



DIRECTORY OF MODULES OFFERED IN ENGLISH LANGUAGE

COURSES OFFERED IN ENGLISH AT THE UNIVERSITY OF GÖTTINGEN
ACADEMIC YEAR 2017/2018

**FACULTY OF FOREST SCIENCES
AND FOREST ECOLOGY**



GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN

A very warm welcome!

The University of Göttingen features an outstanding study environment for both exchange and full-degree students. All courses of study benefit from an excellent research-oriented environment formed by a broad network including five Max Planck Institutes, the German Primate Centre, the German Aerospace Centre and the Academy of Science and Humanities: the Göttingen Campus. An increasing number of lectures and courses are taught in the English language attracting more and more international students. This catalogue provides an impression of what is available.

This catalogue of courses taught in English varies from faculty to faculty and the courses available to you depend on whether you are an exchange student coming to Göttingen for a semester or an academic year, or whether you are a full degree student coming to Göttingen to complete an entire degree programme. You may take most courses in the programme you are enrolled in, however in a few cases restrictions may apply. Selecting courses from other subjects or other departments might require negotiations. If you have any questions, please contact the study advisor in charge of your subject.

Prior to their arrival in Göttingen exchange students have to set up a learning agreement. In some cases restrictions will apply, e.g. signing up for certain laboratory courses may not be possible. Generally exchange students are required to take at least half of the lectures and courses within their chosen subject.

Full degree students must first apply for a study place. Links to websites with application guidelines and deadlines are provided by some subjects/faculties. If not stated otherwise please visit:

<http://www.uni-goettingen.de/en/3811.html>

In any case, you are very welcome to browse through this catalogue to find/check out courses that suit your interests! For the complete course catalogue of the University of Göttingen see:

<https://univz.uni-goettingen.de/qisserver/>

We look forward to welcoming you in Göttingen!

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I. Faculty of Forest Sciences and Forest Ecology

The Faculty of Forest Sciences and Forest Ecology offers two full degree programs in English language.

- **Molecular Ecosystem Sciences:** <http://www.uni-goettingen.de/en/221690.html>
- **Forest Sciences and Forest Ecology – Tropical and International Forestry:** <http://www.uni-goettingen.de/en/introduction/74615.html>

Since the Faculty offers no Bachelor courses directly related to the field of forest sciences and forest ecology exchange students are invited to take part in the Master courses independent of their level at the home university.

1. Bachelor: Molecular Ecosystem Sciences

Students who are planning to participate in practical, laboratory or computer courses (see course description) have to contact the named coordinator first.

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Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES-SK.105: Laboratory techniques		
Learning outcome, core skills: Students will train in small groups to work in a laboratory. They will be introduced into modern basic and sophisticated methods in the fields of chemistry, biochemistry, microbiology and molecular biology to rules assuring personal and environmental safety and good scientific practice. Students acquire knowledge in experimental planning, technical performance, data interpretation and documentation of practical scientific research.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Organic trace analysis (Seminar, laboratory course, exercises) 2. Inorganic analysis (Seminar, laboratory course, exercises) 3. Microbiology and molecular biology (Laboratory course)		2 WLH 1 WLH 1 WLH
Examination: Protocol (30 pages max.) Examination prerequisites: Regular attendance and participation		6 C
Examination requirements: Personal and environmental safety, handling and preparation of samples, calibration and use of standards, chromatographic methods, design, performance and documentation of chemical, microbial, and molecular experiments, assessment of results, team work to resolve experimental problems. Handling of radioactive substances, radiation safety, analytics of radioactive isotopes, contaminations with stable and radioactive isotopes .		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Stefan Schütz	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 1	
Maximum number of students: 25		

