal guidance of the instructor, who also provides the topic and the data. (Those already having a M.Sc. thesis topic can work with their topic and related data.) The reports should be completed by the mid October. The course ends in October with two seminar sessions. In these researcher colloquiums, each group presents the work it has done in the style of a researcher reporting her/his results to a scientific congress (attendance obligatory).

Realisation and working methods: Lectures 18, practical work 82, group work 40, independent study 20 hours

Study materials and literature: Bailey, K. D. 1987 or newer edition. Methods of social research, excluding part 3 (pp. 217-336). New York Free Press.

Evaluation: Pass/fail, based on the examination of literature, SPSS skills assessment and an approved case report.

Other information: In connection with FPM26. This version of the course is for FEC majors.

The course utilises WebCT as a virtual working environment.

### **Forest Policy Analysis (FECP230) 6 credits 83043**

Timing: Spring term.

Responsible person: Professor Jari Kuuluvainen and University Lecturer Mika Rekola

Relations to other study units: Prerequisites: FEC120 or corresponding course; students majoring in forest economics FECP210 or FECP220.

Objective: To give students the tools for forest policy analysis.

Contents: Economic foundations of forest policy, private and social preferences, externalities and market failures; evaluating the effectiveness of forest policy; forest legislation; forest taxation and subsidies; timber supply and nonindustrial forest owner behaviour. Theoretical models and their connection to the empirical analysis in forest economics and forest policy.

Realisation and working methods: Lectures 42, practical work 0, group work 10, independent study 108 hours

Study materials and literature: Provided in the lectures.

Evaluation: Exercises and essays.

Other information: Lectures include written assignments and presentations on the course material.

### **International Forest Policy (FECP240) 3 credits 83048**

Timing: To be announced.

Responsible person: To be announced.

Objective: To familiarise the students with international forest policy.

Contents: International conventions related to forestry: UNFF, MCPFE, UNFCCC, UNCCD, CBD. Themes will include good governance practices and forest certification.

Evaluation: Exam and assignments.

### **Literature (FEC270) 5 credits 83044**

Responsible person: Professor Jari Kuuluvainen

Objective: To familiarise the student with the theories and practices of forest economics in conjunction with forest and environmental policy.

Contents: Literature exam. Literature for the final exam must be agreed upon with Professor Kuuluvainen.

Realisation and working methods: Lectures 0, practical work 0, group work 0, independent study 80

Study materials and literature: The exam is based either on materials for environmental and resource economics:

- Baumol, W. J. and Oates, W. E. 1988. The theory of environmental policy. Cambridge University Press; The Dorsey Press, pp. 319371.
  - Bromley, D. W. 1991. Environment and Economy. Property Rights and Public Policy.
  - Lesser, J. A., Dodds, D. E. and Zerbe Jr, R. O. 1997. Environmental Economics and Policy. AddisonWesley, Oxford Blackwell. or on materials for forest policy:
  - Cubbage, F. W., O'Laughlin, J. and Bullock III, C. S. 1993. Forest Resource Policy. John Wiley & Sons, Inc. Chapters 111 and 17.
  - Verdung, E. 1997. Public Policy and Program Evaluation. Transaction Publishers.
  - Ollonqvist, P. 1998. Metsäpolitiikka ja sen tekijät: pitkä linja 19281997.
  - Wilson, B., Van Gooten, G. C., Vertinsky, I. and Arthur, L. (eds.). 1999. Forest Policy. International Case Studies. CABI Publishing.
- Evaluation: Exam.

### **Private Forestry and Forest Policy (FEC271) 3 credits 83039**

Timing: Spring term, period III.

Responsible person: Professor Heimo Karppinen

Objective: Familiarisation with the characteristics of private forestry and related forest policy in Finland. In addition, a survey of private forestry in other industrialised countries is provided.

Contents: A profile of private forest owner in Finland, private forestry in industrialized countries (group work), social sustainability in private forestry, forest management behavior, timber supply behavior, forest policy measures.

Realisation and working methods: Lectures 18, practical work 0, group work 18, independent study 45 hours

Study materials and literature: Provided in the lectures

Evaluation: Exam (80 %) and group work (20%)

Other information: Students are asked to sign up at WebOodi. This course is optional to literature exam FEC270.

