

Module Handbook

Master of Science

Wood Science

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Mandatory Modules

Title	Biogeochemistry – An Analysis of Global Elemental Cycles				
Symbol	MWS18				
Semester	Winter semester				
Module type and assignment to the curriculum	Compulsory module, recommended for the first semester				
Formal requirements for participation	None				
Module coordinator	Prof. Dr. Ina Meier, Phone: 822459 203, email: ina.meier (at) uni-hamburg.de				
Lecturer	Dr. Anis Khokon Prof. Dr. Ina Meier Ana Caroline Miron Pereira Dr. Awaz Mohamed				
Language	English				
Educational objective	In this course the students get to know the functioning of the most important spheres of the Earth, from the atmosphere to the biosphere, pedosphere, and lithosphere. They understand their importance for global elemental cycles, which <i>inter alia</i> determine biomass and primary production of terrestrial and marine ecosystems. Upon successful completion of the course, students will be able to critically assess the latest changes in global biogeochemistry caused by human activities.				
Contents	In a combination of presentations and discussions, the lecture takes up the fundamentals of global elemental cycles and applies them to current examples of the reaction of forest trees to changing geochemical environmental conditions. The tutorial will apply this knowledge to current case scenarios on global change effects for forests.				
Courses	L: Biogeochemistry – An Analysis of Global Elemental Cycles S/P: Global Change Ecology				2SEM./HRS 2SEM./HRS
Workload (hrs)	L: Biogeochemistry – An Analysis of Global Elemental Cycles S/P: Global Change Ecology	ECTS	P (hrs)	S (hrs)	PV (hrs)
			28	47	15
			28	28	34
	Total workload	6	180		
Exam framework	Requirements for registration: none Type of examination: The lecture is examined with a written examination (graded) and the active participation in the tutorial by a written protocol on the results (c. 10 pages; graded).				
Duration	One semester				
Frequency of occurrence	Annual				
Literature	Will be announced at the beginning of the course				

Title	Biomimetics – Functionalization of Wood				
Symbol	MWS26				
Semester	Winter semester				
Module type and assignment to the curriculum	Compulsory module, recommended for the first semester				
Formal requirements for participation	None				
Module coordinator	Prof. Dr. Linnea Hesse, Phone: 822459 203, email: Linnea. Hesse (at) uni-hamburg.de				
Lecturer	Prof. Dr. Linnea Hesse Prof. Dr. Andreas Krause				
Language	English				
Educational objective	Students have in-depth knowledge of the subject area of bionics with a focus on lightweight construction, shape optimisation and movement. They can understand and abstract functional processes in nature and technically implement them in models made of wood-based materials. Students also learn how to create a scientific poster.				
Contents	<ul style="list-style-type: none">- Fundamentals of bionics.- Methodical approaches to analysing the functional principles of nature (3D imaging, biomechanics, video analysis, sorption measurements, SKO and CAO, DIC, histology, etc.).- Supplementary basics from wood physics.- Independent conceptualisation of functional models made of wood-based materials.- Presentation of the results in the form of a scientific poster.				
Courses	L: Biomimetics S: Biomimetics P: Biomimetics				1 SEM./HRSk 1.5SEM./HRS 1.5SEM./HRS
Workload (hrs)		ECTS	P (hrs)	S (hrs)	EP (hrs)
	L: Biomimetics		14	30	
	S: Biomimetics		21	31	30
	P: Biomimetics		21	21	
	Total workload	6	180		
Exam framework	Requirements for registration: none Type of examination: Talk with handout (graded).				
Duration	One semester				
Frequency of occurrence	Annual				
Literature	<p>Knippers, J., Schmid, U., Speck, T.: Biomimetics for Architecture – Learning from nature, Birkenhäuser (2019). https://doi.org/10.1515/9783035617917 (DE: https://doi.org/10.1515/9783035617870)</p> <p>Nachtigall, W. Pohl, G.: Biomimetics for Architecture & Design, Springer (2015). https://doi.org/10.1007/978-3-319-19120-1. (DE: https://doi.org/10.1007/978-3-540-88995-3).</p> <p>Speck, T., Cheng, T., Klimm, F. <i>et al.</i> Plants as inspiration for material-based sensing and actuation in soft robots and machines. <i>MRS Bulletin</i> (2023). https://doi.org/10.1557/s43577-022-00470-8.</p> <p>Poppinga, S., Schenck, P., Speck, O., Speck, T., Bruchmann, B., Mas-selter, T: Self-Actuated Paper and Wood Models: Low-Cost Handcrafted Biomimetic Compliant Systems for Research and</p>				