Georg-August-Universität Göttingen Module B.MES-SK.110: The science-policy interface: society and re- research structures		6 C 4 WLH
Learning outcome, core skills: Policy of Ecosystems: Knowledge about both: on the one hand the relation between ecosystem sciences and politics and on the other hand about the structure and processes of policy-making. Skills in political consulting and debating. The Research Community: Structure and Organization The scientific community depends on private and public research organizations and funding mechanisms. Students will understand the structure and organization of main institutions conducting or financing research and teaching (universities and large research institutions) in Germany and elsewhere.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Policy of ecosystems (Seminar) 2. The research community: structure and organization (Lecture, seminar)		2 WLH 2 WLH
Examination: 2 Oral presentations (approx. 10 minutes) with written outline (10 pages max.)		6 C
Examination requirements: Current theories of science-policy interface and scientific conditions for knowledge transfer, conditions for application of ecosystem knowledge in society, basics of public policy analysis, research infrastructures, comparison between different research structures. Skills: understanding of the relationship between ecosystem research and actual utilization in society, understanding of the role of different actors in science, planning a research career.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Maximilian Krott	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 5	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES-SK.115: Scientific methods and project design		
Learning outcome, core skills: Understanding, application and interpretation of basic terms of descriptive and confirmative statistics, such as important discrete and continuous distributions, least squares, confidence intervals, testing statistical hypotheses, error propagation and basic experimental designs. Understanding of advanced statistical methods such as two-way ANOVA and multiple regressions.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses:		
1. Research methods (Lecture)		3 WLH
2. Research methods (Exercises)		1 WLH
Examination: Written examination (90 minutes)		6 C
Examination requirements: Detailed knowledge of methods for statistical analysis (t-tests, ANOVA, regression, nonparametric methods), descriptive statistics and probability distributions.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Winfried Kurth	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 3	
Maximum number of students: 25		

Georg-August-Universität Göttingen	6 C 4 WLH
Module B.MES.101: Molecular plant and stress physiology	
Learning outcome, core skills: In this course the students will learn how a plant functions at the cell, tissue and whole-plant level. The contents of the lectures encompass basic cell biology and plant physiology (nutrient uptake, and transport process, photosynthesis, respiration, plant hormones, development and stress adaptation). In the practical courses students will be trained at modern microscopes, will learn the basics of tissue culture, and will obtain practical expertise with the use of ecophysiological methods such as measurements of photosynthesis, fluorescence, water potentials etc.	Workload: Attendance time: 56 h Self-study time: 124 h
Courses:	
1. Molecular plant physiology (Lecture)	2 WLH
2. Cell biology, tissue culture and stress responses (Practical course)	2 WLH
Examination: Written exam (120 minutes)	6 C
Examination requirements: Cell compartments and organelles, their structure and function, membrane transport, molecular principles of photosynthesis and respiration, molecular functioning of plant hormones in plant development and stress adaptation, tree biotechnology. Skills: solid theoretical foundation in plant physiology and practical skills in tree regeneration and working under sterile conditions.	
Admission requirements: none	Recommended previous knowledge: Basic knowledge in biology
Language: English	Person responsible for module: Prof. Dr. Andrea Polle
Course frequency: each winter semester	Duration: 1 semester[s]
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 1
Maximum number of students: 25	

Georg-August-Universität Göttingen Module B.MES.102: Chemical ecology	6 C 4 WLH
Learning outcome, core skills: Students will learn to analyze the molecular basis of plant-insect interactions from the plant and from the insect point of view, based on plant volatiles associated to plant stress correlating with defence status and nutritional value of the plant. They learn how information gained by insect antennae is examined to understand the translation of this information into insect behaviour. Students will learn to assess how sensor-systems on the basis of insect olfaction can be utilized and how chemo-ecological findings can be extended into landscape by an integrative examination of biotic interactions from the molecular to the stand level. This will be the basis for understanding the role of semiochemical diversity in adaptation toward global change and for ecosystem functions and services.	Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Chemical ecology (Lecture) 2. Exercises in chemical ecology (Laboratory course, seminar)	1 WLH 3 WLH
Examination: Oral examination (approx. 20 minutes)	6 C
Examination requirements: Biosynthesis of semiochemicals, signaling pathways, perception of semiochemicals, transduction pathways, physiological action and behavioural activity of semiochemicals, syn- and demecological aspects.	
Admission requirements: none	Recommended previous knowledge: none
Language: English	Person responsible for module: Prof. Dr. Stefan Schütz
Course frequency: each winter semester	Duration: 1 semester[s]
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 1
Maximum number of students: 25	