### **Marketing Planning and Research (Survey Research) (FPM26) 6 credits 84052**

Timing: Autumn term. In 1st year of Master's degree studies. Period 1 only!!!!

Responsible person: Alvar (Sami) Berghäll

Relations to other study units: Prerequisites: Y130, FPM8 and FPM25 lectures

Objective: The course aims to provide a comprehensive basic understanding of how modern quantitative marketing research and social research is conducted and how the results of this research are applied in solving Forest Products Marketing (FPM) research problems.

Contents: The course begins with a course exam on the literature. Enrolees who pass this examination will do group work in pairs, and practice in carrying out a research project using a learning-by-doing approach. The work starts with discussion and preparation of a theoretical frame of reference and a research plan. Either ready data is used or the course prepares the data. The course participants learn the key questions facing the researcher in preparing, using and reporting scientific data based on a field survey (qualitative or quantitative). Each group prepares a research report (a miniature Master's thesis) under the personal guidance of the instructor. (Those already having a M.Sc. thesis topic can work with their topic and related data.) The reports should be completed by the mid October. The course ends in October with two seminar sessions. In these researcher colloquiums, each group presents the work it has done in the style of a researcher reporting her/his results to a scientific congress (attendance obligatory).

Realisation and working methods: Lectures 18, practical work 82, group work 40, independent study 20 hours

Study materials and literature: Juslin H and Lindström, T. The Planning and Implementation of Marketing Research. (Available at the office.)

Evaluation: Pass/fail based on the examination of literature, SPSS skills assessment and approved case report.

Other information: In connection with FEC220. This version of the course is for the FPM majors.

The course utilises WebCT as a virtual working environment.

**Advanced Literature (FPM27) 6 credits 84054**

Responsible person: Professor Heikki Juslin

Relations to other study units: Prerequisites: FPM25

Objective: Forming a comprehensive picture of marketing theory and science.

Contents: Exam on literature.

Realisation and working methods: Lectures 0, practical work 0, group work 0, independent study 160 hours

Study materials and literature:

- Kotler, P. 2003. Marketing Management. 11th edition. Chapters 113 and 22. Prentice Hall International Inc. (or corresponding chapters in the Millenium edition).
- Juslin, H. and Hansen, E. 2002 or 2003. Strategic Marketing in the Global Forest Industries. Chapters 1, 2, 4, 5, 6, and 8. Authors Academic Press.
- FPM27 Article collection

Evaluation: Exam on literature.

**Marketing of Roundwood and Forestry Services (FPM3) 5 credits 84028**

Timing: Spring term, period III. Recommended to be taken in the 1st year of Master studies.

Responsible person: Professor Mikko Tervo

Relations to other study units: Recommended courses to be taken before FPM3: FPM7 and FPM8

Objective: Learning the basic principles of the marketing of services in forestry

Contents: Principles of services marketing, customer satisfaction research and customer relationships management are introduced in the context of forest sector. Theoretical concepts, survey measures, and analytical tools are applied to business transactions in the forestry market. Lectures and independent reading are supported with exercises. Each student produces a portfolio of essays on marketing theory and elements for a customer satisfaction survey.

Realisation and working methods: Lectures 30, practical work 40, group work 0, independent study 50 hours.

Study materials and literature:

- Zeithaml, V.A., Bitner, M.J. 1996. Services Marketing. 700 p. (selected parts)
- Dutka, A. 1995. AMA Handbook for Customer Satisfaction. 231 p. (selected parts)
- Anton, J. 1996. Customer Relationships Management. 183 p. (selected parts)
- Selection of articles.

Evaluation: Portfolio of essays and exercises.

**Structures and Functions of Forest Products Marketing (FPM7) 9 credits 84050**

Timing: Spring term, III period. Recommended to be taken in the 2nd year of studies.

Responsible person: Professor Heikki Juslin

Relations to other study units: Prerequisites: FPM1 lectures

Objective: Understanding and application of FPM in theory and practice.

Contents: In connection with the comprehensive marketing planning, students are familiarised with forest products marketing channels and functions. The planning of marketing channels and functions is connected with marketing strategy. The study of this subject matter is based both on theoretical models and practical applications. Exercises are given.

