# Transilvania University of Braşov, Romania

# Study program: Management and Technical Systems in Forest Engineering

**Faculty: Silviculture and Forest Engineering**
**Study period:** 2 years (master)

| Course title | Code | No. of credits | Number of hours per week | | | |
|---|---|---|---|---|---|---|
| | | | course | seminar | laboratory | project |
| Timber Harvesting Systems | STOSE | 7 | 1 | - | 3 | - |

**Course description (Syllabus):** the course covers a short history of harvesting operations; introduction to and definition of harvesting systems and methods; areas of research in forest operations; forest as a work environment and resource of raw material; capability and performance of harvesting systems; research methods used in forest operations and timber harvesting systems. Laboratory covers case studies on applying research methods and developing effective harvesting systems as well as field trips to monitor harvesting operations.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Academic Skills and Ethics in Research | EASFS | 4 | 1 | - | - | - |

**Course description (Syllabus):** the course covers ethical rules and guidelines for writing scientific papers and dissertation theses, conducting research, development of presentations, resources of academic writing and their use, textural macrostructures. The course is complemented by discussions and individual work in the form of short essays.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Reduced Impact Logging | ECOEXP | 7 | 2 | - | 2 | - |

**Course description (Syllabus):** the course covers the concept of sustainable forest management and the role of timber harvesting in sustainable management of forests; structure of timber harvesting operations and machines used; theory of harvesting processes; modern machines - characteristics, recommended areas of utilisation and limits; reduced impact logging; harvesting impact on forest ecosystems; mechanical injuries on soil, regeneration and residual trees in connection with harvesting methods and wood extraction techniques; acceptable harvesting planning solutions in terms of ecological and economic requirements.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Computer Programming | POPAC | 7 | 2 | - | 2 | - |

**Course description (Syllabus):** the discipline covers an introduction to computer programming, introduction to MS Excel and Visual Basic for Applications language, language structure and data types, input-output operations, excel objects, error handling, which are presented by examples from forest engineering. Laboratory includes individual work to develop simple computer programs under the Visual Basic for Applications as well as checking the functionality of Visual Basic programming code in more complex applications written in Visual Basic for Applications.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Eco Buildings | CONECO | 5 | 1 | - | 1 | - |

**Course description (Syllabus):** the course includes a description of the eco-building concept, eco-materials used in building applications, consumption of thermal energy, natural lighting of houses and buildings and residue cycling and recycling. Laboratory covers practical applications on designing eco-buildings, calculating the thermal energy and electrical power requirements, design of a hybrid powering system, estimation of residues amount and calibration of sewage systems.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Forest Road Networks | REDRUF | 7 | 1 | - | 2 | - |

**Course description (Syllabus):** the discipline covers general notions on forest roads, characteristics of forest transportation, main features of a forest road, design principles and recommendations on choosing the best development path, development of forest roads in various topographic conditions, an introduction into forest road network planning, location of forest roads, forest roads network structure, optimum density of forest roads network, economic efficiency of forest road network development, feasibility study. Laboratory covers a practical case study on developing the forest road network.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Transportation Systems | SIMOF | 7 | 2 | - | 2 | - |

**Course description (Syllabus):** the discipline covers an introduction to transportation systems and their types, then it presents wood transportation systems, modern transportation systems and logistics, organization and management of transportation, logistics, transportation capacity, and transportation planning. Laboratory covers practical case studies on modern navigation systems, transportation data modelling using GIS, software used in the design of forest roads and software used in the planning and developing of transportation network.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Information Systems in Forestry | SIMOID | 5 | 1 | - | 1 | - |

**Course description (Syllabus):** the discipline covers the use of spatial data infrastructure and spatial decision support systems in forestry, the use of GIS in timber harvesting and transportation, the use of remote sensing and satellite images in timber harvesting and transportation and the use of digital images, RADAR and LIDAR data. Laboratory covers an introduction to GIS by the means of ArcView, the use of ERDAS software for digital images, the use of open-source software for digital image processing and field data collection using GPS technology.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Management of Forest Products | MACAP | 4 | 1 | - | 1 | - |

**Course description (Syllabus):** the course covers an introduction to quality, management of quality, system of quality management, ISO 9000 standards, basic principles, performance improvement, documents of quality systems, quality audit, certification of quality, forest certification, forest management certification, certification of forestry supply chain and of forest products. Laboratory covers terminology and concepts of quality management, techniques and instruments used in quality management, documents of quality systems, ISO 9000 standards, certification in forestry (management, products and supply chains).