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES.103: Ecological genetics		
Learning outcome, core skills: Understanding of the importance of intraspecific (genetic) variation for ecosystem processes and functions, in particular <ul style="list-style-type: none"> • knowledge of modern methods to assess genetic diversity in diverse groups of organisms • understanding of the role of the evolutionary factors to shape genetic diversity with emphasis on selection • understanding of evolutionary processes including adaptation under natural conditions and in managed ecosystems • understanding of the impact of global change on genetic resources 		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Ecological genetics (Lecture)		2 WLH
2. Assessment of genetic variation (Laboratory course, workshops)		2 WLH
Examination: Oral examination (approx. 20 minutes)		
Examination requirements: Use of modern methods to assess genetic variation in diverse groups of organisms, evolutionary factors and how they shape genetic diversity, the role of adaptation under natural or managed conditions, impact of global change.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: N. N.	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 1	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C
Module B.MES.104: Biotic and abiotic interactions		4 WLH
<p>Learning outcome, core skills: Interactions between biotic and abiotic components of ecosystems are largely responsible for ecosystem properties and functions. Abiotic interactions will be studied in a submodule focused on the biochemistry of soils; biotic interactions are introduced with a focus on pathogens. Students will be trained to analyze these important ecological interactions at different scales.</p> <p>Significance of soil biochemistry for ecosystem processes will be analyzed based on basic soil properties and chemical principles. Transformations and interactions between solid, liquid, gaseous and living phases in soil will give background for understanding of soils as the main part of terrestrial ecosystems and application of biochemical knowledge from molecular to pedon and field scales.</p> <p>Biotic interactions will be studied at different levels taking into consideration their molecular basis such as genes and their products and with different organisms, plants and/or animals including wildlife.</p>		<p>Workload: Attendance time: 56 h Self-study time: 124 h</p>
<p>Courses: 1. Soil biochemistry (Lecture, seminar) 2. Biotic interactions in ecology (Lecture, seminar)</p>		2 WLH 2 WLH
Examination: Written exam (90 minutes)		6 C
<p>Examination requirements: Biochemical processes in soils, weathering and soil formation, biotic drivers, factors of soil formation, soil organisms and decomposition processes, soil organic matter and interactions with clay minerals, molecular basis of biotic interactions, genes and their products, interactions among different organisms.</p>		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Yakov Kuzyakov	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 1	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES.106: Microbiology and molecular biology		
Learning outcome, core skills: Students will be introduced to molecular, biochemical and physiological aspects in microbiology and molecular biology which is important to Ecosystem Sciences. The acquired knowledge allows the students to address questions and problems in Ecology and Systems Biology on molecular levels and understand the background of modern molecular methods that can be applied to solve such topics.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses:		
1. Microbiology and biotechnology (Lecture)		2 WLH
2. Molecular biology (Lecture)		2 WLH
Examination: Oral examination (approx. 20 minutes)		6 C
Examination requirements: Basic knowledge on genetics, physiology, and ecology of microorganisms (bacteria and fungi), applications of microorganism in biotechnology generally and with specific focus on ecological tasks, structure and functions of DNA, RNA, proteins and exemplified metabolites, basic concepts and techniques in molecular biology, recombinant DNA technology, DNA transfer techniques, handling of GMOs.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Ursula Kües	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 2	
Maximum number of students: 25		

