Forest Information Technology (M.Sc.)

Curriculum and Module Description

*valid from winter term 2022/23*

| Semester | Status | Offered by | Module Title | Module coordinator | Module components (if existing) | Goal of module component | Lecturer | SWH | Workload | Credits | Teaching form | Teaching language | Examination form |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M | HNEE / EUSD | Principles of Forest Information Technology | Jens Müller | Principles of forest data structures | Students gain fundamental knowledge about forest data structures and their spatial and digital representation. They become familiar with IT based methods and techniques of relevance for forest science analysis and management. | Jens Müller | 2 | 3 | 6 | L, PE | E | PR |
| | | | | | Principles of GIS and Remote Sensing | Students get an applied introduction to the use of geospatial data and technology in ecological and sustainable forest management and applied forest technology and more broadly in environmental sciences. Students understand principal methods of geospatial spatial data. They deploy essential and state of the art geospatial technology and are able to analyze and interpret geospatial data collected primarily in forest ecosystems. | Jan-Peter Mund, Jens Müller | 2 | 3 | | | | |
| 1 | M | HNEE / EUSD | Applied Programming in Forestry | Luis Miranda | | Students deploy algorithms conceptually and implement them using a programming language. Students use computer programming techniques to analyze datasets from practical applications in environmental science and forestry. They develop programs that handle different data types and structures, perform calculations and represent the results visually. | Luis Miranda | 4 | 6 | 6 | L, PE | E | PR |
| 1 | M | HNEE / EUSD | Data and Statistics in Forestry | Evelyn Wallor | Forestry data structures and spatial data models | Students know the theoretical fundamentals of data concepts and are able to plan and to implement databases for spatial data processing. They define and describe the important data structures and data types involved in the creation of spatial data models and identify the processing techniques required by different types of data. They are able to perform conversions and information retrieval from complex data sources. | Evelyn Wallor, Jan-Peter Mund | 2 | 3 | 6 | L, PE | E | WE |
| | | | | | Environmental spatial data analysis | Students perform statistical analyses of environmental spatial data. They know the advantages and disadvantages of different sampling strategies and monitoring concepts. Students are able to select appropriate statistical procedures and tests to find structures and relations in the data and to justify statements. | Luis Miranda, Evelyn Wallor | 2 | 3 | | | | |
| 1 | E | HNEE / EUSD | Carbon sequestration and accounting | Martin Guericke | | Students understand the carbon cycle with special reference to forests, soils and forest products. They are qualified to develop and critically reflect forest growth scenarios and have acquired basic knowledge of the purpose and the implementation of life cycle analysis (LCA), product carbon footprints (PCF) and corporate carbon footprints (CCF). | Martin Guericke, Winfried Riek, Tobias Cremer | 4 | 6 | 6 | L, P | E | WR |
| 1 | E | HNEE / EUSD | Forest inventory & Tree monitoring | Ute Sass-Klaassen | Principles of forest inventories | Students know principal methods and concepts of inventories at different spatial scales and collect comprehensive information about the state and dynamics of forests for strategic and management planning. | Ute Sass-Klaassen, Barbara Wolff et al. | 1 | 2 | 6 | L, PE | E | WE (50%); PR (50%) |
| | | | | | Examples of forest monitoring at tree- and stand level | Students gain an understanding of basic principles of tree growth and physiology in relation to changing environmental conditions. Based on this, outcomes of state-of-the-art forest monitoring systems are used to assess forest productivity, carbon budgets, and forest resilience to changing environmental conditions. | | 2 | 2 | | L, PE | E | |
| | | | | | Relevance of FIT for forest conservation & management | Students critically evaluate the relevance of long-term inventory and monitoring for decision making in forestry and environmental sciences. | | 1 | 2 | | L, PE | E | |