	Teaching. <i>Biomimetics</i> (2021), 6, 42. https://doi.org/10.3390/biomimetics6030042
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Title	Fibers and Fiber based Products				
Symbol	MWS03				
Semester	Winter semester				
Module type	Compulsory module, recommended for the first semester				
Module type and assignment to the curriculum	none				
Module coordinator	Prof. Dr. Bodo Saake, Phone: 822 459-206, email: bodo.saake (at) uni-hamburg.de				
Lecturer	Prof. Dr. Andreas Krause Prof. Dr. Bodo Saake				
Language	English				
Educational objective	Students are familiar with the morphological, chemical and physical characteristics of hardwood, softwood and annual plant fibers derived from different production processes. Moreover, they gain knowledge about the application potential of the fibers for composite products, such as paper, board, fiber board and wood plastic composites.				
Contents	<p>The lecture will first focus on the different production processes and modifications of fibers from various resources. The morphological and chemical differences are discussed for fibers from various natural origins and production processes. The interaction of the different raw materials and production processes will be described, demonstrating as well which process route is advantageous for which raw material. Based on this knowledge the structure property relationship of the different fibers will be discussed for important products from the paper, board, wood product and composite industry. This includes a discussion of bulk products as well as high value products such as special papers, fiber-reinforced composite or nanofibrils. The effect and importance of beating and milling treatments are as well discussed for various product groups.</p> <p>Methods for the characterization of fiber properties and origin by chemical analysis, microscopy, and image analysis are presented.</p>				
Courses	L: Fibers and fiber based products S: Seminar Fibers and fiber based products			3 SEM./HRS 1 SEM./HRS	
Workload (hrs)	L: Fibers & fiber based products	ECTS	P (hrs)	S (hrs)	EP (hrs)
	S: Seminar Fibers and fiber based products		42	70	30
	Total workload	6	14	24	
Exam framework	Requirements for registration: none Type of examination: Oral or written exam (will be announced at the beginning of course) Language: English				
Duration	One Semester				
Frequency of occurrence	Annual				
Literature	Will be announced at the beginning of the course				

Title	Functional Forest Ecology				
Symbol	MWS24				
Semester	Summer semester				
Module type and assignment to the curriculum	Compulsory module, recommended for the second semester				
Formal requirements for participation	None				
Module coordinator	Prof. Dr. Ina Meier, Phone: 822459 203, email: ina.meier (at) @uni-hamburg.de				
Lecturer	Prof. Dr. Ina Meier Dr. Anis Khokon Dr. Awaz Mohamed				
Language	English				
Educational objective	In this course the students learn the basic principles of functional forest ecology and biodiversity research and gain a deep insight into different biodiversity facets in relation to important forest ecosystem functions and services.				
Contents	The lecture conveys patterns, scales, and management conflicts of forest diversity as illustrated for specific case studies. The power of trait-based functional ecology to better understand the consequences of some current major environmental problems is addressed. The seminar will apply this knowledge to current research on functional ecology in forests.				
Courses	L: Functional Forest Ecology S: Seminar Functional Forest Ecology			2 SEM./HRS 2 SEM./HRS	
Workload (hrs)	L: Functional Forest Ecology	ECTS	P (hrs)	S (hrs)	EP(hrs)
	S: Seminar Functional Forest Ecology		28	47	17
	Total workload	6	28	43	17
Exam framework	Requirements for registration: none The lecture is examined with a written examination (graded, 50%) and the active participation in the seminar by a paper (graded, 50%).				
Duration	One semester				
Frequency of occurrence	Annual				
Literature	Will be announced at the beginning of the course				