Georg-August-Universität Göttingen Module B.MES.107: Ecological modelling		6 C 4 WLH
Learning outcome, core skills: Comprehensive knowledge of ecological models, theories and concepts. Development of interdisciplinary analytical thinking. Critical analysis and evaluation of the chances and limitations of different modelling approaches.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Ecological modelling (Lecture) <i>Contents:</i> Theoretical basics as well as classical and modern models of terrestrial ecology with special consideration of models in microbial ecology.		2 WLH
2. Ecological modelling (Tutorial) <i>Contents:</i> Application and analysis of classic and modern ecological models and concepts .		2 WLH
Examination: Written exam (90 minutes)		6 C
Examination requirements: Comprehensive knowledge of ecological models, theories and concepts. Interdisciplinary analytical thinking skills. Ability to critically analyze and evaluate the chances and limitations of different modelling approaches.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Kerstin Wiegand	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 2	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C
Module B.MES.108: Computer science and mathematics		4 WLH
Learning outcome, core skills: Understanding of basic notions and methods of computer science and mathematics, including: representation of information, databases, the World Wide Web, foundations of programming, simulation, visualization; notations from logic and set theory, relations, graphs, functions, differentiation, extreme values, integration; vectors, linear transformations, matrices, eigenvalues; scale levels of variables, measures of location, dispersion and correlation, linear regression, probability, sampling, confidence intervals, fundamentals about statistical testing.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses:		
1. Computer science and mathematics (Lecture)		3 WLH
2. Computer science and mathematics (Exercise)		1 WLH
Examination: Written exam (90 minutes)		6 C
Examination requirements: Understanding of basic notions and methods of computer science and mathematics, including: databases, WWW, foundations of programming, simulation, visualization; graphs, functions, differentiation, extreme values, integration; vectors, linear algebra; descriptive statistics, linear regression, probability, sampling, simple tests.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Winfried Kurth	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 2	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES.109: Plant ecology and diversity		
Learning outcome, core skills: Students are familiar with global to regional scale patterns of plant diversity, the distribution of major climatic and vegetation zones (ecozones, biomes), as well as their predominant land uses and anthropogenic impacts. Students are familiar with basic aut- and synecological concepts in plant and vegetation ecology from the level of the individual plant to plant communities. They have learned to distinguish different major plant communities in Central Europe and are familiar with their specific abiotic site conditions, and their conservation significance. Students are able to apply ecological field methods and to perform basic analyses of diversity and community structure.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Plant ecology and diversity (Lecture) 2. Plant ecology and diversity (Field studies)		2 WLH 2 WLH
Examination: Oral examination (approx. 20 minutes)		6 C
Examination requirements: Distribution and determinants of ecozones and biomes, local to global scale patterns of plant diversity, alpha-beta-gamma diversity, aut-and synecological concepts, plant communities and their relations with abiotic site conditions, basic knowledge about field and analysis methods.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Holger Kreft	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 2	
Maximum number of students: 25		

Georg-August-Universität Göttingen	6 C 4 WLH
Module B.MES.111: Terrestrial biogeochemistry	
Learning outcome, core skills: At the end of this course students should understand the major biogeochemical processes at the interface of biosphere, lithosphere hydrosphere and atmosphere. Students will be able to detect where measurements of biogeochemical processes are useful using a system based approach. They will have gained practical experience in relevant measurements of biogeochemical processes in terrestrial ecosystems.	Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Terrestrial biogeochemistry (Lecture)	2 WLH
2. Biogeochemical processes (Laboratory course)	2 WLH
Examination: Written examination (120 minutes) and term paper (10 pages max.)	6 C
Examination requirements: Cycles in biogeochemistry, element ratios, carbon cycle of terrestrial ecosystems, biogeochemical cycling on land, nitrogen cycle of terrestrial ecosystems, soil development, mass balances at different scales, redox reaction in natural environments, biogeochemistry of wetlands, measurements of biogeochemical processes.	
Admission requirements: none	Recommended previous knowledge: none
Language: English	Person responsible for module: Prof. Dr. Edzo Veldkamp
Course frequency: each winter semester	Duration: 1 semester[s]
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 3
Maximum number of students: 25	

