General remarks for the use of the module handbook

Study Programme Forest Information Technology (M.Sc.)

Curriculum effective from WS 2009/10

The present module description for the International Master Study Programme Forest Information Technology (M.Sc.) at the Faculty of Forest and Environment of the University of Applied Sciences Eberswalde (UASE) in Germany and the Faculty of Forestry of the Warsaw University of Life Sciences (WULS) in Poland contains apart from the specification of the teaching and examination form, also information about content, learning objectives and structure of the offered modules and module components.

The module handbook especially facilitates the selection of elective modules, the preparation for individual courses, as well as the goal orientated planning of the whole study process. Information about entry requirements as well as recommended related elective modules and references should facilitate planning and implementation. The following goals matrix indicates the mandatory and elective modules that are contributing to the overall learning objectives. The goals matrix hereby provides a decision support for the selection of elective modules. Furthermore it shows knowledge, skills and competences, that are required to reach the overall learning objectives and that will be enhanced by the selection of relevant modules.

The following considerations and rules apply for the selection of elective modules:

Each elective module can only be selected once. Elective modules of higher semesters can be preselected or elective modules of lower semesters can be selected later on, if possible from an organisational point of view. It is recommended to follow the sequence of the elective modules indicated by the curriculum because it represents the ideal and consecutive structure of the study programme and therefore the best preparation for following modules.

The elective module „specialisation module" (I, II, III & IV)" does not contain a specific topic, but represents an option to freely select, according to the personal interest of the student, modules of other study programmes at the University of Applied Sciences Eberswalde or other Universities. The head of the study programme can use the „specialisation module" to offer a module dealing with upcoming IT trends. The head of the study programme approves the "specialisation module", if it complies with the goals of the study programme and personal study and job perspectives of the student.

If the number of applicants for elective modules exceeds the number of available places, the places are given by lot, but priority is given to students from the semesters, where the module is firstly offered. 10% of the places can be reserved for students according to criteria defined by the module coordinator not later than one week before the start of the registration for elective modules. The registration and selection procedure of the elective modules is accomplished by the head of the study programme until the start of the examination period of the previous semester (exception: selection procedure for the first and fourth semester will be accomplished during the first week of the lecture period of the relevant semester).

In order to achieve not only the Master of Science degree from UASE but also from WAU, students are obliged to choose one elective module from each of the marked groups (A [Principles of Landscape Ecology, Forest Ecology, Landscape Systems Analysis] and B [Sustainable Forest Management, Forest Monitoring, Forest Inventory, Forest Mensuration, Forest Productivity, Forest Ecosystem Modelling, Introduction to Ecosystem Modelling]) during the whole study period. Specific advice will be given by the responsible programme coordinator.

All other specific requirements for the selection of modules are determined in the corresponding module description. For further thematic questions about the modules, the responsible module coordinator is named in the corresponding module description.

Teaching and examination forms:

Teaching form					**Examination form**							
Lecture	Seminar	Practical Exercise	Tutorial	Project	Technical discussion	Project presentation	Oral report	Written exam	Term paper	Protocol	Work report	Project report
L	S	PE	T	P	TD	PP	OR	WE	TP	P	WR	PR

SWH = semester work hours; TL = teaching language; EF = examination form; 1 ECTS Credit = 30 h workload

Goals matrix of the International Study Programme Forest Information Technology (M.Sc.)

Goal of the International Master Study Programme Forest Information Technology

The study programme qualifies for an occupational activity in the application range of information technologies (IT) in practice and research of the forest and environmental sector. Students will be enabled to detect relevant IT application areas and to plan and to technologically promote corresponding innovation processes.

Students learn to solve complex problems based on a deepened and extended understanding of structures, processes and relationships within ecosystems, landscapes as well as within the sphere of forestry and based on a broad spectrum of scientific methods and tools for the collection, analysis, storage, visualization and communication of environmental data. Students are especially enabled to creatively apply and to adapt forestry and environment related software, to open up new application areas and to plan and to develop new application software.

Overall learning objectives	Qualification of learning outcomes	Modules (incl. ECTS Credits) *(M = Mandatory / E = Elective)*
IT application specialist Graduates are enabled to detect and to define application areas of information technologies in the forest and environmental sector as well as to design and to technologically expedite appropriate innovation processes.	**Knowledge** - Students have solid knowledge of the technical bases and the present development trends of modern information technologies (IT). They know terms and concepts of current computer engineering. - Students know the essential application areas of IT in forestry and environment as well as expectations and future challenges. - Students know software systems and solutions customary to the market for forest and environment related problems. - Students possess knowledge concerning product development and application as well as IT technology transfer. **Skills** - Students are able to detect relevant IT application areas in forestry and environment including new technologies and media and are able to define and evaluate innovation promoting frame conditions. - Students are able to critically evaluate alternative IT concepts and organizational solutions. - Students are able to evaluate the most important IT product (software) facts concerning organizational and property rights. **Competences** - Students are able to recognize innovation potentials for the use of IT in the forestry and environmental area and to actively design innovation processes.	**Especially important for objective** - Geomatics I (M 9) - Geomatics II (M 6) - Master-Thesis (M 20) - Research Project (M 12) - Scientific Internet-Colloquium (M 4) - Student Research Colloquium (M 4) **Important for objective** - Computer Science & Technology (E 4) - Forest Decision Support Systems (E 4) - Forest Information Systems (E 4)

Systems analyst Graduates possess a deepened and extended understanding of processes and relationships within forest ecosystems, landscapes and the remaining environmental sector.	**Knowledge** - Students have a sound systemic understanding of natural structures, processes and connections in forest ecosystems as well as in landscapes and in the other environmental area and know the different approaches of different specialist disciplines. **Skills** - Students are able to creatively apply various IT in order to describe problems and to find solutions, especially methods of structure and systems analysis and modelling. **Competences** - Students are able to bring in the advantages of formalized considerations into the disciplinary and interdisciplinary work and to connect various disciplinary knowledge.	**Especially important for objective** - Landscape Systems Analysis (E 4) - Operational Forestry I (M 6) - Operational Forestry II (M 6) - Principles of Landscape Ecology (E 4) - Spatial Analysis (E 4) **Important for objective** - Ecosystem Modelling (E 4) - Environmental Data Analysis (E 6) - Forest Ecology (E 4) - Forest Decision Support Systems (E 4) - Forest Inventory & Modelling (E 4)
Service provider for business management in forestry Graduates possess a deepened and extended understanding of processes and relationships within the forest management as well as within the logistic and societal sphere of forestry.	**Knowledge** - Students dispose of knowledge about socio-economic, ecological and economic connections and processes in ecosystems and landscapes. - Students have knowledge of the use forms of forest ecosystems and of technological procedures. - Students have knowledge of organisation and administration processes in forest management. - Students know bases and methods of computer and model supported situation analysis and impact assessment in forest ecosystems and in the environmental area. **Skills** - Students are able to use and to combine their topical and methodological knowledge. - Students are able to derive and to evaluate use and management scenarios. - Students are able to evaluate forest political, technological and legal frame conditions. **Competences** - Students are able to connect methodical and knowledge as regards content with concrete sector related applications.	**Especially important for objective** - Administration & Management in Forestry (E 4) - Forest Decision Support Systems (E 4) - Forest Information Systems (E 4) - Operational Forestry I (M 6) - Operational Forestry II (M 6) - Sustainable Forest Management (E 4) **Important for objective** - Forest Inventory & Modelling (E 6) - Non-Wood Products & Services (E 4) - Project Planning & Management (E 4) - Social and market survey methods (E 4)
Environmental data manager Graduates are enabled to develop, implement and use concepts for the collection, analysis, storage, visualization and communication of environmental data.	**Knowledge** - Students know the relevant concepts for the collection, analysis, storage, visualization and communication of environmental data. - Students particularly know the theoretical bases of geographical information and of remote sensing systems. **Skills** - Students are able to plan data collection and storage concepts dependent on problem and situation.	**Especially important for objective** - Data Analysis & Management I (M 6) - Data Analysis & Management II (M 3) - Geomatics I (M 9) - Geomatics II (M 6) - Web Databases (E 6) **Important for objective** - Digital Processing of RS Data (E 4)

	- Students are able to multifariously analyze, display and communicate collection data. **Competences** - Students are able to carry out data collections and evaluations with a special forest or environment related context.	- Environmental Data Analysis (E 6) - Spatial Analysis (E 4)
Software expert and developer Graduates are enabled to creatively apply common software products of the forest and environmental sector as well as to develop new application software.	**Knowledge** - Students know commercial and non-commercial software products relevant for the forest and environmental area (customary to the market software products); products in the area of geographical information and remote sensing take a stressed position. **Skills** - Students are able to reliably apply distinguished, above all space related software tools. - Students are able to adapt standard software tools for specific purposes according to customer requirements. - Students are able to develop new application software to solve forest and environmental problems. **Competences** - Students are enabled to creatively use and to develop software tools for special forest and environment related problems.	**Especially important for objective** - Data Analysis & Management I (M 6) - Data Analysis & Management II (M 6) - Fundamentals of Programming (M 3) - Geomatics I (M 9) - Geomatics II (M 6) - Internet Programming (E 4) - Programming III (E 4) - Web Databases (E 6) **Important for objective** - Environmental Data Analysis (E 6) - Forest Decision Support Systems (E 4)
Employee in research institutions, governmental and non-governmental organizations Graduates are applicable in IT relevant branches in practice and research of the forest and environmental sector.	**Knowledge** - Students know the potential interfaces and innovation places between IT and practical as well as scientific questions in the forest and environmental area. **Skills** - Students are able to derive IT-related tasks and to develop and to implement solution strategies. - Students are able to evaluate the success prospects and the efficacy of IT tasks and applications. - Students are able to accomplish data analyses, to develop databases and Geographic Information Systems and to develop and apply application software. - Students are able to apply special forest and environment related data collection and analysis methods. **Competences** - Students are able to connect IT and other disciplinary knowledge with each other. - Students are able to work in interdisciplinary and heterogeneously composed working groups; students have a high foreign language competence.	**Especially important for objective** - Master Thesis (M 20) - Research Project (M 12) - Scientific Internet Colloquium (M 4) - Student Research Colloquium (M 4) **Important for objective** - Digital Processing of RS Data (E 4) - Ecosystem Modelling (E 4) - Forest Biometry (E 4) - Forest Inventory & Modelling (E 6) - German Culture and Language (E 4) - GIS & RS in Forest Protection (E 4) - Polish Culture & Language (E 4)- RS for Global Monitoring (E 6) - Project Planning & Management (E 4) - RS for Environmental Monitoring (E 6) - Scientific Writing & Presenting (E 4) - Spatial Analysis (E 4) - Tree Ring Analysis (E 4)

Employee in engineering offices and service institutions Graduates are applicable in engineering offices in IT project development and processing, software development and application, particularly in case of forest and environment related problems	**Knowledge** - Students have technological and topical knowledge for the processing of IT relevant tasks within complex projects. **Skills** - Students are able to plan the IT components of projects and to evaluate the solution strategies concerning their efficacy and extent. - Students are able to independently solve adaptation and development including programming tasks. **Competences** - Students are capable of transferring IT approaches and methods between different application areas and are able to open new application areas. - Students are able to manage projects and to lead employees.	**Especially important for objective** - Data Analysis & Management II (M/6) - Fundamentals of Programming (M 3) - Geomatics I (M 9) - Geomatics II (M 6) - Operational Forestry I (M 6) - Operational Forestry II (M 6) **Important for objective** - Digital Processing of RS Data (E 4) - Environmental Data Analysis (E 6) - Forest Decision Support Systems (E 4) - German Culture and Language (E 4) - GIS & RS in Forest Protection (E 4) - Internet-Programming (E 4) - Polish Culture & Language (E 4) - Programming III (E 4) - Project Planning & Management (E 4) - Scientific Writing & Presenting (E 4) - Web Databases (E 6)

Module handbook
of the International Study Programme
Forest Information Technology (M.Sc.)