Title:	Project Study				
Symbol	MWS27				
Semester:	Winter semester				
Module type and assignment to the curriculum	Compulsory module recommended for the third semester				
Formal requirements for participation	Advanced knowledge of biology, certain compulsory elective modules may be required.				
Module coordinator:	Lecturer of the program				
Lecturer	Lecturer of the program				
Language	English				
Educational objective	Students have acquired relevant theoretical knowledge as well as methodological and communication skills for a selected research topic.				
Contents	In a project study, general practical and theoretical skills for working on a specific research topic are learned. The question and the methodology can be transferred to the master thesis.				
Courses	<ul style="list-style-type: none">Project Study				12 SEM./HRS
Workload (hrs):	<ul style="list-style-type: none">Project Study	ECTS	P (hrs)	S(hrs)	EP (hrs)
	Total Workload	12	360		
Exam framework	Formal requirements for examinations: none examinations: report (pass/fail)				
Duration	one semester				
Frequency of occurrence	each semester				
Literature:	Will be announced				

Title	Master´s Thesis				
Symbol	MWS-AB				
Semester	Summer				
Module type	Compulsory module				
Formal requirements for participation	72 ECTS from mandatory or compulsory elective modules. All mandatory modules have to be successfully passed				
Module coordinator	Lecturer of the programme				
Lecturer	All lecturers				
Language	English				
Educational concept	Students are able to think and work self-constrainedly in the scientific fields of the Master of Wood Science. They have gained experience in presentation and evaluation of their own experimental work in the context of the current scientific state of the art and they are able to solve scientific problems				
Contents	Students have to organize their scientific work, write structured thesis and discuss the results of their work				
Courses	Planning research work, writing thesis Preparation of defense			
Workload (hrs)		ECTS	P (hrs)	S(hrs)	EP (hrs)
	Total workload	30	900		
Exam framework	Type of examination: written thesis (90%) and oral presentation of thesis (10%)				
Frequency of occurrence	Each semester				
Duration	One semester				
Literature	Literature announced at the beginning of the master thesis				

Elective Compulsory Modules

Title	Paper and Board Technology				
Symbol	MWS08				
Semester	Winter or summer				
Module type	Compulsory elective module				
Formal requirements for participation	none				
Module coordinator	Prof. Dr. Bodo Saake, Phone: 822 459-206, email: bodo.saake (at) uni-hamburg.de				
Lecturer	Prof. Dr. B. Saake				
Language	English				
Educational objective	Students have profound knowledge of the different production processes and products of the paper and cardboard industry. They have acquired in depth knowledge of the various paper making technologies for various products like graphic paper, tissue, specialty paper, cardboard and corrugated card board. The importance of waste paper as a fiber source and the different recycling technologies adapted to the various end products will be understood.				
Contents	The lecture will first focus on the different paper production processes. As a basic scenario the production of graphic paper will be presented including strategies for influencing sheet formation and process control by online measurements. Further on the fundamentals of sheet formation and retention will be discussed introducing the most relevant strength additives and retentions aides. Based on these fundamentals the technological specifics of various product groups like tissue paper or specialty grades (e.g. filter paper, security paper, thermopaper) will be presented. The specific needs for production will be one focus explaining the different concepts for the headbox, wire and drying section. The production of card board, corrugated card board and packaging materials will be a further focus of the module. The recycling of waste paper will be presented for the three major end product groups: board, tissue and graphic paper. Analytical techniques for the characterization of paper and paper components and possibilities for process control will be presented.				
Courses	L: Paper and board technology Pr: Development on paper and board production			2 SEM./HRS 2 SEM./HRS.	
Workload (hrs)	L: Paper and board technology Pr: Development of paper and board production	ECTS	P (hrs) 28	S (hrs) 54	EP (hrs) 30
	Total workload	6	28	40	
Exam framework	Requirements for registration: none Type of examination: Oral or written exam (will be announced at the beginning of course) Language: English				
Duration	One semester				
Frequency of occurrence	Annual				