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES.112: Environmentally friendly production of wood		
Learning outcome, core skills: Environmentally friendly use of timber, of wood for energy and wood products. Basics and practice of wood protection and degradation by fungi. Knowledge of technological relevant wood properties of important commercial timbers. Modification technology for long-living major forest products (lumber, veneer, plywood, wood-based composites) and their significance for forest utilization.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses:		
1. Wood biology (Lecture, exercises, laboratory visits, excursion) <i>Contents:</i> Classroom lectures with practical exercises, visits in labs and short presentations of the students, one excursion to a wood processing company.		2 WLH
2. Wood-based-composites (Lecture, exercises, laboratory visits, excursion) <i>Contents:</i> Classroom lectures with practical exercises, visits in labs and short presentations of the students, one excursion to a wood processing company.		2 WLH
Examination: Oral examination (approx. 20 minutes)		6 C
Examination requirements: Anatomy, wood physics, wood chemistry, wood properties, wood-based composites, wood-plastic composites, wood modification, wood protection.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Holger Militz	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 3	
Maximum number of students: 25		

Georg-August-Universität Göttingen Module B.MES.113: Methods in systems biology	6 C 4 WLH
Learning outcome, core skills: "Omics" techniques are the backbone of modern systems biology. This course comprises lectures and practicals in genomics, proteomics, transcriptomics and statistical computing. The students will learn the theory of these applications, and the functioning of the required hard- and software. The students will obtain practical training in selected methods. This involves lab work as well as computer applications. The learning outcome will be that the students are to apply "omics" methods to questions in ecology and systems biology.	Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Genomics (Lecture, practicals) 2. Statistical computing and Transcriptomics (Lecture, practicals) 3. Proteomics (Lecture, practicals)	1 WLH 2 WLH 1 WLH
Examination: Term paper (20 pages max.)	6 C
Examination requirements: Detailed knowledge and understanding of methods to generate and analyse experiments involving approaches of modern systems biology. This includes a detailed understanding of basic statistical concepts to analyse "omics" data sets as well as skills in laboratory analyses and application of software for proteomic and transcriptomic data analysis.. Skills: knowledge how to analyse plant tissues by application of molecular and statistical methods.	
Admission requirements: Admission requirements: Successful examination in a minimum of 2 of the following courses: B.MES.101: Molecular plant and stress physiology, B.MES.103: Ecological genetics, B.MES.106: Microbiology and molecular biology, B.MES.108: Computer science and mathematics.	Recommended previous knowledge: none
Language: English	Person responsible for module: Prof. Dr. Andrea Polle
Course frequency: each winter semester	Duration: 1 semester[s]
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 3
Maximum number of students: 25	