Module	Data analysis and management I	
Study programme	Forest Information Technology	
Semester	1. Sem.	
Module coordinator	Prof. Dr. Alfred Schultz	aschultz@fh-eberswalde.de
Status	Mandatory	
Goal	The students are enabled to collect, analyze and store environmental data.	
Examination form	Written exam 180 min	
ECTS-Credits	6	Workload 180 h / Semester
SWH instructed	4	

Module component	Statistics I	
Coordinator	Prof. Dr. Alfred Schultz	
Lecturer	Prof. Dr. Alfred Schultz	
ECTS- Credits	3	Workload 90 h / Semester
SWH	2	
Max. study places	25	
Teaching form	Lecture (15h), Practical Exercise (15h), self-study (60h)	
Language	English	
Examination form	Written exam	
Entry requirements	None	
Goal	Students know selected descriptive and analytical statistical methods and are enabled to accomplish environmental data analyses.	
Content	The knowledge of how to collect and analyze environmental data is essential for any empirical science. The course strengthens fundamentals of probability theory as well as standard methods of descriptive and analytical statistics with a focus on test theory. A thorough foundation of inferential statistics and test theory is combined with the introduction of selected parametric and non-parametric tests. Additionally the following approaches and methods are introduced and trained: contingency table analysis, sampling approaches for immobile and mobile objects, cluster and classification methods. Students learn to select appropriate methods for special investigation targets and will become able to accomplish analyses including the utilization of selected standard software tools having GUI. The use of tools with a programming interface is rather introduced in the component module "Statistics II". Data sources and databases from the component module "Database Management" are used.	
Recommended related elective modules	Environmental data analysis	
Competence	Technical competence (50%), Methodological competence (40%), Personal competence (10%)	
References	Sokal, R.R. & F.J. Rohlf (1995): Biometry. Freeman. Norusis, M.J. (2008): SPSS 17.0 – Guide to Data Analysis. Prentice Hall. Sachs, L. (2003): Angewandte Statistik. Springer. Field, A. (2005): Discovering Statistics Using SPSS. Sage Publications. Dalgaard, P. (2008): Introductory Statistics with R. Springer, Berlin.	

Module	Data analysis and management I	
Study programme	Forest Information Technology	
Semester	1. Sem.	
Module coordinator	Prof. Dr. Alfred Schultz	aschultz@fh-eberswalde.de
Status	Mandatory	
Goal	The students are enabled to collect, analyze and store environmental data.	
Examination form	Written exam 180 min	
ECTS-Credits	6	Workload 180 h / Semester
SWH instructed	4	

Module component	Database management	
Coordinator	Prof. Dr. Alfred Schultz	
Lecturer	Prof. Dr. Alfred Schultz	
ECTS- Credits	3	Workload 90 h / Semester
SWH	2	
Max. study places	26	
Teaching form	Lecture (15h), Practical Exercise (15h), self-study (60h)	
Language	English	
Examination form	Written exam	
Entry requirements	None	
Goal	Students know theoretical fundamentals of databases and are able to plan and to implement databases and to retrieve data from databases using various software tools.	
Content	The course deals with the mathematical and information technological fundamentals of databases and with the necessary practical skills to develop, implement and use databases. Relevant elements of formal logic and the steps to create databases incl. data modelling are treated. Different database approaches are handled, although the focus is on relational databases. Students learn to plan databases using the concept of normalization and normal forms. SQL is introduced as language to communicate with databases. Important SQL commands are introduced and trained. The differences between stand-alone and client-server applications are analyzed. Students develop a complex example database containing data from various environmental data observation campaigns using MS Access and/or MySQL. The database is searched from different perspectives. Resulting data sets will be analyzed in the module component "Statistics I".	
Recommended related elective modules	Web databases	
Competence	Technical competence (50%), Methodological competence (40%), Personal competence (10%)	
References	Elmasri, R. & S.B. Navathe (2003): Fundamentals of Database Systems. Addison-Wesley Dubois, P. (2005): MySQL. New Riders. Roman, S. (2003): Access Database Design and Programming. O'Reilly.	

Module	Fundamentals of programming	
Study programme	Forest Information Technology	
Semester	1. Sem.	
Module coordinator	Prof. Dr. Alfred Schultz	aschultz@fh-eberswalde.de
Status	Mandatory	
Coordinator	Prof. Dr. Alfred Schultz	
Lecturer	Prof. Dr. Alfred Schultz	
ECTS- Credits	3	Workload 90 h / Semester
SWH	2	
Max. study places	26	
Teaching form	Lecture (12h), Practical Exercise (12h), Seminar (6h), self-study (60h)	
Language	English	
Examination form	Work report	
Entry requirements	None	
Goal	Students understand the theoretical fundamentals of computer programming and are able to create application programs of limited extent and function in a systematic way using an object-oriented programming language.	
Content	The course introduces the theoretical fundamentals and principal steps of developing computer application programmes. The importance and usefulness of taylor-made application programmes as effective tools to analyze and manage processes in forestry and environment is discussed. Students become acquainted with typical programming language elements. The .NET framework is used as concrete programming environment for developing Windows based applications. Visual Basic .NET is used as language for teaching and training purposes. Various techniques to structure programmes and organize operations are introduced. Students learn to develop programmes using several forms for input and output, and for controlling programme execution. Students learn to implement some common algorithms as procedural as well as object-oriented programmes.	
Recommended related elective modules	Programming III, Web databases	
Competence	Technical competence (50%), Methodological competence (40%), Personal competence (10%)	
References	Liberty, J. (2005): Programming Visual Basic 2005. O'Reilly. Knuth, D. E. (2002): The Art of Computer Programming. Vol 1-3. Addison-Wesley. Felleisen, M., R. B. Findler, M. Flatt & S. Krishnamurthi (2001): How to design programs. An Introduction to Computing and Programming. MIT.	

Module	Geomatics I	
Study programme	Forest Information Technology	
Semester	1. Sem.	
Module coordinator	Prof. Dr. NN (GIS)	
Status	Mandatory	
Goal	The students are enabled to use GIS & RS for various purposes of natural resources management.	
Examination form	Project presentation, Project report	
ECTS-Credits	9	Workload 270 h / Semester
SWH instructed	6	

Module component	Geographic information systems I	
Coordinator	Prof. Dr. NN (GIS)	
Lecturer	Prof. Dr. NN (GIS)	
ECTS- Credits	6	Workload 180 h / Semester
SWH	4	
Max. study places	26	
Teaching form	Lecture (18h), Practical Exercise (30h), Seminar (12h), self-study (120h)	
Language	English	
Examination form	Project presentation	
Entry requirements	None	
Goal	Students know theoretical fundamentals of Geographic Information Systems (GIS) and are enabled to use GIS for various purposes of natural resources management.	
Content	Geographic Information Systems (GIS) are introduced from various viewpoints: as technology, system and science. Traditional and GIS maps are introduced and compared. The role of GIS in spatial information systems is discussed. Special features of GIS such as map projection, geo-referencing, data types and spatial data formats are handled in detail. Students become acquainted with the sources and ways to get spatial data, with evaluating the quality of spatial data and with the organization of spatial data for use in GIS. Students train and practice GIS software with a focus on tools of the ESRI ArcGIS product family including mobile solutions, but also on certain open source products. Various practical spatial analytical examples are accomplished considering especially applications with special emphasis on forest protection.	
Recommended related elective modules	Environmental data analysis, Geographic information systems and remote sensing in forest protection, Landscape systems analysis (A), Spatial analysis	
Competence	Technical competence (50%), Methodological competence (30%), Personal competence (10%), Media competence (10%)	
References	Longley, P.A., M.F. Goodchild, D.J. Maguire & D.W. Rhind (2001): Geographic Information Systems and Science. John Wiley & Sons. A.H. Robinson, J.L. Morrison, P.C. Muehrcke, A.J. Kimerling & S.C. Guptill (1995): Elements of Cartography. John Wiley & Sons.	

Module	Geomatics I	
Study programme	Forest Information Technology	
Semester	1. Sem.	
Module coordinator	Prof. Dr. NN (GIS)	
Status	Mandatory	
Goal	The students are enabled to use GIS & RS for various purposes of natural resources management.	
Examination form	Project presentation, Project report	
ECTS-Credits	9	Workload 270 h / Semester
SWH instructed	6	

Module component	Remote sensing	
Coordinator	Prof. Dr. NN (GIS)	
Lecturer	Prof. Dr. NN (GIS)	
ECTS- Credits	3	Workload 90 h / Semester
SWH	2	
Max. study places	26	
Teaching form	Lecture (6h), Practical Exercise (18h), Project (6h), self-study (60h)	
Language	English	
Examination form	Project report	
Entry requirements	None	
Goal	Students know theoretical fundamentals and are enabled to use remote sensing as one of forest and environment monitoring tools.	
Content	The physical bases of Remote Sensing (RS) (optical and microwaves) are introduced. The role of RS as method of monitoring and inventory of forest and environment is introduced, discussed and demonstrated with the help of various practical applications. Different branches of RS such as photographs, aerial RS and satellite RS are handled. Another focus is on image processing and on image interpretation and classification. The use of RS as source of GIS data and information is demonstrated. The students learn to apply relevant software products. Examples for practical exercises come mainly from forest protection.	
Recommended related elective modules	Digital processing of remotely sensed data, Geographic information systems and remote sensing in forest protection, Remote sensing for environmental monitoring, Remote sensing for global monitoring, Spatial analysis	
Competence	Technical competence (50%), Methodological competence (30%), Personal competence (10%), Media competence (10%)	
References	Campbell, J.B. (2002): Introduction to Remote Sensing. Guilford Press, New York. Lillesand, T.M., R.W. Kiefer (1999): Remote Sensing and Image Interpretation. John Wiley & Sons, Inc.	