Realisation and working methods: Lectures 30, practical work 0, group work 40, independent study 170 hours

Study materials and literature:

- Kotler, P. 2003. Marketing Management. 11th edition. Chapters 1421. Prentice Hall International Inc. (or corresponding chapters in the Millenium edition).
- Juslin, H. and Hansen, E. Strategic Marketing in the Global Forest Industries. 2002 or 2003. Chapters 3, 6.4, and 7. Authors Academic Press.
- FPM7 Article collection.

Evaluation: Exam on lectures and exercise 30%, final exam 70%.

**Introduction to Studies in Forest Sciences and Business (FOR520) 3 credits 837025**

Timing: Master's Degree Programme studies, 1st year. 1st period, annually.

Responsible person: Meeri Pearson

Relations to other study units: An introductory course to studies in the Master's Degree Programme in Forest Sciences and Business. Compulsory for students of the Programme.

Objective: To familiarize students with studies in the Master's Programme and the organizing departments. To give students a general understanding of the ecological, economical, social and cultural aspects of present-day forestry in Finland.

Contents: Students are introduced to studies in their major subject and other study-related matters (student counseling, personal study plan, etc.). Lectures and a 3day field trip covering topics related to the Finnish forestry sector, i.e. forest industry, boreal forest ecology, peatland utilization and restoration, forest ownership, nature conservation, family forestry, forest-related culture.

Realisation and working methods: Lectures 45, group work 10, independent study 25 hours

Study materials and literature: Handouts

Evaluation: Participation, field trip report, course feedback

Other information: Teaching in English.

### **Master's Thesis Seminar (FOR530) 5 credits 837026**

Timing: Master's Degree Programme studies, Part 1: 1st year, periods IIIIV, Part 2: 2nd year, periods III

Responsible person: University lecturer Mike Starr (and Master's Programme student adviser)

Objective: The seminar prepares students for making their Master's thesis and guides them through the process.

Contents: The course consists of two parts: 1) Planning and organizing the study: introductory lectures and preparation of individual research plans, 2) Preparing the oral report: oral presentations by students of the material, methods and results of the study. When the thesis is completed the results are presented in the seminar. The first part should be taken before, and the second part following the collection of research data.

Realisation and working methods: Lectures 60, group work 10, independent study 60

Evaluation: Presentation of research plan and results, active participation in the seminar.

Other information: Teaching in English.

## **DEPARTMENT OF FOREST RESOURCE MANAGEMENT**

### **Essays (MMVAR21) 3 credits 87421**

Timing: Master's studies, 1st/2nd year. Detailed timetable will be agreed separately with the professor.

Responsible person: Prof. Annika Kangas (MSUU), prof. (mvs) Markus Holopainen (MINV), prof. Esko Mikkonen (METEK), prof. Marketta Sipi (PTEK)

Objective: To practise skills in writing and in making oral presentations

Contents: Writing of reports and creation of PowerPoint or corresponding presentations

Realisation and working methods: Independent study 80h

Study materials and literature: Agreed with the professor

Evaluation: Topics and contents approved in advance by the professor. Evaluation of spelling of one essay by an English teacher of the university.

### **Project planning and management (MMVAR31) 5 credits 87431**

Timing: Spring term, III period

Responsible person: Prof. Esko Mikkonen

Relations to other study units: Prerequisite: B.Sc. level

Objective: Understanding the project as a tool; project planning and management; tools for project work.

Contents: The project as a management tool; project planning and scheduling; data collection and management.

Realisation and working methods: Lectures 16 h, Practical work 4 h, Group work 40 h,

Independent study 20 h

Study materials and literature: Given in lectures.

Evaluation: Approved report

### **Research Workshop (MMVAR32) 5 credits 87432**

Timing: I-IV periods

Responsible person: Lecturer Hannu Rita, University Lecturer Juha Rikala, teachers in other specialisation lines of the department.

Objective: To increase the student's ability to evaluate articles from different points of view in order to support the preparation of the Master's thesis.

Contents: Evaluation of scientific articles: theoretical background, hypotheses, objectives, statistical methods, results, discussions

Realisation and working methods: Lectures 16 h, Group work 60 h, Independent study 60 h

Study materials and literature: Given in lectures

Evaluation: Active participation in meetings and presentations

Other information: A detailed schedule will be given later.