Literature	Will be announced at the beginning of the course
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Title	Lignocellulose Biorefinery					
Symbol	MWS09					
Semester	Winter or summer					
Module type	Compulsory elective module					
Formal requirements for participation	none					
Module coordinator	Prof. Dr. Bodo Saake, Phone: 822 459-206, email: bodo.saake (at) uni-hamburg.de					
Lecturer	Dr. J. Appelt (TI), Prof. Dr. B. Saake					
Language	English					
Educational objective	Students have in depth knowledge of processes for the conversion of lignocellulosic feedstock such as wood, straw and bagasse into liquid energy sources and platform chemicals. The knowledge includes thermochemical conversion processes, and technologies based on pretreatment and enzymatic saccharification for the production of fermentable sugars and lignin. The students have acquired also knowledge on economic and environmental aspects of biorefinery processes.					
Contents	In terms of thermochemical conversion processes the generation of oil and other valuable products by pyrolysis, the production of fuel by gasification followed by Fischer-Tropsch synthesis and the implementation of biomass using the hydrothermal carbonisation (HTC) are considered. Another focus is on processes for provision of fermentable sugars and lignin. Here, the steam explosion and organosolv technologies with subsequent enzymatic hydrolysis will be discussed as well as hydrolysis with concentrated mineral acid. The comparison and evaluation of the process of economic and ecological point of view is also part of this lecture. The aspects are deepened in seminar presentations and group work.					
Courses	L: Lignocellulose biorefineries Pr: Lignocellulose biorefineries					3 SEM./HRS 1 SEM./HRS
Workload (hrs)	L: Lignocellulose biorefineries Pr: Lignocellulose biorefineries	ECTS	P (hrs)	S (hrs)	EP (hrs)	
			42 14	70 24	30	
	Total workload	6	180			
Exam framework	Requirements for registration: none Type of examination: Oral or written exam (will be announced at the beginning of course) Language: English					
Duration	One semester					
Frequency of occurrence	Annual					
Literature	Will be announced at the beginning of the course,					

Title	Biopolymers					
Symbol	MWS10					
Semester	Winter or summer					
Module type	Compulsory elective module					
Formal requirements for participation	None					
Module coordinator	Prof. Dr. Bodo Saake, Phone: 822 459-206, bodo.saake (at) uni-hamburg.de					
Lecturer	Prof. Dr. B. Saake					
Language	English					
Educational objective	Students have in depth knowledge about the processing of wood components into valuable products as polymers or in modified forms. Based on knowledge about the chemical properties of the wood components they will acquire further know how about the processes for the separation and transformation the components into products. A further aspect will be the problems arising from the specificities of the biobased raw materials.					
Contents	The production of dissolving pulps will be discussed as a basis for cellulose derivatives and regenerated fibers. The most important cellulose ethers, esters and regenerated fibers, as well as nanofibrils and aerogels will be presented in terms of their production, properties and application potential. For hemicelluloses and lignins different separation options and their influence on the structure and properties will be highlighted. Selected applications for technical lignins and hemicelluloses will be presented Selected processes and products based on the so called accessory components of lignocellulosics will be presented. Special focus will be laid upon technical problems related to accessory components and their effects on over all characteristics of different species. Analytical methods for the characterization of wood components will be presented.					
Courses	L: Biopolymers from lignocellulosics Pr: Biopolymers from lignocellulosics					3 sem. h. 1 sem. h.
Workload (hrs)	L: Biopolymers from lignocellulosics	ECTS	P (hrs)	S (hrs)	EP (hrs)	
	Pr: Biopolymers from lignocellulosics		42 14	70 24	30	
	Total workload	6	180			
Exam framework	Requirements for registration: none Type of examination: Oral or written exam (will be announced at the beginning of course) Language: English					
Duration	One semester					
Frequency of occurrence	Annual					
Literature	Will be announced at the beginning of the course					