Module	Computer science and technology	
Study programme	Forest Information Technology	
Semester	1. Sem.	
Module coordinator	Prof. Dr. Alfred Schultz	aschultz@fh-eberswalde.de
Status	Elective	
Coordinator	Prof. Dr. Alfred Schultz	
Lecturer	Prof. Dr. Alfred Schultz, Oskar Dietterle	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	25	
Teaching form	Lecture (27h), Practical Exercise (18h), self-study (75h)	
Language	English	
Examination form	Technical discussion 20 min	
Entry requirements	None	
Goal	Students know topical fundamentals of computer science and technology including current computer hardware and possess practical skills using different computer environments and operating systems.	
Content	The course introduces into the basic branches and concepts of computer science and technolgy such as computer architecture, software development, human-computer-interfaces and artificial intelligence. Important fundamentals to digitally represent data and information will be refreshed, extended and strengthened. Important concepts of computer communication, especially computer networks, and computer security are introduced. The expectations, challenges and risks concerning the use of computers in the modern society with a focus on forestry and environment are discussed. Practical exercises are related to hardware components of Personal Computers, to mobile computing devices, to accomplish basic calculations in different number systems, to plan calculation algorithms, and to use and to communicate between Windows and Linux operating systems.	
Recommended related elective modules		
Competence	Technical competence (50%), Methodological competence (30%), Personal competence (10%), Media competence (10%)	
References	Patt, Y.N. & J. Patel (2001): Introduction to Computing Systems: From Bits and Gates to C and Beyond. McGraw-Hill. Welsh, M., M. K. Dalheimer, T. Dawson & L. Kaufman (2003): Running Linux. O'Reilly. Gumm; H.P. & M. Sommer (2004): Einführung in die Informatik. Oldenbourg. Tannenbaum, A. (2008): Modern Operating Systems. Prentice Hall International.	

Module	German culture and language	
Study programme	Forest Information Technology	
Semester	1. Sem.	
Module coordinator	Undine Beyersdorff	ubeyersdorff@fh-eberswalde.de
Status	Elective	
Coordinator	Undine Beyersdorff	
Lecturer	N.N.	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	25	
Teaching form	Practical Exercise (22h), Seminar (22h), self-study (75h)	
Language	German, English	
Examination form	Technical discussion 20 min	
Entry requirements	None	
Goal	Students know the fundamentals of the current German society and are able to apply German language in everyday situations.	
Content	The course is an offer exclusevely for non-German foreign students. It introduces into German language and the fundamentals of the current German society. Everyday situations of German language are imparted and trained. It is given an insight into German social life, history and culture. Comprehension for the integration into German life and society is developed.	
Recommended related elective modules		
Competence	Technical competence (25%), Methodological competence (25%), Social competence (25%), Media competence (25%)	
References	Wird zu Beginn der Lehrveranstaltung bekannt gegeben/ to be announced at start of semester	

Module	Specialisation module I (Current technologies and applications)
Study programme	Forest Information Technology
Semester	1. Sem.
Module coordinator	Head of study program
Status	Elective
Coordinator	Prof. Dr. Alfred Schultz
Lecturer	N.N.
ECTS- Credits	4 Workload 120 h / Semester
SWH	3
Max. study places	25
Teaching form	Lecture (0h), Practical Exercise (0h), Seminar (0h), self-study (75h)
Language	English
Examination form	
Entry requirements	None
Goal	Students become acquainted with current developments of IT and their applications in forestry and environment related areas.
Content	This module offers a changing spectrum of topics related to current developments in the area of IT fundamentals and forest and environment related applications. The offered topics preferably deepen and extend knowledge imparted in the mandatory modules of the 1st semester (databases, Geographic Information Systems, Remote Sensing, statistics). Guest lecturers from other universities and research institutions will appear. Furthermore students may select Master level modules related to the core contents of the FIT programme offered by other Master programmes and accepted by the head of the study programme.
Recommended related elective modules	
Competence	
References	Dependend on offered topic

Module	Ecosystem modelling (B)	
Study programme	Forest Information Technology	
Semester	1. Sem., 3. Sem.	
Module coordinator	Prof. Dr. Alfred Schultz	aschultz@fh-eberswalde.de
Status	Elective	
Coordinator	Prof. Dr. Alfred Schultz	
Lecturer	Oskar Dietterle, Prof. Dr. Alfred Schultz	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	25	
Teaching form	Lecture (22h), Practical Exercise (14h), Seminar (9h), self-study (75h)	
Language	English	
Examination form	Technical discussion 20 min	
Entry requirements	None	
Goal	Students have a principal understanding of notion and approach of ecosystem modelling and have basic practical skills to plan, develop and apply models of ecosystem related target areas.	
Content	The course gives an overview of and refreshes fundamental, frequently used mathematical methods in ecosystem modelling including vectors and matrices (matrix operations, determinants, eigenvalues and eigenvectors) as well as infinitesimal calculus (differential calculus, difference and differential equations, ordinary differential equations, numerical solvers). The notion of ecological compartment and the compartment approach are especially introduced considering forest insect models and models for carbon and biomass. The use of ecosystem models in information and management systems is demonstrated and discussed. The methods are trained and practiced with examples of population and growth modelling (Leslie matrices, growth kinetics and curves, habitat models).	
Recommended related elective modules	Forest decision support systems, Forest inventory and modelling (B)	
Competence	Technical competence (50%), Methodological competence (30%), Personal competence (10%), Media competence (10%)	
References	Seppelt, R. (2003): Computer-based Environmental Management. Wiley-VCH. Jörgensen, S.E. & G. Bendoricchio (2001): Fundamentals of Ecological Modelling. Elsevier. Imboden, D. & S. Koch (2003): Systemanalyse. Einführung in die mathematische Modellierung natürlicher Systeme. Springer.	

Module	Landscape systems analysis (A)
Study programme	Forest Information Technology
Semester	1. Sem., 3. Sem.
Module coordinator	Prof. Dr. Alfred Schultz aschultz@fh-eberswalde.de
Status	Elective
Coordinator	Prof. Dr. Alfred Schultz
Lecturer	Prof. Dr. Alfred Schultz, Dr. Gerd Lutze, Joachim Kiesel
ECTS- Credits	4 Workload 120 h / Semester
SWH	3
Max. study places	25
Teaching form	Lecture (18h), Practical Exercise (18h), Seminar (9h), self-study (75h)
Language	English
Examination form	Technical discussion 20 min
Entry requirements	GIS I
Goal	Students are enabled to understand concepts, principles and methods of landscape systems analysis and are trained to select and to apply different quantitative methods of landscape systems analysis for varying targets.
Content	The module introduces the students to the notion of systems analysis and to the view of landscapes as complex systems. Related concepts like composition and configuration, patterns and processes as well as scales and hierarchies are covered. The interactions of abiotic, biotic and social landscape subsystems are discussed. Various approaches to classify, structure and describe landscapes in a formal way are introduced, among them particularly GIS-oriented approaches. Special emphasize is given to the quantitative characterization of landscapes. Students learn to select and to apply appropriate quantitative methods, among them especially GIS related ones, in order to describe landscape elements and structures, and to analyze and to display landscape processes. Students learn to interpret the analytical results and to derive strategic conclusions.
Recommended related elective modules	Forest ecology (A)
Competence	Technical competence (50%), Methodological competence (30%), Personal competence (10%), Media competence (10%)
References	Lang, S. & T. Blaschke (2007): Landschaftsanalyse mit GIS. Ulmer. Farina, A. (2006): Principles and Methods in Landscape Ecology. Springer. Gergel, S. & M. Turner (2003): Learning Landscape Ecology: A Practical Guide to Concepts and Techniques. Springer.

Module	Project planning and management	
Study programme	Forest Information Technology	
Semester	1. Sem., 3. Sem.	
Module coordinator	Prof. Dr. Martin Welp	mwelp@fh-eberswalde.de
Status	Elective	
Coordinator	Prof. Dr. Martin Welp	
Lecturer	Prof. Dr. Martin Welp	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	25	
Teaching form	Lecture (22h), Project (22h), self-study (75h)	
Language	English	
Examination form	Project presentation (50%), Project report (50%)	
Entry requirements	None	
Goal	Students are acquintad with methods of project planning and management and are able to apply these methods in practice.	
Content	The module gives an overview of definitions, specifications, structure and control mechanisms of projects. The students will train to prepare a grant application, to make a feasibility study and to implement and evaluate projects. Various project management techniques including computer based techniques will be used. Students will prepare project drafts which will be discussed and evaluated in seminars.	
Recommended related elective modules		
Competence	Technical competence (20%), Methodological competence (20%), Social competence (20%), Personal competence (20%), Media competence (20%)	
References	Kerzner, H. (2003): Project Management. A System Approach to Planning, Scheduling and Controlling. John Wiley & Sons, Inc.	

Module	Scientific writing and presenting
Study programme	Forest Information Technology
Semester	1. Sem., 3. Sem.
Module coordinator	Prof. Dr. Martin Welp mwelp@fh-eberswalde.de
Status	Elective
Coordinator	Prof. Dr. Martin Welp
Lecturer	Prof. Dr. Alfred Schultz, Prof. Dr. Martin Welp
ECTS- Credits	4 Workload 120 h / Semester
SWH	3
Max. study places	25
Teaching form	Practical Exercise (22h), Seminar (22h), self-study (75h)
Language	English
Examination form	Term paper (50%), Project presentation (50%)
Entry requirements	None
Goal	Students know the fundamentals of effective scientific writing and oral presenting.
Content	This course imparts the fundamentals of scientific information and communication of scientific information and especially handles the differences between oral presentations and written texts. The course is given in two segments: 1. students learn how to prepare an oral presentation including substance and structure of text components, design and creation of illustrations, use of visual media; 2. students learn to prepare an actual scientific manuscript including adjustment of text to target group, pre- and postprocessing of data/illustrations, terminology and language of text, layout, rules for submitting, dealing with reviewer comments. Students taking the module will complete some short writing and editing exercises and will additionally develop an oral presentation/manuscript of their individual choice.
Recommended related elective modules	
Competence	Technical competence (25%), Methodological competence (25%), Personal competence (25%), Media competence (25%)
References	Munter, M. & L. Russell (2007): Guide to Presentations. Prentice Hall. Forsyth, P. (2006): How to Write Reports and Proposals. Kogan Page. Alley, M. (1996): The Craft of Scientific Writing. Springer.

Module	Data analysis and management II	
Study programme	Forest Information Technology	
Semester	2. Sem.	
Module coordinator	Dr. Michal Zasada	michal.zasada@wl.sggw.pl
Status	Mandatory	
Goal	Students improve their practical skills in collecting, analyzing and presenting environmental data.	
Examination form	Project report 20 min, Written exam 90 min	
ECTS-Credits	6	Workload 180 h / Semester
SWH instructed	4	

Module component	Programming II	
Coordinator	Dr. Wiktor Tracz (WULS)	
Lecturer	Dr. Wiktor Tracz (WULS)	
ECTS- Credits	3	Workload 90 h / Semester
SWH	2	
Max. study places	25	
Teaching form	Lecture (9h), Practical Exercise (15h), Project (6h), self-study (60h)	
Language	English	
Examination form	Project report 20 min	
Entry requirements	Data Analysis and Management I	
Goal	Students are able to develop application programmes of increased extend using the object oriented programming approach.	
Content	The following chapters are handled: development of advanced application programmes and projects; string processing; controlling programme execution, debugging, programme tracing, throwing and catching exceptions; communication between programme parts and between different programs; object-oriented programming approach in detail (continuation of Programming I).	
Recommended related elective modules	Programming III, Web databases	
Competence	Technical competence (50%), Methodological competence (40%), Personal competence (10%)	
References	Petroutsos E. 2006. Mastering Microsoft Visual Basic 2005. Wiley Publishing Inc Liberty J. 2005. Programming Visual Basic 2005. O'Reilly. Felleisen M., Findler R., Flatt M., Krishnamurthi S. 2001. How to design programs. An Introduction to Computing and Programming. MIT.	