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES.114: Biodiversity of pro- and eukaryotic soil microbial communities		
Learning outcome, core skills: Biodiversity, phylogenetics, morphology and functions of soil microbial communities consisting of prokaryots (archaea, bacteria) and eukaryots (algae and fungi); diversity of prokaryotic microbial metabolism and environmental functions. Knowledge of prokaryotic microorganisms and algae relevant for environmental functions, ability to identify these organisms and to analyse them with molecular methods; ability to identify major lineages of cyanobacteria and eukaryotic algae from cultures by microscopy.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Biodiversity of pro- and eukaryotic soil microbial communities (Lecture) 2. Biodiversity of pro- and eukaryotic soil microbial communities (Laboratory course)		2 WLH 2 WLH
Examination: Protocol (10 pages max.)		6 C
Examination requirements: Students prove their ability to perform specific microbiological molecular techniques independently and their ability to record, interpret and present their experimental results in written form.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Rolf Daniel	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 3	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES.116: Conservation and ecosystem management		
Learning outcome, core skills: The course imparts knowledge about the sustainable management of forest ecosystems and about nature conservation. Based on some fundamentals of forest ecology such as the impact of competitive interactions between trees, options of stand management are presented. Mixed stands and their management are of special importance. The course will provide information on how to analyze forest stands and how to derive appropriate silvicultural treatments in order to achieve the goals set by a given forest owner. The nature conservation part will introduce priority goals of conservation biology, the major threats to natural ecosystems and how they can be managed.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Forest ecosystem management (Lecture) 2. Nature conservation (Lecture)		2 WLH 2 WLH
Examination: Written exam (120 minutes)		6 C
Examination requirements: Competition in plant communities, plant – environment interactions, mixed stands, principles of stand management, silvicultural systems, human land-use, climate change, biodiversity, ecosystem functioning.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Christian Ammer	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 5	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES.117: Atmosphere-ecosystem interactions		
Learning outcome, core skills: In this course students will gain insights in the main atmospheric characteristics and how they influence ecosystem processes and fluxes between ecosystem compounds (e.g. air, plants, soil). They will also learn how ecosystems feed back to the atmosphere at local and global scale. This will form the basis for understanding the impact of climate change on ecosystem functions and services. The lecture course will give an overview on atmospheric variables such as radiation, humidity, temperature, and wind and their interactions with terrestrial ecosystems. In the seminar/exercise class, the understanding will be deepened by quantitative exercises. The students will be trained in quantitative and qualitative scientific methods to describe climate-dependent physical, chemical and biological processes in terrestrial ecosystems enabling them to understand and evaluate the current discussion on climate change and its impact on terrestrial ecosystems.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Atmosphere-ecosystem interactions (Lecture) 2. Atmosphere-ecosystem interactions (Seminar, exercise)		2 WLH 2 WLH
Examination: Written exam (120 minutes)		6 C
Examination requirements: Qualitative and quantitative description of radiation, humidity, temperature, wind, their interactions with terrestrial ecosystems, carbon and water cycle, atmospheric chemistry, climate change, climate modelling.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Alexander Knohl	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 5	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES.118: Resource assessment in ecosystems		
Learning outcome, core skills: The students will be trained <ul style="list-style-type: none"> to analyse issues and problems of ecological monitoring, with a focus on terrestrial ecosystems, to plan their own monitoring studies on statistically sound grounds balancing scientific-technical objectives and economic feasibility, to critically assess and understand monitoring studies carried out by other. These learning outcomes imply acquiring / enhancing knowledge and skills in the following fields: <ul style="list-style-type: none"> design-based statistical sampling, including estimation design, empirical statistical models, characteristics of a series of sampling designs and plot designs, the systematic planning process in monitoring studies. 		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Resource assessment in ecosystems (Lecture) <i>Contents:</i> The lectures comprise the theoretical foundations of monitoring and also the discussion based analysis of cases.		2 WLH
2. Resource assessment in ecosystems (Laboratory course) <i>Contents:</i> The field labs are practical exercises in field data collection techniques and measurement devices, the in-house labs are on data analysis and estimation.		2 WLH
Examination: Written exam (120 minutes)		6 C
Examination requirements: Basics of descriptive and inferential statistics (mean, variance, standard error, confidence interval, bias, precision, random selection), relevant basic sampling design options (simple random, stratified random, systematic, cluster sampling), relevant response designs options (fixed area plots, variable plots, distance techniques, point sampling, line sampling). Statistical estimation. Planning criteria for assessments.		
Admission requirements: B.MES-SK.115, B.MES.108	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Christoph Kleinn	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 5	