Title	Solid Wood Technology					
Symbol	MWS11					
Semester	Winter or summer					
Module type	Compulsory elective module					
Formal requirements for participation	none					
Module coordinator	Prof. Dr. A. Krause, Phone: 73962623, email: andreas.krause (at) uni-hamburg.de					
Lecturer	Prof. Dr. A. Krause					
Language	English					
Educational objective	<p>Students are familiar with secondary wood processing; based on timber as typical sawmill output manifold solid wood products are known. Following an initial timber grading procedure (visual vs. machine grading) the products are still showing typical wood attributes.</p> <p>The students master specific knowledge in wood processing (milling/cutting, routing etc.) and non-cutting processes) of solid wood products (timber drying, laminating, cross laminating ... bending) and structural solid wood components as well as surface treatment methods (staining, oiling, lacquering, powder coating). Also involved are required pre-products and additives, including appropriate timber grading and testing methods (regulations and standards). Complete process chains – starting with timber drying – and processing or operating sequences, plant layouts, alternative production methods and manufacturing costs are included as well.</p>					
Contents	<ul style="list-style-type: none">• Secondary wood processing (regulations, standards, processing steps, production costs) ...• Timber drying• KVO®, Duo-®, Triolam®, glulam• Cross laminated timber (CLT, XLam, Microllam)• Solid wood components (→ window frames, doors, parquet etc.)• Wood modification (→ heat treatment, wax treatment etc.)• Surface treatment of solid wood products<ul style="list-style-type: none">• Liquid systems (wood stain, glaze, oil, lacquer)• Solid surface coatings (films, laminates, powder ...)• Quality assurance for surface treatment processes• Ecological assessment of processes and products• Product testing procedures, evaluation of regulations and standards• Excursion to manufacturers of typical solid wood products					
Courses	L: Solid wood technology Pr: Solid wood technology				2 SEM./HRS 2 SEM./HRS	
Workload (hrs)		ECTS	P (hrs)	S (hrs)	EP (hrs)	
	L: Solid wood technology Pr: Solid wood technology		28 28	44 50	30	
	Total workload	6	180			
Exam framework	Requirements for registration: none Type of examination: Oral or written exam (will be announced at the beginning of course) Language: English					
Duration	One semester					

Frequency of occurrence	Annual
Literature	<p>Forest Products Laboratory 2010 - Wood handbook— Wood as an engineering material. General Technical Report FPL-GTR-190. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 508 p.</p> <p>Navi, P., Sandberg, D. 2011 - Thermo-Hydro-Mechanical Wood Processing (Engineering Sciences). CRC Press - Taylor & Francis Group. ISBN-13: 978-1-4398-6043-4 (eBook - PDF)</p> <p>Walker, J. C. F. 2006 - Primary Wood Processing: Principles and Practice. Springer, 2nd ed. 2006. ISBN-10: 1402043929, ISBN-13: 978-1402043925</p>