Module	Data analysis and management II	
Study programme	Forest Information Technology	
Semester	2. Sem.	
Module coordinator	Dr. Michal Zasada	michal.zasada@wl.sggw.pl
Status	Mandatory	
Goal	Students improve their practical skills in collecting, analyzing and presenting environmental data.	
Examination form	Project report 20 min, Written exam 90 min	
ECTS-Credits	6	Workload 180 h / Semester
SWH instructed	4	

Module component	Statistics II	
Coordinator	Dr. Michal Zasada	
Lecturer	Dr. Michal Zasada	
ECTS- Credits	3	Workload 90 h / Semester
SWH	2	
Max. study places	25	
Teaching form	Lecture (9h), Practical Exercise (15h), Seminar (6h), self-study (60h)	
Language	English	
Examination form	Written exam	
Entry requirements	Data Analysis and Management I	
Goal	The main objective of the course is to introduce the use of the statistical programming environment for practical statistical problem solving.	
Content	The following chapters are handled: data preparation and processing, statistical software, sampling, sampling and sample site determination, estimation procedures, testing statistical hypotheses, multiple and multivariance methods (non-linear regression, analyse of variance and covariance), non-linear regression, analysis of variance.	
Recommended related elective modules	Environmental data analysis	
Competence	Technical competence (40%), Methodological competence (50%), Personal competence (10%)	
References	Norusis, M.J. (2008): SPSS 17.0 – Guide to Data Analysis. Prentice Hall. Field, A. (2005): Discovering Statistics Using SPSS. Sage Publications. Dalgaard, P. (2008): Introductory Statistics with R. Springer, Berlin. Online and digital materials provided by the lecturer	

Module	Geomatics II	
Study programme	Forest Information Technology	
Semester	2. Sem.	
Module coordinator	Dr. Krzysztof Będkowski (WULS)	krzysztofbedkowski@tlen.pl
Status	Mandatory	
Goal	The students are able to solve various forestry-related problems by using GIS, GPS and photogrammetry.	
Examination form	Project report, Written exam 90 min	
ECTS-Credits	6	Workload 180 h / Semester
SWH instructed	4	

Module component	Geographic information systems II	
Coordinator	Dr. Krzysztof Będkowski (WULS)	
Lecturer	Dr. Krzysztof Będkowski (WULS), Dr. Michal Brach	
ECTS- Credits	3	Workload 90 h / Semester
SWH	2	
Max. study places	26	
Teaching form	Lecture (9h), Practical Exercise (15h), Seminar (6h), self-study (60h)	
Language	English	
Examination form	Project report	
Entry requirements	Geomatics I	
Goal	The main objective of the module is to introduce the use of GIS and GPS in solving of various forestry-related problems.	
Content	The following chapters are handled: GPS as a data source for the GIS system, GPS systems, differential correction methods, virtual reference station and active geodetic network, GIS in pocket PC, GPS receivers, software choice for various applications, field practice.	
Recommended related elective modules	Geographic information systems and remote sensing in forest protection, Remote sensing for environmental monitoring, Remote sensing for global monitoring	
Competence	Technical competence (50%), Methodological competence (30%), Personal competence (10%), Media competence (10%)	
References	Longley, P.A., M.F. Goodchild, D.J. Maguire & D.W. Rhind (2001): Geographic Information Systems and Science. John Wiley & Sons. A.H. Robinson, J.L. Morrison, P.C. Muehrcke, A.J. Kimerling & S.C. Guptill (1995): Elements of Cartography. John Wiley & Sons.	

Module	Geomatics II	
Study programme	Forest Information Technology	
Semester	2. Sem.	
Module coordinator	Dr. Krzysztof Będkowski (WULS)	krzysztofbedkowski@tlen.pl
Status	Mandatory	
Goal	The students are able to solve various forestry-related problems by using GIS, GPS and photogrammetry.	
Examination form	Project report, Written exam 90 min	
ECTS-Credits	6	Workload 180 h / Semester
SWH instructed	4	

Module component	Forest photogrammetry	
Coordinator	Dr. Krzysztof Będkowski (WULS)	
Lecturer	Dr. Krzysztof Janeczko (WULS)	
ECTS- Credits	3	Workload 90 h / Semester
SWH	2	
Max. study places	25	
Teaching form	Lecture (9h), Practical Exercise (9h), Project (6h), Seminar (6h), self-study (60h)	
Language	English	
Examination form	Written exam	
Entry requirements	Geomatics I	
Goal	The main objective of the course is to introduce the use of Photogrammetry and other related tools in solving of various forestry-related problems.	
Content	The following chapters are handled: aerial photographs, single image and two-image photogrammetry, stereoscopy (3D), stereopairs, simple photogrammetric Instruments and their use, digital photogrammetry, laser-scanners, photogrammetric measurement of forest stand boundaries and attributes.	
Recommended related elective modules	Geomatics I	
Competence	Technical competence (30%), Methodological competence (50%), Personal competence (10%), Media competence (10%)	
References	Books: Hildebrandt G.: Fernerkundung und Luftbildmessung. Wichmann 1996: Manual of Remote Sensing. American Society of Photogrammetry. Lillesand T.M., Kiefer R.W. 2004: Remote Sensing and Image Interpretation. John Wiley & Sons, New York. Journals: The Photogrammetric Journal of Finland. ISPRS Journal of Photogrammetry and Remote Sensing. Geoinformatics. GIS-Geoinformationssysteme: http://www.geodetic.com/photogrammetry.htm Other Internet sources	

Module	Operational forestry I
Study programme	Forest Information Technology
Semester	2. Sem.
Module coordinator	Prof. Dr. habil. Bogdan Brzeziecki (WULS) bogdan_brzeziecki@sggw.pl
Status	Mandatory
Goal	Students are able to manage and act according to the sustainable use of forest resources with the use of new technologies and planning techniques as well as the role of forests in natural systems, climate change and forest policy.
Examination form	Technical discussion 20 min, Written exam 90 min
ECTS-Credits	6 Workload 180 h / Semester
SWH instructed	4

Module component	Close-to-nature silviculture and nature conservation
Coordinator	Prof. Dr. habil. Bogdan Brzeziecki (WULS)
Lecturer	Prof. Dr. habil. Bogdan Brzeziecki (WULS), Kamil Bielak
ECTS- Credits	3 Workload 90 h / Semester
SWH	2
Max. study places	25
Teaching form	Lecture (11h), Practical Exercise (19h), self-study (60h)
Language	English
Examination form	Written exam
Entry requirements	None
Goal	The objective of this module is to develop an understanding of major principles of close-to-nature silviculture determining its role in the sustainable forest resource management and multifunctional forestry.
Content	Ecological foundations of close-to-nature silviculture: structure and dynamics of natural and managed forests (natural disturbance regimes, forest developmental cycle), stand structure as a key to forest ecosystem, quantitative indices of forest stand structure (rationale and application). Fundamentals of silvicultural planning: target growing stock, forest growth region, forest site type, silvicultural roles of tree species. Forest establishment and growth: silvicultural systems (major components, classification, practical application), regeneration methods (natural and artificial), soil treatment, spacing, planting methods and techniques, planting material. Intermediate treatments: clearings and thinnings, negative and positive selection Presentation and discussion of study examples representative of Central European conditions.
Recommended related elective modules	Forest ecology (A)
Competence	Technical competence (50%), Methodological competence (20%), Social competence (10%), Personal competence (10%), Media competence (10%)
References	Smith D.M. 1986. The practice of silviculture. Eighth edition. John Wiley & Sons. New York. Chichester. Brisbane. Toronto. Singapore. Matthews J. D. 1989. Silvicultural systems. Clarendon Press. Oxford. Persson J., Manus S. (ed.) 1990. A richer forest. The National Board of Forestry. Jönköping. Sweden. Further scientific papers and articles to be announced at start of the semester.

Module	Operational forestry I	
Study programme	Forest Information Technology	
Semester	2. Sem.	
Module coordinator	Prof. Dr. habil. Bogdan Brzeziecki (WULS)	bogdan_brzeziecki@sggw.pl
Status	Mandatory	
Goal	Students are able to manage and act according to the sustainable use of forest resources with the use of new technologies and planning techniques as well as the role of forests in natural systems, climate change and forest policy.	
Examination form	Technical discussion 20 min, Written exam 90 min	
ECTS-Credits	6	Workload 180 h / Semester
SWH instructed	4	

Module component	Forest utilization	
Coordinator	Dr. Grzegorz Jednoralski	
Lecturer	Dr. Grzegorz Jednoralski	
ECTS- Credits	3	Workload 90 h / Semester
SWH	2	
Max. study places	25	
Teaching form	Lecture (15h), Practical Exercise (8h), Tutorial (8h), self-study (60h)	
Language	English	
Examination form	Technical discussion 20 min (10%), Written exam (90%)	
Entry requirements	None	
Goal	Students are able to recognize wood of the most important European tree species. Further they gain knowledge about wood properties, wood processing, industry and forest resources.	
Content	This module contains tutorial work with samples of different wood species and practical exercises in the sawmill cycle of processing large sized timber. Further, the module offers lectures about wood properties, wood industry and forest resources.	
Recommended related elective modules		
Competence	Technical competence (100%)	
References	COST Action E44: Wood Processing Strategies COST Action E40: Innovative utilization and products of large dimensioned timber including the whole forest-wood-chain http://www.lp.gov.pl/ in English	

Module	Digital processing of remotely sensed data	
Study programme	Forest Information Technology	
Semester	2. Sem.	
Module coordinator	Dr. Krzysztof Będkowski (WULS)	krzysztofbedkowski@tlen.pl
Status	Elective	
Coordinator	Dr. Krzysztof Będkowski (WULS)	
Lecturer	Dr. Krzysztof Będkowski (WULS)	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	20	
Teaching form	Lecture (15h), Practical Exercise (30h), self-study (75h)	
Language	English	
Examination form	Project report	
Entry requirements	Geomatics I	
Goal	The main objective of the course is to provide students with the ability of processing remotely sensed data for forestry and environmental purposes.	
Content	Introduction to digital processing of image data, image acquiring by satellite, aircraft, UAV and other remote sensing systems, image restoration, image filtering, spectral space transformation (Pan-sharpening, Vegetation indices, PCA transformation), classification (supervised and unsupervised), basics of digital photogrammetry.	
Recommended related elective modules	Geomatics II	
Competence	Technical competence (50%), Methodological competence (50%)	
References	Books: Manual of Remote Sensing. American Society of Photogrammetry. Lillesand T.M., Kiefer R.W. 2004: Remote Sensing and Image Interpretation. John Wiley & Sons, New York. Lasselin D., Remote Sensing: Physical and Technical Bases. Groupement pour le Développement de la Télédétection Aérospatiale. GDTA: Booklet M1. Digital Image Display. Booklet B3. Color Representation.Tutorials. Journals: ISPRS Journal of Photogrammetry and Remote Sensing. Geoinformatics. GIS-Geoinformationssysteme. http://www.geodetic.com/photogrammetry.htm	