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| 1 | E | HNEE / EUSD | Forest 4.0 - Methods and tools for spatial parametrization of biomass | Jan-Peter Mund | | Students are aware of the principal methods and innovative technical tools for estimating, quantifying, calculating and mapping the baseline of different carbon pools and to monitor carbon stock changes related to various forest and land management measures. After the course, students have a solid foundation of principal concepts of biomass and carbon quantification and their specific cycles. Students know about the advantages applying remote sensing and modelling techniques for the spatial assessment and modelling of forest biomass at different scales. Students will learn about different carbon parametrization, quantification or simulation models for forest biomass on a landscape level and discuss methods to quantify forest biomass and estimate the forest carbon stock and their uncertainty. | Jan-Peter Mund | 4 | 6 | 6 | L, S, PE | E | PP (50%), PR (50%) |
| 1 | E | HNEE / EUSD | Project Management | Uli Gräbener | | Students acquire in-depth knowledge of projects, their planning and implementation, of different planning and implementation methods and instruments.<br>Applying: Students are able to plan and implement projects using both classic and nature conservation-specific project planning tools. They can take different roles in project planning and execution. They define important tasks of their own lives as projects and to carry them out in an appropriately structured and organised manner.<br>Analysing and evaluating: Students can assess and reflect on project success and ways for improvement. | Uli Gräbener et al. | 4 | 6 | 6 | L,S | E | OR |
| 1 | E | HNEE / EUSD | Approaches and tools for research & monitoring with geodata and remote sensing | Jens Müller | Geodata and remote sensing as tools for spatial monitoring | Familiarize the students with the fundamental theoretical ideas and practical concepts for a long term monitoring framework in protected areas using geo-spatial data and remote sensing products. | Jan-Peter Mund, Jens Müller | 2 | 3 | 6 | S, PE | E | OR |
| | | | | | Basics in Monitorig and Research | Presentation of the theoretical principles of quantitative research as well as spatial research and monitoring methods. Practical examples of application from research, monitoring and evaluation in the context of international protected areas. Inter- and transdisciplinary methods of knowledge management will be presented as well as innovative, digital methods of citizen science and communication via social media. Students learn the methods of empirical social research as well as scaled spatial analysis from the perspective of different actors in the context of protected areas. | Erik Aschenbrand, Jens Müller | 2 | 3 | | L | | |
| 1 | E | HNEE / E | Academic Writing and Presenting | Language Centre | Academic Writing and Presenting | Students can understand and apply the principles of academic writing and presenting. They can communicate effectively in an academic context. | Language Centre | 4 | 6 | 6 | S | E | OR |
| 1 | E | HNEE / EUSD | Fundamentals of Measurements and Modelling | Luis Miranda | Sensors for automated measurements | Students identify and describe the measuring principles behind sensor technologies used as data sources for environmental modelling. They know the principles of data quality assessment and further data processing procedures that guarantee a meaningful re-use of the measured data. | Luis Miranda | 2 | 3 | 6 | L; PE | E | TD (50%) |
| | | | | | Process modelling methodology | Students know about application areas of ecosystem models and are able to distinguish between different modelling concepts. They have a broad overview of different models and tools related to different focuses on environmental processes, e.g. carbon dynamics, water- and nutrient cycling, and biomass growth. Students learn the principles of modelling practice in terms of parameter estimation, model set-up, and model validation. They conceptualize and design mathematical models to be used in environmental science, forestry and ecology. The students define input and output variables as well as protocols for modelling exercises. | Evelyn Wallor | 2 | 3 | | | | TP (50%) |
| 1 | E | tbd | Specialisation module | Head of study programme | | Students deepen their professional knowledge and skills in a specific area, that is of special interest for them. Students can identify their personal interests in the field of forest information technology and expand their horizon to approaches in related study programmes. | tbd | 4 | 6 | 6 | tbd | tbd | tbd |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | M | WULS | Sustainable forestry | Arkadiusz Gruchała | Close to Nature Silviculture & Nature Conservation | To get the students acquainted with the basic concepts, terms, terminology and methods of close-to-nature silviculture (CNS) as a core component of modern, multifunctional forestry. After the course, the students should be able to plan different types of silvicultural actions (relating to forest reproduction and forest tending) in various categories of forest stands, with a special reference to Central European conditions. | Bogdan Brzeziecki, Kamil Bielak | 2 | 2 | 6 | L, P, PE | E | PR, WE* |
| | | | | | Forest engineering and utilization | Students are able to manage the sustainable use of forest resources by using new technologies, optimization and planning techniques. 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. | Tadeusz Moskalik, Grzegorz Jednoralski | 2 | 2 | | | | |
| | | | | | Forest policy and economics | Students can apply fundamentals of modern Forest policy in practice. | Lech Płotkowski, Irena Łukawska | 2 | 2 | | | | |
| 2 | M | WULS | Data processing and programming | Michał Zasada | Applied GIS programming | Students are able to develop programs of increased extent by means of different structures, database management and geodata analysis. | Wiktor Tracz | 2 | 2 | 6 | L, P, PE | E | PR, PP* |
| | | | | | Spatial data analysis and modelling | The main objective of the course is to introduce the use of the statistical programming environment for practical statistical problem solving. | Karol Bronisz, Michał Zasada | 2 | 2 | | | | |
| | | | | | GIS in forest practice | The concept of this module base on combining different data sources (LiDAR, filed measurements, GNSS and UAV) and different techniques (GIS, remote sensing, map algebra, tree segmentation) in order to get detailed forest metrics. | Michał Brach | 2 | 2 | | | | |
| 2 | M | WULS | Data collection and processing technology | Michał Zasada | Forest Photogrammetry | The aim of the course is to introduction students with the methods of acquiring, processing and interpreting image information (satellite images, aerial photos and low-altitude UAV-images) to assess the condition and changes in the environment of forest areas. | Łukasz Kwaśny | 2 | 2 | 6 | L, P, PE | E | PR, PP, WE* |
| | | | | | Digital Processing of Remotely Sensed Data | The main objective of the course is to provide students with the ability of processing remotely sensed data for forestry and environmental purpos-es. | Jarosław Chormański, Jonathan Chan | 2 | 2 | | | | |
| | | | | | Forest inventory and modelling | Students are able to apply deepened knowledge of the statistical fundamentals of forest inventory for planning and evaluating inventories. | Karol Bronisz, Michał Zasada | 2 | 2 | | | | |
| 2 | E | WULS | Scientific Principles: Presentation and planning skills | Luiza Czekała | Public speaking and scientific presentation | The course is going to cover all competencies being involved in public – both academic and non-academic – speaking. | Karol Chrobak | 2 | 3 | 6 | L, P, PE | E | PP |
| | | | | | Presentation & planning skills: Writing and implementing research projects | The aim of the course is to provide students with knowledge in the field of applying and implementing international research projects, as well as to indicate the added values related to the implementation of MPB that affect the development of a scientific career. During the course, students will be presented with information on: application possibilities, partnerships, elements of a good application, benefits of project reporting and others. | The International Research Projects Office | 2 | 3 | | | | |
| 2 | E | WULS | Scientific Principles: Language and social skills | Katarzyna Marciszewska | Polish language | Students know the fundamentals of the current Polish society and are able to apply Polish language in everyday situations. | International Relations Office | 2 | 3 | 6 | L, P, PE | E | TD, PP* |
| | | | | | Forests - human cultural heritage | Students gain the knowlegde about forests as the material basis of European culture and source of inspiration in culture and art with special emphasis to Poland. They become familiar with various ways of defining the forest and the basic concepts and definitions of civilization, culture and art, relations between these concepts and their development. On the basis of their own cultural identity, they make comparisons of the culture-creating role of the forests in different periods and regions of the world. Students understand the need and develop the skills to present forests as human cultural heritage. | Katarzyna Marciszewska | 2 | 3 | | | | |