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Capitalization of Forest Products | VSRFV | 7 | 1 | - | 3 | - |

**Course description (Syllabus):** the discipline covers forest resources as raw materials for production, sustainable and integral valorization, grading and sorting of timber products, drying as a prerequisite of valorization, capitalization of non-timber forest products (fruits, plants, mushrooms etc.). Laboratory covers practical applications of drying,

preparation and examination of fruit quality, preservation technology, honey quality, colorimetry, veneer grading, oil extraction and research and development on the valorization of forest products.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Forest Fire Management (O1) | PROCIF | 7 | 2 | - | 2 | - |

**Course description (Syllabus):** the discipline covers a general presentation of European forests and statistics of forest fires across Europe, forests of Romania and statistics of forest fires in Romania and Brasov county, controlled fire, determinants and factors affecting the triggering and propagation of forest fires, forest fuels, forest fire development, forest fire prevention, forest fire detection, means used to control fires, methods used to control forest fires, strategy and tactics of firefighting, intervention planning and post-fire management. Laboratory covers field trips, preparation of a portfolio on the forest fire in a European country and of a portfolio on forest fuels.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Road Construction Management (O1) | COREDO | 7 | 2 | - | 2 | - |

**Course description (Syllabus):** the discipline covers the process of road building, mechanization of road building, geosynthetics, the use of emulsions for road reinforcement, new techniques and technology used in road building, work organization in road building operations, operational planning and work safety in road building operations. Laboratory covers notions of forest road traffic, categorization and use of geosynthetics, causes of forest road deterioration, maintenance and rebuilding operations.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Analysis of Experimental Data (O2) | DATEX | 7 | 2 | - | 2 | - |

**Course description (Syllabus):** the discipline covers the tools for understanding and applying the statistical methods for processing the experimental data in forestry, using tools for applying the statistical tests, study of the relationships between variables, regression equations etc. The following main topics are covered: measuring principles, error sources, statistical parameters describing data distributions, presenting the statistical data, repartition laws, indicators for non-symmetric distributions, sampling, sampling distribution, testing the homogeneity of the dispersions, comparison, precision and control of precision, regression, presenting the results of experimental data.

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| | | | course | seminar | laboratory | project |
| Mathematical Modeling in Forest Engineering (O2) | MOMEF | 5 | 1 | - | 2 | - |

**Course description (Syllabus):** the discipline covers structural programming in VBA, forest structure, indicators of structure, estimators of forest structure and descriptors of forest structure. The concepts explained in the course are used in the laboratory by the means of practical applications.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Management of Research Projects (O3) | MAPEC | 6 | 1 | - | 2 | - |

**Course description (Syllabus):** the discipline covers the generalities regarding the scientific research, instruments of scientific research, formulation of a research project, research projects objectives and risks, resource identification, allocation and management, activities, implementation, quality management and financing. The laboratory consists of discussions and case studies on experimental design, establishing the objectives of research projects, budgeting and the development of a practical application on a research project.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Management of Timber Harvesting Activity (O3) | MATER | 6 | 1 | - | 2 | - |

**Course description (Syllabus):** the discipline covers the methods of developing timber harvesting plans, factors affecting the use of extraction equipment, type of equipment used in extraction, methods used to find near-optimal solutions, operational planning and management of operations, technology of storage and processing facilities, framework of operational organization of cutting blocks. Laboratory covers practical applications on developing sound solutions and planning of timber harvesting sites.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Timber Harvesting Machines (O4) | SIMEF | 5 | 1 | - | 1 | - |

**Course description (Syllabus):** the course gives an introduction to mechanization, theory of felling, skidding and yarding, mechanization of timber harvesting operations, mechanization of forest operations, evolution of machines, machine types and functions, capabilities of machines, fleet management, transition to robotics and automation. Laboratory includes individual case studies and field trips on the subjects covered in the course.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Automation in Forestry (O4) | APELEF | 5 | 1 | - | 1 | - |

**Course description (Syllabus):** the discipline covers the following: an introduction to automation, types and classification of automation, technology readiness level, concept of Industry 4.0, concept of Forestry 4.0, robotics, artificial intelligence, internet of things and their application in forest engineering. Laboratory consists of case studies on the subjects covered in the course which include the preparation of a paper on the mechanization level at international level and of a paper on the automation level of a Romanian company.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Time Studies in Forestry (O5) | STIF | 5 | 1 | - | 1 | - |

**Course description (Syllabus):** the discipline covers an introduction to time studies, basic concepts of time studies, classification of time and work structure in forest engineering, preparation and implementation of time studies, data processing, statistical analysis and the elaboration of scientific reports. Practical activities consist of individual and team work to build a scientific report/article using the following activities based on a time-study database provided by the teaching staff: estimation of descriptive statistics, modelling the data, calculation of performance indicators, description of materials and methods, discussion of results and building the introduction.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Wood Protection (O5) | PROLEM | 5 | 1 | - | 1 | - |

**Course description (Syllabus):** the course covers the definition, history, some physical properties of wood, water sorption, shrinkage and swelling of wood, dimensional stabilization of wood, wood decay fungi, general characters, pathways of infection, prevention and control of major pests, wood preservation products, the mechanism of antiseptics action on natural pests, background on the products used in wood preservation, basics of antiseptics, classification of wood protection products, wood preservatives treatments, non-pressure (brush and spray treatments, dipping, steeping, kyanizing, etc.) and pressure processes (full-cell process, fluctuation pressure process, etc.), wood heritage protection, the main species of macromycetes in the Romanian historical monuments, the main species of boring insects in the Romanian historical monuments (*Anobiidae* family), protection products and application methods, protection of wood against fire, combustion phases, ways to avoid combustion conditions, classification of flame retardants, preparation and application of flame retardants.

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Research Activity | RES | 20 | - | - | - | - |

| Course title | Code | No. of credits | Number of hours per week | | | |
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| | | | course | seminar | laboratory | project |
| Elaboration of MSc Thesis | DIS | 10 | - | - | - | - |