### **Master's thesis (MMVAR33) 40 credits 87433**

Timing: Master's studies 1st/2nd year

Responsible person: Prof. Annika Kangas (MARV), Prof. (mvs) Markus Holopainen (MINV), Prof. Esko Mikkonen (METEK), Prof. Marketta Sipi (PTEK)

Objective: To practise a student in scientific research work and reporting of results in his/hers specific research field

Contents: Collecting, processing and analysing of data

Realisation and working methods: Independent study 1080 h

Evaluation: Accepted thesis

**Special practical training (MMVAR35) 3 credits 87435**

Timing: Master's studies 1st/2nd year (or outside academic years)

Responsible person: Prof. Annika Kangas (MSUU/MINV), MMM Kalle Ylisirniö (METEK),  
University Lecturer Juha Rikala (PTEK)

Objective: To familiarize the student with scientific research work in a research institute, university, or forest industry.

Contents: Working in a study project, writing of training report

Realisation and working methods: Independent study 80 h

Evaluation: Approved training report with the working reference. Instructions from the department.

Other information: Advance approval of the training is required.

**Personal Study Plan (M.Sc.) (MMVAR36) 1 credit 87436**

Timing: At the beginning of advanced studies

Responsible person: Prof. Annika Kangas (MSUU), prof. (mvs) Markus Holopainen (MINV), university lecturer Juha Rikala (PTEK), MMM Kalle Ylisirniö (METEK)

Contents: Personal study plan of advanced studies

Evaluation: Accepted personal study plan

**Basic Course in Programming (MMVAR37) 3 credits 87437**

Timing: Period III

Responsible person: MMM Jussi Rasinmäki, MMM Antti Mäkinen

Objective: To give students basic abilities to solve data processing problems computationally.

Contents: The students will first learn the basics of programming and then apply those skills to solve problems commonly met when dealing with research material. Python programming language will be used during the course.

Realisation and working methods: Lectures 10 h, Practical work 40 h, Independent study 30 h

Study materials and literature: The course material will be available on the web pages of the course.

Evaluation: Based on the course exercises.

Other information: Details of the course will be available later.

**Personal Study Plan (B.Sc.) (MMVAR16) 2 credits 87416**

Timing: First and second autumn

Contents: Preparation of a personal study plan for the Bachelor's degree

**Literature (B.Sc.) (MMVAR22) 3 credits 87422**

Timing: 3rd academic year.

Contents: Study on readings for Bachelor's thesis

**Bachelor's thesis (MMVAR23) 6 credits 87423**

Timing: 3rd academic year

Contents: Brief research report based on primary or secondary data

**Bachelor's seminar (MMVAR24) 3 credits 87424**

Timing: Periods III/IV.

Contents: Academic writing, fluent writing and speaking, acting as an opponent, evaluation of papers and critical thinking

**Practical training (MMVAR25) 23 credits 87425**

Timing: 2nd or 3rd academic year (or outside academic years)

Contents: Practical training

**Master's Seminar (MMVAR34) 3 credits 87434**

Contents: Theoretical background of the research, selection of scientific methods.

**Licentiate and Doctoral Literature (MMVAR42) 10 credits 87442**

Timing: Whole academic year

Contents: Literature

**Licentiate and Doctoral Seminar (MMVAR44) 3 credits 87444**

Timing: to be arranged individually

Contents: Theoretical backgrounds of study, selection of scientific methods

## Wood Technology

### **Current Topics in Wood Technology (PTEK41) 3 credits 83994**

Timing: Spring term, III period.

Responsible person: University Lecturer Juha Rikala, visiting lecturers

Objective: To deepen a student's knowledge in the topical questions of wood technology

Contents: Expert presentations, writing a report of a topical question of wood technology

Realisation and working methods: Lectures 10 h, Practical work 2 h, Independent study 68 h

Study materials and literature: Material given in lectures

Evaluation: Participation in lectures and passed report on a given topic

Other information: Detailed schedule will be given later.