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| 2 | E | WULS | Forest biometry, biomass and tree ring analysis | Michał Zasada | Forest mensuration | 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. | Robert Tomusiak, Rafał Wojtan | 2 | 2 | 6 | L, P, PE | E | PR,PP* |
| | | | | | Biomass assesment and modeling | During the course students will learn how to design, collect and process data in order to estimate amount of woody biomass biomass in forest stands - as a tool for forest inventory related mainly to carbon sequestration. | Karol Bronisz, Michał Zasada, Szymon Bijak | 2 | 2 | | | | |
| | | | | | Tree ring analysis | 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. | Robert Tomusiak | 2 | 2 | | | | |
| 2 | E | WULS | Principles of landscape ecology | Marek Sławski | Principles of landscape ecology | students will understand principles of landscape functioning and factors influencing it. Recognize ways and rates of matter flux within landscapes. Understand relations between landscape pattern and ecological processes | Marek Sławski, Taida Tarabuła | 3 | 6 | 6 | L, P, PE | E | PR, PP, WE* |
| 2 | E | WULS | LiDAR data processing and geostatistical methods in forestry | Michał Brach | Spatial analysis | Acquisition of knowledge and skills for applications of geostatistical methods in forestry at local and regional scale. | Wiktor Tracz | 2 | 2 | 6 | L, P, PE | E | PR,PP* |
| | | | | | Map editing | Get knowledge about the principles of digital cartography, master the skills of precise digitalization, create a complete workflow of spatial analysis and process LiDAR data in order to solve three-dimensional spatial problems. | Michał Brach | 2 | 2 | | | | |
| | | | | | Spatial statistics | Statistical measures of spatial dependence and spatial variability. Local and global spatial autocorrelation indices. Geostatistical methods of spatial interpolation and evaluation of uncertainty. Optimization of sampling methods based on geostatistical prediction. | Dariusz Gozdowski | 2 | 2 | | | | |
| 2 | E | WULS | Sustainable Forest Management & forest products | Roman Wójcik | The environmental basis for management planning in forests | Learning about the methods for determining the natural basis for man-agement planning in forests. | Michał Orzechowski, Roman Wójcik, Wojciech Kędziora, Dawid Sikora, Joanna Mielczarczyk | 2 | 2 | 6 | L, P, PE | E | PR,PP* |
| | | | | | Urban forestry - planning of urban and suburban forests | Learning about the specificity of forestry in urban and suburban conditions. | Roman Wójcik, Michał Orzechowski, Wojciech Kędziora, Dawid Sikora, Joanna Mielczarczyk | 2 | 2 | | | | |
| | | | | | Non-Wood Forest Products | The main objective of the course is to present forest as a source of various non-wood forest raw material and products as well as problems of estimation of non-wood forest resources, its utilization, market and law in-struments. | Paweł Staniszewski | 2 | 2 | | | | |
| 2 | E | WULS | Specialisation module | Head of study programme | Specialisation module | Students deepen their professional knowledge and skills in a specific ar-ea, that is of special interest for them. Students can identify their personal interests in the field of forest information technology and expand their horizon to approaches in related study programmes. | tbd | 4 | 6 | 6 | tbd | tbd | tbd |