Maximum number of students:	
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25	
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Georg-August-Universität Göttingen		6 C
Module B.MES.119: Isotopes in ecosystem sciences		4 WLH
Learning outcome, core skills: The course provides a very broad background for isotope applications in ecosystem compartments including soils, plants, atmosphere, and microorganisms. Overview of various tracer methods and isotope applications will be presented. The specifics of stable and radioactive isotopes for investigations of ecosystem processes from submolecular to global scale will give deep background for future isotope applications in Bachelor, Master and PhD theses.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Stable isotopes (Lecture, seminar with exercises) 2. Radioactive isotopes and labeling techniques (Lecture, seminar)		2 WLH 2 WLH
Examination: Written exam (90 minutes)		6 C
Examination requirements: Knowledge of specified teaching content, achievement of defined goals and proof of target competence.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Yakov Kuzyakov	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 5	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C
Module B.MES.121: Global change		4 WLH
Learning outcome, core skills: At the end of this course the students are expected to <ul style="list-style-type: none"> • have insight in the major components of the earth system and how they are connected, • understand how environmental processes and biogeochemical cycles are regulated by biosphere-hydrosphere-atmosphere feedbacks and how they are affected by global change through natural and anthropogenic processes, • are able to understand and evaluate simple biogeochemical models. 		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Global change (Lecture)		2 WLH
2. Global change (Modelling exercises, seminar)		2 WLH
Examination: Presentation (approx. 30 minutes, 50%) and written report (10 pages max., 50%) Examination prerequisites: Successful completion of exercises and seminar		6 C
Examination requirements: Successful completion of assignments. After every lab students are given a mandatory homework assignment (though not graded).		
Admission requirements: none	Recommended previous knowledge: B.MES.111, B.MES.117	
Language: English	Person responsible for module: Prof. Dr. Edzo Veldkamp	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 6	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C
Module B.MES.122: Molecular soil ecology		4 WLH
Learning outcome, core skills: This lecture and laboratory course aims to integrate the basic knowledge on soil microbiology in ecological studies. The course is focused on the importance of active microorganisms and their diversity of species/genetic lineages as biogeochemical driver of soil processes linking microbial growth, enzymes kinetics and the stoichiometry with the modern molecular and isotopic approaches. Experiments will demonstrate how the hotspots of microbial activity (rhizosphere, detritusphere, biopores) can be revealed and visualized in situ in soil. <ul style="list-style-type: none"> • Goup 1: The microbial activity state is characterized by the values of eco-physiological indicators based on respiration, molecular biomarkers and viable cell compartments (ATP, PLFA, RNA). The Laboratory training links visualization of plant-microbial interactions by novel zymography approach (based on fluorogenic substrates) with enzyme kinetics and microbial growth parameters determined in the rhizosphere hotspots under impact of environmental stressors. • Group 2: Students will become familiar with molecular technologies used for analyzing the structure and function of decomposer systems, such as quantitative real time PCR, tagging of organisms by fluorescent markers compound specific stable isotope lipid analysis and molecular gut content analysis. 		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Molecular soil ecology (Lecture and Seminar)		2 WLH
2. Molecular soil ecology (Laboratory course and Seminar)		2 WLH
Examination: Oral presentation (approx. 15 minutes) with written outline (10 pages max.)		6 C
Examination requirements: Knowledge on: <ul style="list-style-type: none"> • Plant-microbial and microbial interactions in soil • Functional diversity and genetic diversity of soil microbial communities • Techniques to analyze soil-micro-foodwebs, such as zymography, application of fluorogenic substrates, enzymes kinetics, microbial growth, stable isotopes and lipid analysis • Response of soil microorganisms to environmental stressors 		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Stefan Scheu	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted:	Recommended semester:	