### **Literature Examination (M.Sc.) in Wood Technology (PTEK7) 6 credits 83907**

Timing: II/IV period

Responsible person: Prof. Marketta Sipi

Relations to other study units: MMVAR34

Objective: To deepen a student's knowledge in a topic in wood technology

Contents: Advanced readings in wood technology

Realisation and working methods: Independent study 160 h

Study materials and literature: Agreed separately with the professor

Evaluation: Essays on topics provided by the professor and/or literature exam

## Forest Technology

### **The Environmental Effects of Wood Utilization, Wood Procurement and Silvicultural Practices (METEK16) 3 credits 83838**

Timing: Spring term, IV period

Responsible person: Professor Esko Mikkonen

Objective: To give students an overall picture of modern forest technology operations and their harmful impacts on the environment.

Contents: The course will use the PBL approach to determine how to prevent or ameliorate harmful impacts on the environment.

Realisation and working methods: Lectures 14 h, Practical work 40 h, Independent study 26 h

Evaluation: Examination

Other information: Lectures are held in English if needed.

### **Operations Research in Wood Procurement (METEK36) 8 credits 83826**

Timing: Intensive periods of instruction in spring or autumn

Responsible person: Professor Esko Mikkonen MMM Kalle Ylisirniö

Relations to other study units: Y100/Y101, Y115, METEK23, LME4, Elementary

Operations Research classes, intermediate level studies in forest technology.

Objective: To give a student a broad overview of operations research methods and their applicability in wood procurement.

Contents: Operations research modelling

Realisation and working methods: Lectures 56 h, Independent study 160 h

Study materials and literature: Given pages from:

· Dykstra, D.P. 1984. Mathematical Programming for Natural Resource Management. New York.

· Lokki, O. Matemaattinen ohjelmointi III. OtaData. Espoo.

· Mikkonen, E. 1983. Eräiden matemaattisen ohjelmoinnin menetelmien käyttö puun korjuun ja kuljetuksen sekä tehdaskäsittelyn menetelmävalinnan apuvälineenä. Acta For. Fenn. 183.

· Taylor, B.W. 1990. Introduction of Management Science. Allyn and Bacon, Shimon & Shuster.

· Sikanen, L. Oinas, S. ja Harstela, P. (toim.) 1998. Operaatioanalyysimenetelmät ja puunhankinnan sovellukset. Joensuun yliopisto, metsätieteellinen tiedekunta.

Tiedonantoja No. 83. QSB+. 1991. ORsovellutusohjelmisto.

· Material and handouts given in the class.

Evaluation: 50 % exam, 50 % exercises

Other information: Lectures are held in English if needed.

### **Literature Examination (M.Sc.) in Forest Technology (METEK38) 6 credits 83812**

Timing: Whole year

Responsible person: Professor Esko Mikkonen

Relations to other study units: Clevel courses.

Objective: To give the student a more detailed understanding of the methods and technologies applied in forest technology.

Contents: Set readings

Realisation and working methods: Independent study 200 h

Evaluation: Examination

### **International Field Trip (METEK40) 2 credits 83830**

Timing: Spring term, depending on the number of participants. Offered in even-numbered years.

Objective: Introduction to foreign land forest sectors

Contents: Scheduled travelling

Study materials and literature: Given during the course

### **Current topics in forest technology (METEK41) 3 credits 83832**

Timing: Spring term, depending on the number of participants

Responsible person: N.N.

Objective: An introduction to current topics

Contents: Lectures and presentations on current topics.

Study materials and literature: Given during course

Other information: Lectures are held in English.

## **Forest Planning**

### **Literature Examination (M.Sc.) in Forest Planning (MSUU11) 6 credits 83423**

Timing: Preferably in the fifth spring

Responsible person: Professor Annika Kangas

Objective: To deepen the knowledge from the own subject area.

Contents: Literature

Realisation and working methods: Independent study 160 h

Study materials and literature: Examination of three of these books.

1. Assman, E. 1970. The principles of forest yield study. Pergamon press. Sivut 39245, 287330.

2. Pukkala, T. (Ed.). 2002. Multiobjective forest planning. Managing Forest Ecosystems Vol 5. Kluwer Academic Publishers. Dordrecht. 207 s.

3. Schmoldt, D., Kangas, J., Mendoza, G.A. and Pesonen, M. (Eds.). 2001. The Analytic Hierarchy Process in Natural Resource and Environmental Decision Making. Kluwer Academic Publishers, Managing Forest Ecosystems 3. 305 s.

4. Vanclay, J. 1994. Modelling forest growth and yield: applications to mixed tropical forests. CAB International, Oxford.