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| 3 | M | tbd | Research project | Head of study programme | Scientific or technical research project | Students are enabled to plan and accomplish a particular research project of moderate size and consolidated their senior level of graduate academic maturity concerning their thematic focus. | Luis Miranda, Jan-Peter Mund et al., Michał Zasada et al., Felipe Bravo et al. | 12 | 15 | 18 | PE | E | PP & TP |
| | | | | | Scientific Internet Colloquium | Students are able to discover new areas of IT applications, extend and manifest their capacities for accomplishing scientific work including academic writing and reviewing scientific papers in an online virtual seminar. | Luis Miranda, Michał Zasada, Felipe Bravo | 2 | 3 | | | | |
| 3 | E | WULS | Innovative economy, policy and social sciences in forestry | Arkadiusz Gruchała | Negotations in forestry | Students are able to prepare oral presentations. Student is able to carry out a two-way communication process, the aim of which is to reach an agreement when at least one party does not agree with a given opinion or with a given solution to the situation. | Arkadiusz Gruchała | 2 | 3 | 6 | L, P, PE | E | PR,PP* |
| | | | | | Entrepreneurship (for Tourism) | Student knows methods and instruments of gaining data about functioning tourist enetrprises; knows basic rules of creation and development of individual entrepreneurship's forms; is planning and implementing own enterprising ideas; can prepare documents necessary to start and run business; can think and act in enterprising way; can work in a team. | Piotr Gabryjończyk | 2 | 3 | | | | |
| 3 | E | WULS | Natural resources & conservation | Katarzyna Marciszewska | Assessment and Evaluation of Natural Resources | Student knows basic characteristics of populations ecosystems and landscapes, basic method of assessment and evaluation. Is able to to assess and evaluate natural and cultural resources in practice | Axel Schwerk | 2 | 2 | 6 | L, P, PE | E | PR, PP, WE* |
| | | | | | Forest trees in Poland | The aim of the course is to familiarize students with the main species of conifers and deciduous trees found in the forests of Poland. The scope of the acquired knowledge includes the systematic affiliation of species, their morphological features, ecological requirements and forest-forming importance. Practical classes include recognizing the species according habit, characteristics of leaves, bark, flowers and fruits or cones. Field classes consist in recognizing native trees and learning about species of foreign origin during a trip through the forest near Warsaw. | Katarzyna Marciszewska | 2 | 2 | | | | |
| | | | | | Active Nature Conservation | The aim of the course is to present the measures of active nature conservation, with special focus on wild animals. | Krzysztof Klimaszewski | 2 | 2 | | | | |
| 3 | E | WULS | Information & mathematical models | Michał Brach | Mathematical Models in Biology and Economics | Students will know basic mathematical models in economics and biology, be able to analyze the models, will be apply special software to analyze qualitative behavior of investigated models, will be able to make calculations concerning matrices, differential and difference equations in Mathematica or Matlab. | Urszula Grzybowska | 2 | 4 | 6 | L, P, PE | E | PR, PP* |
| | | | | | Sharing data over the internet | Practical exercises how to move the GIS projects from desktop to online form, create and field update the web-based maps and finally create the simple geoportal. | Michał Brach | 2 | 2 | | | | |
| 3 | E | WULS | Environmental Monitoring | Leszek Hejduk | | Legal basis of environmental monitoring, cross-border transfer of waste and pollution, international environmental monitoring programs. Sources of information about environment condition. Flow of environment information on the example of Polish State Environmental Monitoring System. Norms for air, water and soil quality. | Leszek Hejduk | 2 | 6 | 6 | L, P, PE | E | PR,PP* |