Module	Forest ecology (A)
Study programme	Forest Information Technology
Semester	2. Sem.
Module coordinator	Prof. Dr. habil. Jarosław Skłodowski (WULS) jarek.sklodowski@wl.sggw.pl
Status	Elective
Coordinator	Prof. Dr. habil. Jarosław Skłodowski (WULS)
Lecturer	Dr. Taida Tarabuła (WULS), Dr. Marek Sławski (WULS), Prof. Dr. habil. Jarosław Skłodowski (WULS)
ECTS- Credits	4 Workload 120 h / Semester
SWH	3
Max. study places	25
Teaching form	Lecture (14h), Practical Exercise (22h), Seminar (9h), self-study (75h)
Language	English
Examination form	Written exam
Entry requirements	
Goal	Students are able to analyse processes in forests and of interactions between processes and external influences for practical purposes.
Content	The following chapters are covered: cosystems, classification of ecosystems, levels of biological integration, physical environment of ecosystems, trophic chains and webs, production ecology, cycling of nutrients in ecosystems, population ecology, community ecology, ecological succession, role of disturbance in forest ecosystems, forest ecosystem stability, biodiversity and succession, management.
Recommended related elective modules	Principles of landscape ecology (A)
Competence	Technical competence (50%), Methodological competence (50%)
References	Wird zu Beginn der Lehrveranstaltung bekannt gegeben/ to be announced at start of semester

Module	Forest information systems	
Study programme	Forest Information Technology	
Semester	2. Sem.	
Module coordinator	Dr. Wiktor Tracz (WULS)	wiktor.tracz@wl.sggw.pl
Status	Elective	
Coordinator	Dr. Wiktor Tracz (WULS)	
Lecturer	Dr. Wiktor Tracz (WULS)	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	25	
Teaching form	Practical Exercise (5h), Project (18h), Seminar (22h), self-study (75h)	
Language	English	
Examination form	Project report	
Entry requirements	Geomatics I, Database Management	
Goal	The main objective of the course is to introduce students to a wide range of topics in nowadays forest ecosystem management, information systems architecture and their use in forest ecosystems management. Students will know the utility of various information systems for forestry data analyses and will be able to apply them for solving problems related to forestry and natural environment.	
Content	Tasks and components of Forest Management Information Systems (FMIS), case studies, recognize capabilities of current information systems (IS), chose adequate IS, simulation of different scenarios.	
Recommended related elective modules	Forest ecosystem modelling, Spatial analysis	
Competence	Technical competence (30%), Methodological competence (50%), Personal competence (10%), Media competence (10%)	
References	Decision Support Systems for Ecosystem Management: An Evaluation of Existing Systems. 1998. Rocky Mountain Research Station. Fort Collins. Mitasova H. and Mitas L. 1998. Process Modeling and Simulations, NCGIA Core Curriculum in GIScience. www.ncgia.ucsb.edu/giscc/units/u130/u130.html Refenes A. (ed.). 1995. Neural Networks in the Capital Markets. John Wiley and Sons. Chichester Robak T. and Bhaskara R. Murty. Forest Management Information System. www.gisdevelopment.net/technology/gis/techgi0052.htm Sprague Jr. R. H. and H. J. Watson, 1996: Decision support for management. Upper Saddle River, N.J.: Prentice Hall. Turban E., 1993: Decision Support and Expert Systems: Management Support Systems. Macmillan. New York.	

Module	Polish culture and language	
Study programme	Forest Information Technology	
Semester	2. Sem.	
Module coordinator	Dr. Michal Zasada	michal.zasada@wl.sggw.pl
Status	Elective	
Coordinator	Dr. Michal Zasada	
Lecturer	N.N.	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	25	
Teaching form	Practical Exercise (22h), Seminar (22h), self-study (75h)	
Language	English	
Examination form	Technical discussion 20 min	
Entry requirements	None	
Goal	Students know the fundamentals of the current Polish society and are able to apply Polish language in everyday situations.	
Content	The course is an offer exclusevely for non-Polish foreign students. It introduces into Polish language and the fundamentals of the current Polish society. Everyday situations of Polish language are imparted and trained. It is given an insight into Polish social life, history and culture. Comprehension for the integration into Polish life and society is developed.	
Recommended related elective modules		
Competence	Technical competence (25%), Methodological competence (25%), Social competence (25%), Media competence (25%)	
References	to be announced at start of the semester	

Module	Social and market survey methods
Study programme	Forest Information Technology
Semester	2. Sem.
Module coordinator	Dr. habil. Krzysztof Siekierski (WULS) ksiekierski@pentor.pl
Status	Elective
Coordinator	Dr. habil. Krzysztof Siekierski (WULS)
Lecturer	Dr. habil. Krzysztof Siekierski (WULS), Dr. Piotr Kwiatkowski
ECTS- Credits	4 Workload 120 h / Semester
SWH	3
Max. study places	25
Teaching form	Lecture (22h), Seminar (22h), self-study (75h)
Language	English
Examination form	Written exam
Entry requirements	Data analysis and management I (Statistics I)
Goal	Students understand basics of social and market surveys, know tools and methods for social and market surveys, and are able to design and elaborate surveys.
Content	Qualitative and quantitative methods, questionnaire design, face-to-face interviewing, telephone surveys, on-line interviewing, in-depth interviews, focus group interviews, projective techniques, sampling methods, analysis of data, typical applications of market and social researches.
Recommended related elective modules	
Competence	Technical competence (20%), Methodological competence (40%), Social competence (20%), Personal competence (10%), Media competence (10%)
References	to be announced at start of the semester

Module	Spatial analysis
Study programme	Forest Information Technology
Semester	2. Sem.
Module coordinator	Dr. Wiktor Tracz (WULS) wiktor.tracz@wl.sggw.pl
Status	Elective
Coordinator	Dr. Wiktor Tracz (WULS)
Lecturer	Dr. Wiktor Tracz (WULS)
ECTS- Credits	4 Workload 120 h / Semester
SWH	3
Max. study places	25
Teaching form	Practical Exercise (22h), Seminar (22h), self-study (75h)
Language	English
Examination form	Project presentation
Entry requirements	
Goal	To introduce students to wide range of topics regarding spatial analyses; develop students' abilities to choose adequate analysis and successfully process and analyze spatial data and information about environmental objects and processes
Content	Overview of spatial analyses. The spatial analyze process. Types of spatial analyses. Analyze of different spatial data type. How to choose adequate analysis of spatial data. Spatial and attribute queries. Overly, neighbourhood and aggregation analyses. Interpolation and types of interpolation. Network analyses. 3D analyses and result visualization.
Recommended related elective modules	
Competence	Technical competence (50%), Methodological competence (30%), Personal competence (10%), Media competence (10%)
References	Mitchell A. 1999. The ESRI guide to GIS analysis. Geographic Patterns and Relationships. ESRI Press. ERDAS Field Guide. 1997. ERDAS, Inc. Kraak Menno-Jan, Ormeling Ferjan. 1996. Cartography: Visualization of Spatial Data. Addison Wesley Longman Limited. Zeiler M. 1999. Modeling our Word. ESRI Press. Longley P., Goodchild M., Maguire D., Rhind D. 2005. Geographic Information Systems and Science. Wiley, Chichester. Robinson A., Morrison J., others. 1995. Elements of cartography. JohnWiley and Son, New York. Using ArcGIS 9. 2006. ESRI Press

Module	Specialisation modul II (Current technologies and applications)	
Study programme	Forest Information Technology	
Semester	2. Sem.	
Module coordinator	Dr. Michal Zasada	michal.zasada@wl.sggw.pl
Status	Elective	
Coordinator	Head of study program	
Lecturer	N.N.	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	25	
Teaching form		
Language	English	
Examination form		
Entry requirements	None	
Goal	Students become acquainted with current developments of IT and their applications in forestry and environment related areas.	
Content	This module offers a changing spectrum of topics related to current developments in the area of IT fundamentals and forest and environment related applications. The offered topics preferably deepen and extend knowledge imparted in the mandatory modules of the 1st and 2nd semester (databases, Geographic Information Systems I, Geographic Information Systems II, Remote Sensing, Statistics I, Statistics II). Guest lecturers from other universities and research institutions will appear.	
Recommended related elective modules		
Competence		
References		

Module	Sustainable forest management (B)
Study programme	Forest Information Technology
Semester	2. Sem.
Module coordinator	Prof. Dr. habil. Stanislaw Miścicki (WULS)
Status	Elective
Coordinator	Prof. Dr. habil. Stanislaw Miścicki (WULS)
Lecturer	Prof. Dr. habil. Stanislaw Miścicki (WULS)
ECTS- Credits	4 Workload 120 h / Semester
SWH	3
Max. study places	25
Teaching form	Lecture (9h), Practical Exercise (9h), Project (9h), Seminar (18h), self-study (75h
Language	English
Examination form	Technical discussion 20 min
Entry requirements	
Goal	Students are able to use various sources of information and different techniquess to prepare management plans and are able to analyze the impact of various management scenarios on forest structure.
Content	Sources of information for forest management planning: forest, society and science; forest inventory, forest regulation, methods of how to achieve the expected structure of a forest; forest resources, silvicultural methods, dividing territory into several forest management units.
Recommended related elective modules	
Competence	Technical competence (50%), Methodological competence (30%), Personal competence (10%), Media competence (10%)
References	Gadow K., Pukkala T., Tomé M., 2000. Sustainable Forest Management. Kluwer Academic Publishers. Hasenauer H. (ed.), 2006. Sustainable Forest Management: Growth Models for Europe. Springer. Reynolds, K.M., Thomson A.J., Köhl M., Shannon M.A., Ray D., Rennolls K., 2007. Sustainable Forestry: from Monitoring and Modelling to Knowledge Management and Policy Science. CABI.

Module	Operational forestry II
Study programme	Forest Information Technology
Semester	3. Sem.
Module coordinator	Prof. Dr. habil. Tadeusz Moskalik (WULS) tadeusz.moskalik@wl.sggw.pl
Status	Mandatory
Goal	The students are able to apply methods and techniques of the classification and analysis of characteristic forest plants, natural forest developmental cycles, silvicultural systems and treatments, as well as nature conservation activities.
Examination form	Project presentation, Work report, Written exam 90 min
ECTS-Credits	6 Workload 180 h / Semester
SWH instructed	6

Module component	Forest technology and engineering
Coordinator	Prof. Dr. habil. Tadeusz Moskalik (WULS)
Lecturer	Dr. Wiesława Nowacka, Prof. Dr. habil. Tadeusz Moskalik (WULS)
ECTS- Credits	3 Workload 90 h / Semester
SWH	3
Max. study places	25
Teaching form	Lecture (29h), Practical Exercise (9h), Project (7h), self-study (45h)
Language	English
Examination form	Work report (25%), Written exam (75%)
Entry requirements	
Goal	Students are able to manage the sustainable use of forest resources by using new technologies, optimization and planning techniques.
Content	This course has the following contents: Organization of wood harvesting processes in premature and mature stands; methods of utilization of logging residuals; ecological aspects of timber harvesting; forest operation costs; forest road network optimization; ergonomics in harvesting operations.
Recommended related elective modules	
Competence	Technical competence (100%)
References	Moskalik T., 2004: Model of fully mechanized timber harvesting in sustainable Polish forestry. Wyd. SGGW, Warszawa. Nowacka W., Moskalik T., Paschalis –Jakubowicz P., Zastocki D., 2006: Implementation and socio-economic impact of wood harvesting mechanization in Poland. Warsaw Agricultural University Press. Röser D., Asikainen A., Raulund-Rasmussen K., Stupak I. 2008: Sustainable use of forest biomass for energy. Springer-Verlag. Sessions J., Sessions J.B., 1992: Cost control in forest harvesting and road construction. FAO Forestry Paper, Rome.