Title	Project Management					
Symbol	MWS03					
Semester	Winter semester					
Module type	Compulsory Elective Module					
Formal requirements for participation	none					
Module coordinator	Dr. Julien R.G. Navarro, Phone: 73932 612, email: julien.navarro (at) uni-hamburg.de					
Lecturer	Dr. Julien R.G. Navarro					
Language	English					
Educational objective	The students gain skills in project management, planning of processes and productions with respect to ethic and social aspects. They get knowledge on internal management structures and organizational aspects, as well as internal logistics (material flow, internal supply structures etc.). Furthermore the students apply their theoretical knowledge in small projects, such as organizing and managing an excursion, the participation in an exhibition (e.g. LIGNA-fair), a symposium and conference contribution, a special event (e.g. Science Night), and a feasibility study.					
Contents	<ul style="list-style-type: none">• Introduction (project types, project phases and execution, objectives, management, economic viability)• Structure / content of feasibility studies• Project studies - examples from forest product industry• Project implementation (planning of project realization, additional aspects, project follow up and control)• Aspects of business management (selected examples) Exercises and project implementation (e.g. LIGNA fair organization, excursion management, grading field on campus, marketing of wood center, inquiries of actors)					
Courses	L: Theory of project management S: Seminar project exercises E: Excursion					1 SEM./HRS 2 SEM./HRS 1 SEM./HRS
Workload (hrs)	L: Theory of project management S: Seminar project exercises E: Excursion	ECTS	P (hrs) 14 28 14	S (hrs) 24 48 24	EP (hrs) 28	
	Total workload	6	180			
Exam framework	Requirements for registration: active participation in excursion (5 to 10 working days) and project planning Type of examination: project report Language: English					
Duration	One semester					
Frequency of occurrence	annual					
Literature	Will be announced at the beginning of the course					

Title	Composite Technology					
Symbol	MWS12					
Semester	Winter or summer					
Module type	Compulsory module					
Formal requirements for participation	none					
Recommended prerequisites	none					
Module coordinator	Prof. Dr. A. Krause, Phone: 73962623, andreas.krause (at) uni-hamburg.de					
Lecturer	Prof. Dr. A. Krause, Dr. Jan Lüdtke (TI)					
Language	English					
Educational concept	Students are familiar with basic and advanced principles of composite technology. They have specific knowledge on wood-based composites and natural fiber based composites using various matrix systems.					
Contents	<ul style="list-style-type: none">• General fiber based composite technology• Duroplastic wood composites• Thermoplastic wood composites• Developing, manufacturing and testing of composites					
Courses	L: Composite technology Pr: Composite technology				2 SEM./HRS 2 SEM./HRS	
Workload (hrs)		ECTS	P (hrs)	S (hrs)	EP (hrs)	
	L: Composite technology Pr: Composite technology		28 28	21 63	40	
	Total workload	6	180			
Exam framework	Requirements for registration: none Type of examination: Oral or written exam (will be announced at the beginning of course)					
Duration	One semester					
Frequency of occurrence	Annual					
Literature	Literature being announced at the beginning of the module					

Title	Structural Applications of Wood					
Symbol	MWS13					
Semester	Winter or summer					
Module type	Compulsory elective module					
Formal requirements for participation	none					
Module coordinator	Prof. Dr. A. Krause, Phone: 73962623, andreas.krause (at) uni-hamburg.de					
Lecturer	N.N.					
Language	English					
Educational objective	Students are familiar with essential aspects of timber construction using solid wood and engineered wood products (EWP). They have comprehensive knowledge on structural timber as well as on EWP for structural use (static / dynamic load, building physics – heat, moisture, sound and fire). Required regulations and standards are discussed. Students gain fundamental skills of timber constructions, thus gaining a deeper understanding on internal relationships between material and structure.					
Contents	<ul style="list-style-type: none">• Fundamentals of wood construction methods and types (building systems: log construction, stud construction, frame construction, panel / solid timber construction...)• Fundamentals of timber construction of walls, roofs, ceilings, etc.; framework and panel constructions (basic calculations, stability proof, appropriate use of the material in construction and design)• Properties of wood species and EWP used for structural applications including standards, regulations and rules• Heat-, moisture, sound- and fire-protection and related standards (physical fundamentals and basic calculations, performance and typical examples)• Timber utilization in residential housing• Timber engineering• Ecological and economical aspects of structural timber utilization.					
Courses	L: Structural application of wood Pr: Structural application of wood				2 SEM./HRS 2 SEM./HRS	
Workload (hrs)	L: Structural application of wood Pr: Structural application of wood	ECTS	P (hrs)	S (hrs)	EP (hrs)	
			28	52	20	
			28	52		
	Total workload	6	180			
Exam framework	Requirements for registration: none Type of examination: Oral or written exam (will be announced at the beginning of course) Language: English					
Frequency of occurrence	Annual					
Duration	One semester					
Literature	Kolb, J. 2008 - Systems in Timber Engineering. Loadbearing Structures and Component Layers. Basel, Boston, Berlin: Birkhaeuser. ISBN: 978-3-7643-8689-4					