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| 3 | E | HNEE / EUSD | Advanced remote sensing innovations (ARSI) | Jan-Peter Mund | Photogrammetry and advanced image analytics 2 | Students know principles of photogrammetry algorithms and technological solutions for automated data collection using UAV applied in forestry and environment and have practical experiences with specific UAV devices. | Jan-Peter Mund | 2 | 3 | 6 | L, PE | E | TP |
| | | | | | Remote Sensing change detection principles | Students are enabled to use remote sensing and geographic information system in different applications related to forest protection and forest change detection. | Jan-Peter Mund, Luis Miranda | 2 | 3 | | | | |
| 3 | E | HNEE / EUSD | Advanced LiDAR data analysis | Jan-Peter Mund | | Students are familiar with the technological principles of LiDAR approaches and are able to pre-process and analyse LiDAR data and to display and communicate related results. | Jan-Peter Mund, Nikolai Knapp | 4 | 6 | 6 | L, PE | E | TP |
| 3 | E | HNEE / EUSD | Big Data Analytics | Jens Müller | | Students are able to identify and define Big Data applications as well as the technical and strategic constrains related to them, including relevant data types, algorithms and hardware. The students can give an professional opinion on technical issues an are able to lay down a Big Data analysis project. | Jens Müller | 4 | 6 | 6 | L, PE | E | TD |
| 3 | E | HNEE / EUSD | Machine Learning and Data-Driven Modelling | Luis Miranda | | Students are able to implement selected machine learning techniques and evaluate their pertinence for practical applications. They are able to implement, evaluate and reflect on the results of machine learning techniques and are able to fine-tune and compare models. | Luis Miranda | 4 | 6 | 6 | L, PE | E | TD |
| 3 | E | HNEE / EUSD | Innovative Forest Management Methods | Tobias Cremer | Innovative concepts and technology trends in forest management | Students get to know innovative concepts and technologies related to forest management and wood logistics and learn how to apply them in practice. | Tobias Cremer | 2 | 3 | 6 | L, S, PE | E | TP (50%) |
| | | | | | Forest growth models and scenarios | Participants know about the conceptual background, the basic types and fields of application of forest growth and yield models. They can apply the TreeGrOSS model in the BWINPro simulation program for their individual purposes by adapting model components and data levels to the specific needs. | Martin Guericke, Jens Schröder | 2 | 3 | | | | PP (50%) |
| 3 | E | UVA | Learning by doing: Adaptive Management | Felipe Bravo | | The students carry out a programming project incorporating current coding techniques and standards relevant in the sector. | Felipe Bravo | 4 | 6 | 6 | L, S, PE | E | OR/ Case study* |
| 3 | E | UVA | Forest Pest & Diseases | Julio Javier Diez Casero | | Students know strategies, tactics and scientific and research advanced methods for the diagnostic and management of forest pests and diseases. Students remove, mine, manage, analyze and discuss the relevant information contained in national and international data bases. Students understand main concepts related to the diagnostic, defense and resistance mechanisms of conifers against insects vectors and their associated fungi. | Julio Javier Diez Casero, Juan Alberto Pajares Alonso, Mercedes Fernández Fernández, Fernando Alves Santos | 4 | 6 | 6 | L,PE | E | OR / Case Study* |
| 3 | E | UVA | Genetic Resources Conservation and Molecular Markers | Rosario Sierra de Grado | | The students will acquire a global vision of the main problems facing by the forest genetic resources, and will learn how to:<br>1. Evaluate the need of conservation and use of particular genetic resource<br>2. Decide on the more suitable strategy of conservation<br>3. Decide on the molecular tools suitable to identify genotypes and measure diversity in forest species<br>4. Understand the interplay between conservation and breeding in different contexts | Rosario Sierra de Grado, Elena Hidalgo Rodríguez, José Climent Maldonado | 4 | 6 | 6 | L,PE | E | OR, PP* |
| 3 | E | tbd | Specialisation module | Head of study programme | | Students deepen their professional knowledge and skills in a specific area, that is of special interest for them. Students can identify their personal interests in the field of forest information technology and expand their horizon to approaches in related study programmes | tbd | 4 | 6 | 6 | tbd | tbd | tbd |