Module	Operational forestry II	
Study programme	Forest Information Technology	
Semester	3. Sem.	
Module coordinator	Prof. Dr. habil. Tadeusz Moskalik (WULS)	tadeusz.moskalik@wl.sggw.pl
Status	Mandatory	
Goal	The students are able to apply methods and techniques of the classification and analysis of characteristic forest plants, natural forest developmental cycles, silvicultural systems and treatments, as well as nature conservation activities.	
Examination form	Project presentation, Work report, Written exam 90 min	
ECTS-Credits	6	Workload 180 h / Semester
SWH instructed	6	

Module component	Forest policy	
Coordinator	Prof. Dr. habil. Piotr Paschalis-Jakubowicz (WUL	
Lecturer	Prof. Dr. habil. Piotr Paschalis-Jakubowicz (WULS), Dr. habil. Lech Plotkowski (WULS)	
ECTS- Credits	3	Workload 90 h / Semester
SWH	3	
Max. study places	25	
Teaching form	Lecture (22h), Practical Exercise (11h), Seminar (11h), self-study (45h)	
Language	English	
Examination form	Project presentation	
Entry requirements		
Goal	Students can apply fundamentals of modern Forest policy in practice.	
Content	The role of forestry in modern world forest biodiversity protection programmes, global environmental concerns, forest research and forestry institutions, global perspective on forest policy, forest certification systems.	
Recommended related elective modules		
Competence	Technical competence (30%), Social competence (30%), Personal competence (30%), Media competence (10%)	
References	Wird zu Beginn der Lehrveranstaltung bekannt gegeben/ to be announced at start of semester	

Module	Research project	
Study programme	Forest Information Technology	
Semester	3. Sem.	
Module coordinator	Prof. Dr. Alfred Schultz	aschultz@fh-eberswalde.de
Status	Mandatory	
Coordinator	Prof. Dr. Alfred Schultz	
Lecturer	Prof. Dr. Alfred Schultz, Dr. Michal Zasada	
ECTS- Credits	12	Workload 360 h / Semester
SWH		
Max. study places	25	
Teaching form	Project (h)	
Language	English	
Examination form	Project report	
Entry requirements		
Goal	Students are enabled to plan and accomplish a research project of moderate size and have consolidated their graduate profession empowering competences.	
Content	The main content of the course is to develop and to deepen abilities of analytical, methodical and reporting skills in an environment close to later professional practice. Students learn to plan and accomplish a research project of moderate size. Projects are related to the application of information technologies in order to describe and / or solve problems in forestry or environment. Students accomplish the research project in own responsibility, document the working steps, discuss conclusions and prepare a final project report.	
Recommended related elective modules		
Competence	Technical competence (40%), Methodological competence (40%), Personal competence (10%), Media competence (10%)	
References		

Module	Scientific internet colloquium	
Study programme	Forest Information Technology	
Semester	3. Sem.	
Module coordinator	Prof. Dr. Alfred Schultz	aschultz@fh-eberswalde.de
Status	Mandatory	
Coordinator	Prof. Dr. Alfred Schultz	
Lecturer	Prof. Dr. Alfred Schultz, Dr. Michal Zasada	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	25	
Teaching form	Seminar (45h), self-study (75h)	
Language	English	
Examination form	Term paper	
Entry requirements		
Goal	Students are able to open new areas of IT applications, extend and manifest abilities for accomplishing scientific work incl. writing and reviewing scientific papers.	
Content	The goal of the course is to enable students to open new areas of IT applications in forestry and environment. The course is organized as an interactive discussion of selected scientific papers which extend ideas and concepts conveyed in the previous semesters. The papers cover a typical spectrum of forest / environment related information technologies such as Geographical Information Systems, complex databases, ecosystem modelling and simulation incl. case studies, information systems, communication structures within complex projects and to the public. The presented papers will be individually analyzed by the students according to inputs of the colloquium moderator. Students are requested to make additional literature search and to evaluate and to compare references. Students publish their evaluations in an online Discussion Forum. The individual contributions will then be commonly discussed and summarized. The mutual insemination and evaluation of knowledge and opinions is an integral part of the course.	
Recommended related elective modules		
Competence	Technical competence (20%), Methodological competence (20%), Personal competence (30%), Media competence (30%)	
References	Up-to-date scientific papers from IT applications in forest and environmental research; to be announced at start of the semester	

Module	Administration and management in forestry	
Study programme	Forest Information Technology	
Semester	3. Sem.	
Module coordinator	Dr. Krzysztof Janeczko (WULS)	krzysztof.janeczko@wl.sggw.pl
Status	Elective	
Coordinator	Dr. Krzysztof Janeczko (WULS)	
Lecturer	Dr. Krzysztof Janeczko (WULS)	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	15	
Teaching form	Lecture (18h), Practical Exercise (14h), Project (14h), self-study (75h)	
Language	English	
Examination form	Work report	
Entry requirements		
Goal	The objective of the course is to develop knowledge about specific forest management processes and to reflect their importance for the competitive position and growth of forest businesses. Students will know how to use some analytical tools helpful in solving economic problems in forestry. The influence of non-timber forest functions on the financial results of forest businesses will also be analyzed and discussed.	
Content	This course has following contents: Methods to calculate costs of forest processes, economically optimal technique of forest processes, applying Lagrange's method in case of limited money forest investments, forest projects budgeting and optimization with Critical Patch Method, linear programming in solving forest economic problems, dealing with economic aspects of non-timber forest functions.	
Recommended related elective modules	Forest decision support systems	
Competence	Technical competence (40%), Methodological competence (40%), Personal competence (10%), Media competence (10%)	
References	Boungiorno J., Gilless J.K. 2003: Decision Methods for Forest Resource Management. Elsevier Science, London. Stover T.S. 2004: Microsoft Office Project 2003 Inside Out. Microsoft Press, Washington.	

Module	Forest biometry
Study programme	Forest Information Technology
Semester	3. Sem.
Module coordinator	Dr. habil. Albert Dudek (WULS) albert.dudek@wl.sggw.pl
Status	Elective
Coordinator	Dr. habil. Albert Dudek (WULS)
Lecturer	Dr. habil. Albert Dudek (WULS), Dr. Robert Tomusiak (WULS)
ECTS- Credits	4 Workload 120 h / Semester
SWH	3
Max. study places	25
Teaching form	Lecture (22h), Project (9h), Seminar (14h), self-study (75h)
Language	English
Examination form	Project report (50%), Technical discussion 20 min (50%)
Entry requirements	Statistics I
Goal	The main objective of the course is to introduce to theoretical foundations of forest measurements, use of principles and techniques for evaluating and monitoring forest growth and yield in various methods.
Content	This module is composed of the following topics: growth of single trees and whole stands; tree crown development; stand social structure; impact of various biotic and abiotic factors on stand structure; growth and yield, impact of thinning on stand structure; growth and yield; yield tables; introduction to growth and yield models; stem analysis; measuring trees and stands, measurement techniques for various tree and stand attributes, volume, shape, taper, and product determination for single trees, concepts and techniques to determine product/tree volume and increment of stands.
Recommended related elective modules	
Competence	Technical competence (40%), Methodological competence (40%), Personal competence (20%)
References	Husch B., Beers T.W., Kershaw J.A. 2003. Forest Mensuration. Chichester: John Wiley and Sons.

Module	Forest decision support systems	
Study programme	Forest Information Technology	
Semester	3. Sem.	
Module coordinator	Prof. Dr. Martin Guericke	mguericke@fh-eberswalde.de
Status	Elective	
Coordinator	Prof. Dr. Martin Guericke	
Lecturer	Prof. Dr. Martin Guericke	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	25	
Teaching form	Lecture (22h), Seminar (22h), self-study (75h)	
Language	English	
Examination form	Project report	
Entry requirements	Forest Information Systems, Ecosystem Modelling, general knowledge of forest management	
Goal	Students know the growth dynamics of trees and forest stands and are able to use various growth models and Forest Decision Support Systems to derive and support decisions.	
Content	The course contains the following parts: decision process in forestry, key components of growth models and decision support systems (DSS), project identification, initiation, analysis, examples of forest DSS, use of simulation models in DSS. Students practically train the elaboration of scenarios, the analysis of computer based simulation results and the derivation of decisions using common DSS software.	
Recommended related elective modules	Forest ecosystem modelling, Forest inventory and modelling (B)	
Competence	Technical competence (30%), Methodological competence (30%), Personal competence (20%), Media competence (20%)	
References	Vanclay, J.K. (2001): Modelling Forest Growth and Yield : Applications to Mixed Tropical Forests. CAB International. Gregory, E. (1999): Decision Support Systems for Sustainable Development. Kluwer Academic Publisher.	

Module	Geographic information systems and remote sensing in forest protection
Study programme	Forest Information Technology
Semester	3. Sem.
Module coordinator	Prof. Dr. NN (GIS)
Status	Elective
Coordinator	Prof. Dr. NN (GIS)
Lecturer	Prof. Dr. NN (GIS)
ECTS- Credits	4 Workload 120 h / Semester
SWH	3
Max. study places	25
Teaching form	Seminar (45h), self-study (75h)
Language	English
Examination form	Technical discussion 20 min (50%), Oral report (50%)
Entry requirements	
Goal	Students are enabled to use remote sensing and geographic information system in different applications related to forest protection.
Content	Nowadays Remote Sensing combined with Geographic Information Systems provide a variety of techniques which can be used in forest management planning including prevention of damage, risk assessment and carrying out different activities in critical situations like fires, insect infestations and wind damage to forests. The course will introduce diferent RS/GIS techniques which may be used in forest protection and challenge the students to critically analyse their utility.
Recommended related elective modules	
Competence	Technical competence (30%), Methodological competence (30%), Personal competence (20%), Media competence (20%)
References	Wulder, M.A., S.E. Franklin (2003): Remote Sensing of Forest Environments. Kluwer Academic Publishers.