5. von Gadow, K. 2001 (Ed.) . Risk analysis in forest management. Kluwer Academic Publishers, Managing Forest Ecosystems 2. 241 s.

6. Malczewski, J. 1999. GIS and Multicriteria decision analysis. Wiley. 392 s.

Evaluation: Examination.

## **Forest Inventory**

### **Literature Examination (M.Sc.) in Forest Inventory (MINV11) 6 credits 83422**

Timing: Preferably in the fifth spring

Responsible person: prof. (mvs) Markus Holopainen

Objective: To deepen the knowledge from the own subject area.

Contents: Literature

Realisation and working methods: Independent study 160 h

Study materials and literature: Two books about the inventory methods / applications and one book about remote sensing / GIS systems:

Inventory methods and applications

1. Ringvall, A. 2000. Assessment of sparse populations in forest inventory. Development and evaluation of probability sampling methods. Acta Universitatis Agriculturae Sueciae Silvestria 151. 133.

2. Shiver, B.D. & Borders, B.E. 1996. Sampling techniques for forest resources inventory. 356 p. (if the student has not examined the book earlier in B.Sc. level literature)

3. Vanclay, J.K. 1998. Towards more rigorous assessment of biodiversity. Pages 211-232. In: Bachmann, P., Köhl, M. & Päivinen, R. Assessment of biodiversity for improved forest planning. EFI proceedings no. 18.
  4. Kangas, A. & Maltamo, M. (editors) 2006. Forest Inventory – Methodology and Applications. Springer Science & Business Media, Dordrecht. 362 pp.
- Remote sensing and GIS
1. Fotheringham, S. & Wegener, M. 2000. Spatial Models and GIS. Taylor & Francis. 279 pp.
  2. Malczewski, J. 1999. GIS and Multicriteria decision analysis. Wiley. 392 pp.
  3. Riitters, K.H., O'Neill R.V., Hunsaker C.T., Wickham J.D., Yankee D.H., Timmins S.P., Jones K.B., and Jackson B.L.. 1995. A factor analysis of landscape pattern and structure metrics. Landscape Ecology 10:2339.
  4. Mather, P. 1999. Computer Processing of Remotely Sensed Images: An Introduction. Wiley. 292 pp.
  5. Franklin, S.T. 2001. Remote sensing for sustainable forest management. CRC Press. 407 pp.
- Evaluation: Examination.

## Forest Mensuration and Management

### MultiAttribute Forest Planning (MARV5/1) 6 credits 83465

Timing: Autumn term, period II.

Responsible person: Professor Annika Kangas

Relations to other study units: MARV2

Objective: To familiarize students with theories of multicriteria decision making and decision support systems. In addition, the course deals with forestry applications such as participatory planning and landscape-ecological planning.

Contents: Utility theory, social choice theory, image theory, prospect theory, AHP, outranking, participation, group decision making, landscape-ecological planning.

Realisation and working methods: Lectures 24 h, Independent study 140 h

Evaluation: Examination

### Decision Support System (MARV5/2) 3 credits 83466

Timing: Spring term

Responsible person: Professor Annika Kangas

Relations to other study units: MARV5/1

Objective: To familiarize students with multi-attribute forest planning in practise.

Contents: To collect information and prepare a recommendation to solve a real planning problem.

Realisation and working methods: Lectures 10 h, Group work 100 h

Evaluation: Accepted report.

## Geoinformatics

### Desktop GIS (GIS1) 2 credits 83446

Timing: Autumn term, I period.

Responsible person: Timo Tokola

Objective: Introduction to basic use of simple GIS system

Contents: This is elementary course of GIS. Following issues are covered during the course digitizing, coordinate transformations, spatial queries, visualization and data transfer. Lectures are replaced with literature and exercises are also introduced in English.

Realisation and working methods: Lectures 10 h, Practical work 20 h, Independent study 20 h

Evaluation: Quality of practical work will be evaluated. No exams.

Other information: This course uses e-learning materials and can be completed at any time using the Webct learning environment and self-registration.