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| 4 | M | EUSD / WULS | Research colloquium | Head of study programme | | Students acquire further skills in interdisciplinary scientific work. They are able to evaluate research projects and to communicate results to expert and professional audience. | Jan-Peter Mund, Luis Miranda, Jens Müller, Evelyn Wallor; Lecturers WULS, EUSD | 2 | 4 | 4 | S | E | PP |
| 4 | M | EUSD / WULS | Master thesis & defence | Head of study programme | | Students obtain own research results while solving and discussing a scientific problem. Students present the research results of their master thesis and are able to defend its underlying assumptions, methodologies, and robustness of the key findings. | Jan-Peter Mund, Luis Miranda, Jens Müller, Evelyn Wallor; Lecturers WULS, EUSD | 2 | 20 | 20 | P | E/P/G (tbd) | PR (70%) PP (30%) |
| 4 | E | WULS | Climate change impacts on plant growth and crop yield: non-invasive monitoring methods | Hazem M. Kalaji | | The aim of this course is to expose the students to the theory and tools that allow them understanding climate change impact on trees growth and quality by thoroughly emphasizing the theory and practice of using analytical tools to aid in taking proper action of pending and future changes in the complex global climate change situation. | Hazem M. Kalaji | 4 | 6 | 6 | L, PE | E | PP, WE* |
| 4 | E | WULS | Advanced data mining techniques | Urszula Grzybowska | Modern Data Mining Techniques and Families of Classifiers. Examples of their application in forestry | Student should be able to define classification problems, choose appropriate method and solve problems with help of available software (R, SAS). Student should be able to interpret obtained results and draw conclusions. | Marek Karwański, Urszula Grzybowska | 2 | 4 | 6 | L, PE | E | WE, PR* |
| | | | | | CAD in practice | Students should be familiar with creation of parametric sketches. They should properly apply sketch relation. Students should know basic methods of 3d modelling. They should also know how to create assemblies. Should know how to generate technical drafts of their models Optional (depending on the advance level). Students should know the basics of MES. | Marcin Zbieć | 2 | 2 | | L, PE | E | |
| 4 | E | HNEE / EUSD | Innovations and Applications of Forest IT | Luis Miranda | | Students are enabled to use state-of-art and innovative remote sensing and geographic information system in different applications related to forest monitoring, management and forest change detection. Students know the theoretical foundations and practical procedures for acquisition, exploration, transformation and analysis of environmental data. They are able to manage and process large structured and unstructured datasets from different environmental sources using suitable algorithms for analysis and visualisation. | Jan-Peter Mund, Jens Müller, Luis Miranda, Evelyn Wallor | 4 | 6 | 6 | L, PE | E | TP |
| 4 | E | HNEE / EI | Applied Big Data Analytics | Jens Müller | | Students define and implement a Big Data analysis project using relevant techniques of the field. | Jens Müller | 4 | 6 | 6 | S, PE | E | PP |
| 4 | E | HNEE / EUSD | Advanced Programming | Luis Miranda | | Students carry out a programming project incorporating current coding techniques and standards relevant in the sector. | Lusi Miranda; Jens Müller | 4 | 6 | 6 | L, S | E | PP |
| 4 | E | tbd | Specialisation module | Head of study programme | | Students deepen their professional knowledge and skills in a specific area, that is of special interest for them. Students can identify their personal interests in the field of forest information technology and expand their horizon to approaches in related study programmes | tbd | 4 | 6 | 6 | tbd | tbd | tbd |

EUSD = Eberswalde University for Sustainable Development / WULS = Warsaw University of Life Sciences / UVA = University of Valadolid

tbd = to be defined

* Assignment and proportion of examination form are determined by the partner university

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|---|
| **Mandatory module (M)** |
| **Elective module (E)** |
| **Research semester / Thesis** |

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

SWH = Semester work hours; M = Mandatory module; E = Elective module

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