Module	Internet programming	
Study programme	Forest Information Technology	
Semester	3. Sem.	
Module coordinator	Dr. Michal Zasada	michal.zasada@wl.sggw.pl
Status	Elective	
Coordinator	Dr. Michal Zasada	
Lecturer	Dr. Robert Tomusiak (WULS), Dr. Michal Zasada	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	25	
Teaching form	Practical Exercise (22h), Project (9h), Seminar (14h), self-study (75h)	
Language	English	
Examination form	Project report	
Entry requirements	Computer Science & Technology, Fundamentals of Programming	
Goal	Students know the potentials of the Internet as source and target of various forest and environmental information and are able to develop static and dynamic websites.	
Content	The following chapters are handled: advanced HTML tags and techniques, forms, scripts, dynamic websites, web service integration with databases, content managers.	
Recommended related elective modules	Web databases	
Competence	Technical competence (30%), Methodological competence (30%), Personal competence (20%), Media competence (20%)	
References	Wird zu Beginn der Lehrveranstaltung bekannt gegeben/ to be announced at start of semester	

Module	Non-wood forest products and services	
Study programme	Forest Information Technology	
Semester	3. Sem.	
Module coordinator	Dr. Paweł Staniszewski (WULS)	pawel.staniszewski@wl.sggw.pl
Status	Elective	
Coordinator	Dr. Paweł Staniszewski (WULS)	
Lecturer	Dr. Paweł Staniszewski (WULS)	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	25	
Teaching form	Lecture (22h), Practical Exercise (22h), self-study (75h)	
Language	English	
Examination form	Written exam (50%), Work report (50%)	
Entry requirements		
Goal	The main objective of the course is to present forest as a source of various non-wood forest products as well as problems of estimation of non-wood forest resources, its utilization, market and law instruments.	
Content	Forest resource utilisation in sustainable forestry; resource analysis and inventory of non-wood forest products (NWFP); characteristic, harvesting, processing and quality assessment of selected NWFP; policy and law instruments related to NWFP utilisation; environmental effects; NWFP market analysis and prognosis; utilisation examples..	
Recommended related elective modules		
Competence	Technical competence (70%), Methodological competence (10%), Social competence (10%), Media competence (10%)	
References	Wird zu Beginn der Lehrveranstaltung bekannt gegeben/ to be announced at semester beginning	

Module	Principles of landscape ecology (A)
Study programme	Forest Information Technology
Semester	3. Sem.
Module coordinator	Prof. Dr. habil. Jarosław Skłodowski (WULS) jarek.sklodowski@wl.sggw.pl
Status	Elective
Coordinator	Prof. Dr. habil. Jarosław Skłodowski (WULS)
Lecturer	Prof. Dr. habil. Jarosław Skłodowski (WULS), Dr. Marek Sławski (WULS), Dr. Taida Tarabuła (WULS)
ECTS- Credits	4 Workload 120 h / Semester
SWH	3
Max. study places	25
Teaching form	Lecture (14h), Project (22h), Seminar (9h), self-study (75h)
Language	English
Examination form	Project report
Entry requirements	
Goal	Students have an understanding of landscape processes and skills of improvement of functioning of disturbed landscapes.
Content	This module introduces into the following topics: Scale and hierarchy, causes of landscape patterns, succession theory, energy in landscape, fragmentation of forests and others habitats, biogeographical island theory, metapopulation ecology, water in landscape, disturbance in landscape, biological active patches, landscape equilibrium, ecosystem processes in the landscape, landscape in tourism.
Recommended related elective modules	Forest ecology (A)
Competence	Technical competence (50%), Methodological competence (50%)
References	Turner M., Gardner R.H., O'Neill R.V. 2001. Landscape Ecology in Theory and Practice: Pattern and Process. Springer-Verlag. Gergel S.E., Turner M.G. 2002. Learning Landscape Ecology. Springer-Verlag.

Module	Programming III	
Study programme	Forest Information Technology	
Semester	3. Sem.	
Module coordinator	Prof. Dr. Johannes Creutziger	jcreu@fh-eberswalde.de
Status	Elective	
Coordinator	Prof. Dr. Johannes Creutziger	
Lecturer	Prof. Dr. Johannes Creutziger	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	25	
Teaching form	Lecture (18h), Practical Exercise (18h), Seminar (9h), self-study (75h)	
Language	English	
Examination form	Work report	
Entry requirements	Programming I; Programming II	
Goal	Students are enabled to use methods of object oriented programming with ArcObjects, Visual Basic and Visual Basic for Applications, to extend ArcGIS Desktop applications and to programmatively access Database systems.	
Content	The course extends and deepens the abilities to develop object oriented programmes. It includes in particular the following topics: Understanding ArcObjects, programming extensions to ArcGIS Desktop applications using ArcObjects and VBA (Visual Basic for Applications), programming with .NET classes, understanding geometry objects and geoprocessing; customizing the user interface; accessing databases from Visual Basic, using development tools. Students learn to develop rather complex application programmes in own responsibility.	
Recommended related elective modules	Web databases	
Competence	Technical competence (30%), Methodological competence (30%), Personal competence (20%), Media competence (20%)	
References	Liberty, J. (2005): Programming Visual Basic. O'Reilly. Burke, R. (2003): Getting to Know ArcObjects. Environmental Systems Research Institute, Inc., U.S. Liebig, W. (2007): ArcGIS-ArcView 9 Programmierung. Einführung in Visual Basic (VBA) und ArcObjects. Points Verlag Norden Halmstad. Documentation on the ESRI Developer Network Website (http://edn.esri.com/)	

Module	Specialisation modul IIIe (Current technologies and applications)	
Study programme	Forest Information Technology	
Semester	3. Sem.	
Module coordinator	Prof. Dr. Alfred Schultz	aschultz@fh-eberswalde.de
Status	Elective	
Coordinator	Head of study program	
Lecturer	N.N.	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places		
Teaching form	Seminar (45h), self-study (75h)	
Language	English	
Examination form	Undefined, Undefined	
Entry requirements		
Goal	Students become acquainted with current developments of IT and their applications in forestry and environment related areas.	
Content	This module offers a changing spectrum of topics related to current developments in the area of IT fundamentals and forest and environment related applications. The offered topics preferably deepen and extend knowledge imparted in the mandatory modules of the 1st and the 2nd semester (databases, Geographic Information Systems, Remote Sensing, statistics, photogrammetry, programming). Guest lecturers from other universities and research institutions will appear.	
Recommended related elective modules		
Competence		
References		

Module	Specialisation modul IIIw (Current technologies and applications)	
Study programme	Forest Information Technology	
Semester	3. Sem.	
Module coordinator	Dr. Michal Zasada	michal.zasada@wl.sggw.pl
Status	Elective	
Coordinator	Dr. Michal Zasada	
Lecturer	N.N.	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places		
Teaching form	Seminar (45h), self-study (75h)	
Language	English	
Examination form	Undefined, Undefined	
Entry requirements		
Goal	Students become acquainted with current developments of IT and their applications in forestry and environment related areas.	
Content	This module offers a changing spectrum of topics related to current developments in the area of IT fundamentals and forest and environment related applications. The offered topics preferably deepen and extend knowledge imparted in the mandatory modules of the 1st and the 2nd semester (databases, Geographic Information Systems, Remote Sensing, statistics, photogrammetry, programming). Guest lecturers from other universities and research institutions will appear. Furthermore students may select Master level modules related to the core contents of the FIT programme offered by other Master programmes and accepted by the head of the study programme.	
Recommended related elective modules		
Competence		
References	wird am Anfang des Semesters bekannt gegeben / to be announced at start of the semester	

Module	Tree ring analysis	
Study programme	Forest Information Technology	
Semester	3. Sem.	
Module coordinator	Dr. Robert Tomusiak (WULS)	robert.tomusiak@wl.sggw.pl
Status	Elective	
Coordinator	Dr. Robert Tomusiak (WULS)	
Lecturer	Dr. Robert Tomusiak (WULS)	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	25	
Teaching form	Practical Exercise (22h), Seminar (22h), self-study (75h)	
Language	English	
Examination form	Project report (40%), Written exam (60%)	
Entry requirements		
Goal	Students are able to conduct research based on tree-ring data and have an extended understanding of past responses of tree growth to environmental variability and prediction of forest responses to change of environment in the future.	
Content	The following chapters are handled: process of forming of tree rings, factors effecting tree ring's width, software for control, creating and analysing tree ring chronologies, methods and applications of dendrochronology.	
Recommended related elective modules		
Competence	Technical competence (50%), Methodological competence (40%), Personal competence (10%)	
References	IPCC 2007, Fourth Assessment Report. URL: www.ipcc.ch; Kates et al. 2001. Sustainability Science. Science 27. Vol. 292. no. 5517, pp. 641 - 642; Stern Review on the Economics of Climate Change 2006.	

Module	Master thesis and defence	
Study programme	Forest Information Technology	
Semester	4. Sem.	
Module coordinator	Prof. Dr. Alfred Schultz	aschultz@fh-eberswalde.de
Status	Mandatory	
Examination form	Project presentation, Project report, Technical discussion 15 min	
ECTS-Credits	20	Workload h / Semester
SWH instructed		

Module component	Master thesis	
Coordinator	Head of study program	
Lecturer	N.N.	
ECTS- Credits		Workload
SWH		
Max. study places	25	
Teaching form	Project (h)	
Language	English	
Examination form	Project report (50%)	
Entry requirements		
Goal	Students obtain own research results while solving an IT application related design or discussing a scientific problem.	
Content	The goal of the Master Thesis is that students work on and independently solve an IT application related problem according to scientific standards within a limited time. Students show their ability to apply recent scientific results and to derive new consolidated findings on the basis of their topical and methodological knowledge. Main parts of the thesis are the motivation and practical definition of the topic, the formulation of research targets and questions, the annotated representation of the state-of-the-art including prevailing theories and meanings, as well as the own contribution for reaching the assumed targets. It is possible to prepare a thesis concerning a question of design (concept and/or implementation of a problem solution) as well as concerning discursive topics (discussion of theories and published results). Cooperation with companies and organisations is possible as far as reasonable common targets can be found and the necessary scientific quality may be attained.	
Recommended related elective modules		
Competence	Technical competence (25%), Methodological competence (25%), Personal competence (25%), Media competence (25%)	
References	Schilling, A. 2005. Hinweise für das Anfertigen einer Bachelor-Arbeit/ Master-Arbeit am Fachbereich Forstwirtschaft. Fachhochschule Eberswalde. Unveröffentlicht.	