	Forest Products Laboratory 2010 - Wood handbook—Wood as an engineering material. General Technical Report FPL-GTR-190. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 508 p.
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Title	Project Course Forest Ecology				
Symbol	MWS22				
Semester	Winter semester				
Module type and assignment to the curriculum	Compulsory elective module				
Formal requirements for participation	None				
Module coordinator	Prof. Dr. Ina Meier, Phone: 822459 203, email: ina.meier (at) uni-hamburg.de				
Lecturer	Dr. Anis Khokon Ana Caroline Miron Pereira Dr. Awaz Mohamed				
Language	English				
Educational objective	This course addresses students who are planning to write a master’s thesis in a biological or forest ecological topic before long. The aim of the course is to teach the basics of scientific work and the presentation and publication of the research results. Students acquire competencies for scientific research projects in the field.				
Contents	In a combination of lectures, trainings, and exercises, the course introduces important aspects of the experimental design, statistical data analysis, and graphical presentation of research results (based on available data sets), as well as their oral and written presentation.				
Courses	L: Planning and performing ecological research projects E: Data analysis and presentation techniques			1 SEM./HRS 3 SEM./HRS	
Workload (hrs)	L: Planning and performing ecological research projects	ECTS	P (hrs)	S (hrs)	EP (hrs)
	E: Data analysis and presentation techniques		14	7	
			98	53	8
	Total workload	6	180		
Exam framework	Requirements for registration: none Type of examination: Oral presentation of research results and written elaboration in the form of a scientific article (15 pages max; graded).				
Duration	One semester				
Frequency of occurrence	annual				
Literature	Will be announced at the beginning of the course				

Title	Forest Ecophysiology				
Symbol	MWS25				
Semester	Summer semester				
Module type and assignment to the curriculum	Compulsory elective module				
Formal requirements for participation	None				
Module coordinator	Prof. Dr. Ina Meier, Phone: 822459 203, E-Mail: ina.meier (at) uni-hamburg.de				
Lecturer	Dr. Anis Khokon Dr. Awaz Mohamed				
Language	English				
Educational objective	In this course, students acquire basic knowledge on the physiology of forest ecosystems as a function of environmental conditions. They can relate key aspects of forest ecophysiology to different forest management practices throughout the early and mid-growing season. Students gain theoretic and practical knowledge of modern measuring techniques in the field of tree ecophysiology and microclimate measurements. They can interpret the results of measurements of the carbon and water balance in accordance with scientific standards and can present them orally.				
Contents	Through practical field work and laboratory analysis, students learn to independently carry out measurements on photosynthetic performance, soil respiration, leaf conductance, trunk growth, mycorrhizal root traits, and microclimatic measurements. From repeated measurements throughout the growing season, students approach the phenology of forest ecophysiology in differently managed forests.				
Courses	P: Forest Ecophysiology				4 SEM./HRS
Workload (hrs)	P: Forest Ecophysiology	ECTS	P (hrs)	S (hrs)	PV (hrs)
	Total workload	6	56	80	44
Exam framework	Requirements for registration: none Type of examination: Written protocol on the results (10 pages max; graded).				
Duration	One semester				
Frequency of occurrence	annual				
Literature	Will be announced at the beginning of the course				