Exercises are also introduced in English. Details and current course information can be obtained at

<http://www.mm.helsinki.fi/gis/>

### **Use of GPS in Agriculture and Forestry (GIS2) 3 credits 83449**

Timing: Autumn term, I period

Responsible person: Timo Tokola

Objective: Introduction to the use of GPS and attribute data collection

Contents: This course is a basic introduction to the use of GPS. Topics include coordinate systems, principles of GPS, GPS equipment, agricultural applications and forestry applications.

Realisation and working methods: Lectures 12 h, Practical work 20 h, Group work 20 h,

Independent study 20 h

Evaluation: Writing essay, exercises 50 % and final exam 50%.

Other information: Lectures are replaced with literature and exercises are also introduced in English. Details and actual course information can be checked from internet

<http://www.mm.helsinki.fi/gis/>

### **Principles of GIS (GIS4) 4 credits 83439**

Timing: Spring term, III and IV periods. This course uses e-learning materials and can be completed at any time using the Webct learning environment and self-registration.

Responsible person: Prof. N.N.

Objective: The purpose of this course is to teach principles of geoinformatics. After completing the course successfully, students will be able to solve spatial problems using the GIS system.

Contents: This is basic elementary course of GIS. Following issues are covered during the course Gis datamodels, Formats, Topology, Geometry, Vector Analysis, Interpolation, Raster Analysis, GIS systems and software, and Application development.

Realisation and working methods: Lectures 24 h, Practical work 72 h, Group work 5 h,

Independent study 10 h

Evaluation: Preliminary test (pass), exercises (50 %) and final exam (50%).

Other information: The course begins with a preliminary exam. Lectures are replaced with literature and exercises are also introduced in English. Details and current course information can be obtained from the internet

<http://www.mm.helsinki.fi/gis/>

### **GIS in Logistics and Business (GIS13) 5 credits 83450**

Timing: Autumn term. Offered in even-numbered years.

Responsible person: Prof. Bo Dahlin

Relations to other study units: GIS4

Objective: Course will introduce business GIS methods and applications.

Contents: This business-oriented GIS course introduces the basics of logistical and business analysis applications in a GIS environment. ArcGIS software will be used during exercises and a relatively extensive project will be finished during the study period.

Realisation and working methods: Lectures 20 h, Practical work 30 h, Group work 10 Independent study 50 h

Evaluation: Course will be rated using exam (40 %), exercises (30 %) and practical work (30 %).

Other information: Details and actual course information can be checked from internet

<http://www.mm.helsinki.fi/gis/>

### **Environmental GIS (GIS14) 5 credits 83454**

Timing: Spring term. Offered in odd-numbered years.

Responsible person: prof. N.N.

Relations to other study units: GIS4

Objective: The aim of course is to demonstrate environmental GIS analysis and GISproject implementation.

Contents: The course concentrates on GIS applications of the environmental sciences

Realisation and working methods: Lectures 20 h, Practical work 30 h, Group work 10 h,

Independent study 70 h

Evaluation: Final grades are determined according to quality of reports on the practical work (30%) and the final exam (70%).

Other information: Details and actual course information can be obtained from the internet

<http://www.mm.helsinki.fi/gis/>

### **Application Development and Applied WebGIS (GIS15) 5 credits 83455**

Timing: Spring term. Offered in odd-numbered years.

Responsible person: Prof. N.N., M.Sc. Jussi Rasinmäki

Relations to other study units: GIS4

Objective: The aim of course is to learn GIS software and application development project implementation.

Contents: The course concentrates on GIS applications for the sustainable use of natural resources, taking the special features of nature in planning and resource mapping into account. Special emphasis on the use UML in database design, use of database with SQL language and GIS software development in a WebGIS environment.

Realisation and working methods: Lectures 10 h, Practical work 40 h, Independent study 80 h

Evaluation: Final grades are determined according to quality of reports on practical work (100%).

Other information: Details and actual course information can be checked from internet

<http://www.mm.helsinki.fi/gis/>

## **Logistics**

### **Basics in Logistics (LOG1) 3 credits 84201**

Timing: Autumn term, II period

Responsible person: Prof. Bo Dahlin

Objective: To give students an overall view of the modern logistics, its technological solutions and methodology to solve the problems in transporting goods.

Contents: Transportation solutions for collection and distribution of basic products such as wood, chips, grain etc.

Introduction to methods of steering and management of logistics.

Study materials and literature: Given during course

Evaluation: Examination