Module	Master thesis and defence	
Study programme	Forest Information Technology	
Semester	4. Sem.	
Module coordinator	Prof. Dr. Alfred Schultz	aschultz@fh-eberswalde.de
Status	Mandatory	
Examination form	Project presentation, Project report, Technical discussion 15 min	
ECTS-Credits	20	Workload h / Semester
SWH instructed		

Module component	Defence	
Coordinator	Prof. Dr. Alfred Schultz	
Lecturer	N.N.	
ECTS- Credits		Workload
SWH		
Max. study places	25	
Teaching form		
Language	English	
Examination form	Project presentation (25%), Technical discussion 15 min (25%)	
Entry requirements		
Goal	Students present individual research results as academic personalities.	
Content	The goal of the public Master thesis defence is that students present their individual research results as academic personalities. The defence takes 30 minutes and consists of a 15 minutes lecture block and a 15 minutes block of questions concerning the thesis as well as topical and methodological background of the topic.	
Recommended related elective modules		
Competence	Technical competence (25%), Methodological competence (25%), Social competence (25%), Personal competence (25%)	
References		

Module	Student research colloquium	
Study programme	Forest Information Technology	
Semester	4. Sem.	
Module coordinator	Prof. Dr. Alfred Schultz	aschultz@fh-eberswalde.de
Status	Mandatory	
Coordinator	Head of study program	
Lecturer	N.N.	
ECTS- Credits	4	Workload 120 h / Semester
SWH	3	
Max. study places	25	
Teaching form	Seminar (45h), self-study (75h)	
Language	English	
Examination form	Project presentation	
Entry requirements	Research project	
Goal	Students extend and strengthen abilities to carry out scientific work and develop and manifest skills to evaluate and communicate results of this work.	
Content	Students present the results of a scientific project related to current areas of IT application in forestry and environment. While doing so, selected, especially IT-related topics of the curriculum are independently deepened concerning content and methods. Students demonstrate their topical knowledge about the selected research problem, but also show their abilities to present it in a convincing manner. Students are requested to give reasons for and to defend positions and to deal with feedback and critics. Conclusions concerning further working steps and expectations should be derived. The research results are summarized in a ready-to-publish form for the homepage of the study programme and presented within the frame of a public colloquium. The presentation should show that details and interrelationships are elaborated and understood on a wide base of sources.	
Recommended related elective modules		
Competence	Technical competence (20%), Methodological competence (20%), Social competence (20%), Personal competence (20%), Media competence (20%)	
References		

Module	Environmental data analysis	
Study programme	Forest Information Technology	
Semester	4. Sem.	
Module coordinator	Prof. Dr. Alfred Schultz	aschultz@fh-eberswalde.de
Status	Elective	
Coordinator	Prof. Dr. Alfred Schultz	
Lecturer	Prof. Dr. Alfred Schultz	
ECTS- Credits	6	Workload 180 h / Semester
SWH	4	
Max. study places	25	
Teaching form	Lecture (24h), Practical Exercise (24h), Seminar (12h), self-study (120h)	
Language	English	
Examination form	Project report	
Entry requirements	Data analysis and management I & II, GIS I	
Goal	Students know theoretical fundamentals of analyzing non-spatial and spatial environmental data and are able to pre-process, compile and analyze large structured and unstructured environmental data sets for different targets. Students are able to apply related software for data analysis and visualization.	
Content	The module introduces essential concepts and the differences of non-spatial and spatial environmental data analysis – including statistical and non-statistical methods. One focus is on the concept of data mining and knowledge discovery in databases. Here an overview of principal mining techniques and practical skills to select and apply methods such as 1. clustering, 2. association, 3. classification and 4. numeric prediction are imparted. Demonstration examples come from applications in environmental research and practice. The second focus is on analysis of spatial data. Here the fundamentals of spatial interpolation including theoretical concepts and practical methods for the visualization of spatial environmental data are imparted. Special emphasis is given to the geostatistical approach (variogram, variogram modelling, spatial prediction, kriging and cokriging). Students learn to select and to apply appropriate methods for data analysis and will become able to accomplish analyses including the utilization of common software tools.	
Recommended related elective modules		
Competence	Technical competence (50%), Methodological competence (40%), Personal competence (10%)	
References	Witten, I. A. & E. Frank (2005): Data Mining. Elsevier. Han, J. & M. Kamber (2000): Data Mining: Concepts and Techniques. Morgan Kaufmann Publishers. Tukey, J. W (1978): Exploratory Data Analysis. Addison-Wesley. Isaaks, E.H. & R.H. Srivastava (1992): Introduction to Applied Geostatistics. Oxford University Press. Schumann, H. & W. Müller (1999): Visualisierung, Grundlagen und allgemeine Methoden. Springer.	

Module	Forest inventory and modelling (B)
Study programme	Forest Information Technology
Semester	4. Sem.
Module coordinator	Prof. Dr. NN (GIS)
Status	Elective
Coordinator	Prof. Dr. NN (GIS)
Lecturer	Dr. Michal Zasada
ECTS- Credits	6 Workload 180 h / Semester
SWH	4
Max. study places	25
Teaching form	Lecture (24h), Project (18h), Seminar (18h), self-study (120h)
Language	English
Examination form	Written exam (50%), Project report (50%)
Entry requirements	Data Analysis & Management I, Forest Mensuration, Data Analysis & Management II,
Goal	Students are able to apply deepened knowledge of the statistical fundamentals of forest inventory for planning and evaluating inventories.
Content	Representative method; sampling frame construction; sample design; estimation methods; sampling error; examples of forest inventory using various designs.
Recommended related elective modules	Data analysis and management II
Competence	Technical competence (50%), Methodological competence (40%), Personal competence (10%)
References	Shiver, B.D. & B.E. Borders (1996): Sampling Techniques for Forest Resource Inventory. John Wiley & Sons. Iles K. (2003): A sampler of Inventory Topics. Kim Iles & Associates. Materials provided by the lecturer

Module	Remote sensing for environmental monitoring
Study programme	Forest Information Technology
Semester	4. Sem.
Module coordinator	Prof. Dr. habil. Jerzy Mozgawa (WULS)
Status	Elective
Coordinator	Prof. Dr. habil. Jerzy Mozgawa (WULS)
Lecturer	Prof. Dr. habil. Jerzy Mozgawa (WULS)
ECTS- Credits	6 Workload 180 h / Semester
SWH	4
Max. study places	25
Teaching form	Lecture (30h), Seminar (30h), self-study (120h)
Language	English
Examination form	Technical discussion 20 min
Entry requirements	Geomatics I&II, Digital Processing of Remotely Sensed Data
Goal	Students are able to select main fields and apply possible practical application of remote sensing techniques with a landscape ecological approach.
Content	Introduction to contemporary remote sensing (RS) technology; principles of RS image interpretation for rural areas monitoring with ecological landscape approach, and the selection of main fields of possible practical application (IACS, precision agriculture, crop condition evaluation, land use/land cover change, disaster management on the rural areas).
Recommended related elective modules	
Competence	Technical competence (50%), Methodological competence (40%), Personal competence (10%)
References	Ahern, F., J.M. Gregoire, C. Justice (2000): Forest Fire Monitoring and Mapping: a Component of Global Observation of Forest Cover. Publications of the European Commission, EUR 19588, Luxembourg.

Module	Remote sensing for global monitoring
Study programme	Forest Information Technology
Semester	4. Sem.
Module coordinator	Prof. Dr. NN (GIS)
Status	Elective
Coordinator	Prof. Dr. NN (GIS)
Lecturer	Prof. Dr. NN (GIS)
ECTS- Credits	6 Workload 180 h / Semester
SWH	4
Max. study places	25
Teaching form	Lecture (30h), Seminar (30h), self-study (120h)
Language	English
Examination form	Project report
Entry requirements	Geomatics I&II
Goal	Students are enabled to use Remote Sensing (RS) and Geographic Information Systems (GIS) for various purposes in different applications related to phenomena observed on global scale.
Content	Nowadays Remote Sensing (RS) combined with Geographic Information Systems (GIS) provides a variety of techniques which can be used in monitoring global phenomena. The course introduces different RS/GIS techniques which may be used in analysis of processes in atmosphere, oceans and lands. It will be concentrated in deriving information from multi-temporal and multi-score data.
Recommended related elective modules	
Competence	Technical competence (50%), Methodological competence (40%), Personal competence (10%)
References	Ahern, F., J.M. Gregoire, C. Justice (2000): Forest Fire Monitoring and Mapping: a Component of Global Observation of Forest Cover. Publications of the European Commission, EUR 19588, Luxembourg.

Module	Specialisation modul IVe (Current technologies and applications)	
Study programme	Forest Information Technology	
Semester	4. Sem.	
Module coordinator	Prof. Dr. Alfred Schultz	aschultz@fh-eberswalde.de
Status	Elective	
Coordinator	Prof. Dr. Alfred Schultz	
Lecturer	N.N.	
ECTS- Credits	6	Workload 180 h / Semester
SWH	4	
Max. study places	25	
Teaching form	Seminar (60h), self-study (120h)	
Language	English	
Examination form	Undefined, Undefined	
Entry requirements		
Goal	Students become acquainted with current developments of IT and their applications in forestry and environment related areas.	
Content	This module offers a changing spectrum of topics related to current developments in the area of IT fundamentals and forest and environment related applications. The offered topics preferably deepen and extend knowledge imparted in the mandatory modules of the 1st and the 2nd semester (databases, Geographic Information Systems, Remote Sensing, statistics, photogrammetry, programming). Guest lecturers from other universities and research institutions will appear.	
Recommended related elective modules		
Competence		
References		

Module	Specialisation modul IVw (Current technologies and applications)	
Study programme	Forest Information Technology	
Semester	4. Sem.	
Module coordinator	Dr. Michal Zasada	michal.zasada@wl.sggw.pl
Status	Elective	
Coordinator	Dr. Michal Zasada	
Lecturer	N.N.	
ECTS- Credits	6	Workload 180 h / Semester
SWH	4	
Max. study places	25	
Teaching form	Seminar (60h), self-study (120h)	
Language	English	
Examination form	Undefined, Undefined	
Entry requirements		
Goal	Students become acquainted with current developments of IT and their applications in forestry and environment related areas.	
Content	This module offers a changing spectrum of topics related to current developments in the area of IT fundamentals and forest and environment related applications. The offered topics preferably deepen and extend knowledge imparted in the mandatory modules of the 1st and the 2nd semester (databases, Geographic Information Systems, Remote Sensing, statistics, photogrammetry, programming). Guest lecturers from other universities and research institutions will appear.	
Recommended related elective modules		
Competence		
References		

Module	Web databases	
Study programme	Forest Information Technology	
Semester	4. Sem.	
Module coordinator	Prof. Dr. Alfred Schultz	aschultz@fh-eberswalde.de
Status	Elective	
Coordinator	Prof. Dr. Alfred Schultz	
Lecturer	Prof. Dr. Alfred Schultz, Dr. E. Groll	
ECTS- Credits	6	Workload 180 h / Semester
SWH	4	
Max. study places	26	
Teaching form	Lecture (24h), Practical Exercise (24h), Seminar (12h), self-study (120h)	
Language	English	
Examination form	Project report	
Entry requirements	Data analysis and management I, Internet Programming	
Goal	Students know the theoretical fundamentals and possess the practical skills to design and to implement Internet based databases.	
Content	The course treats the design and implementation of databases for use in the Internet. The knowledge of SQL language elements is strengthened and extended. The PHP programming language (basics, variables, control structures) is introduced. The notion of client-server-databases is imparted using a LAMP and WAMP environments. Practical exercises for designing databases will be accomplished using MySQL. Various techniques to create and manipulate MySQL tables through PHP and to perform SQL queries to obtain data from MySQL tables are introduces and trained. Course participants develop jointly an application project.	
Recommended related elective modules		
Competence	Technical competence (50%), Methodological competence (40%), Personal competence (10%)	
References	Elmasri, R. & S. B. Navathe (2004): Fundamentals of Database Systems. Addison-Wesley. Dubois, P (2005): MySQL. New Riders Publishing SAMS. Welling, L. & L. Thomson (2004): PHP and MySQL Web Development. New Riders Publishing SAMS.	