cf. examination regulations	6
Maximum number of students: 25	

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES.123: Project (research participation)		
Learning outcome, core skills: This course is a final step linking the data-set obtained and statistically treated by the students in practical trainings (B.MES. 105; 111; 113; B.MES-SK-115; 122) to the ongoing research projects. Introduction of structure, research strategy and outcome of the projects, from which the students have got the samples for practical training in previous semesters. Students compare their own results to the projects outcome. Course gives an advanced knowledge and application skills on the methods learnt within MES program (B.MES. 105; 111; 113; 115; 119; 122). Lecture course on Project design comprises all necessary steps to develop a scientific project: literature acquisition, research idea, scientific hypotheses, research strategy, design of the experiments (sites selection, sampling procedure, selection of methods), expected outcome and knowledge dissemination, time-table. Students develop and present their own projects for Bachelor study. This course is also aimed to help the students in preparation of their Bachelor study using as practical examples on-going projects of the department of "Soil Science of Temperate Ecosystems".		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Project design (Lectures and Seminar) <i>Contents:</i> Lecture course on Project design. Seminar on the own contribution to research.		2 WLH
2. Project (research participation) <i>Contents:</i> Laboratory courses work and/or active participation in ongoing research projects of lectures involved in the program.		2 WLH
Examination: Oral presentation (approx. 15 minutes) with written outline (10 pages max.)		6 C
Examination requirements: Scientific hypotheses, experimental design, laboratory techniques, analysis interpretation and scientific presentation of research results.		
Admission requirements: At least 120 credits earned	Recommended previous knowledge: none	
Language: English	Person responsible for module: PD Dr. Evgenia Blagodatskaya	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 6	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES.301: Special topics in plant methods and ecological applications I		
Learning outcome, core skills: This elective module consists of a seminar and advanced method courses. In the seminar the students will be informed about recent development and new discoveries in forest botany, plant – microbial interactions, biotechnology, plant molecular genetics and practical applications. In the advanced method courses student undertake internships and/or field excursions to learn new methods and applications in plant physiology and ecology. The students will take responsibility in the organization of their study program.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses:		
1. Forest botany (Seminar)		2 WLH
2. Ecological applications / Field excursion (Lecture, practical)		2 WLH
Examination: Oral presentation (aapprox. 15 minutes) and written report (10 pages max.)		6 C
Examination requirements: Discussion of scientific presentations, knowledge in recent problems in Forest Botany, application of advanced scientific methods to selected problems in plant science. Skills: knowledge in critical text analyses and presentation skills, knowledge in data base research, practical skills in handling modern equipment for plant analyses.		
Admission requirements: none	Recommended previous knowledge: In-depth knowledge in biology is required	
Language: English	Person responsible for module: Prof. Dr. Andrea Polle	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 4	
Maximum number of students: 10		

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES.302: Special topics in plant methods and ecological applications II		
Learning outcome, core skills: This elective module consists of a seminar and an advanced method course. The seminar will be conducted as a journal club. The students will get lists of papers which they have to read and present during the semester. The topics will be chosen from recent literature. The goal is to become involved in research and to learn to understand how to structure research and to publish. In the advanced method courses, lectures and specialized techniques will be taught and practiced. The students will organize the journal club.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses:		
1. Advanced plant biochemistry and genetics / Journal club (Seminar)		2 WLH
2. Advanced methods (Lecture, practical)		2 WLH
Examination: Oral presentation (approx. 15 minutes) and written report (10 pages max.)		6 C
Examination requirements: Reading and analyzing scientific publications, in-depth understanding of scientific working methods in plant ecology and molecular biology. Skills: knowledge in critical text analyses and presentation skills, knowledge in research methods.		
Admission requirements: none	Recommended previous knowledge: In-depth knowledge in biology is required	
Language: English	Person responsible for module: Prof. Dr. Andrea Polle	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 4	
Maximum number of students: 10		

Georg-August-Universität Göttingen	6 C 4 WLH
Module B.MES.303: Semiochemical diversity	
Learning outcome, core skills: Students will learn to investigate the dynamics of semiochemical diversity in different types of ecosystems. This involves field sampling of important plants and animals, volatile extraction from different tissues, laboratory analyses of various types of volatile markers, data analyses and interpretation. Students will learn practical steps to assess semiochemical diversity, and will be able to evaluate the use of chemo-ecological methods for applications in plant protection, nature conservation, and ecosystem management.	Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Semiochemical diversity (Lecture)	1 WLH
2. Methods to study semiochemical diversity and biodiversity (Workshop, laboratory course)	3 WLH
Examination: Term paper (20 pages max.)	6 C
Examination requirements: Classification of semiochemicals, measures of chemical and biological diversity, analytical and determination methods, key species, key volatiles, key processes, semiochemicals in practical application.	
Admission requirements: B.MES.102	Recommended previous knowledge: none
Language: English	Person responsible for module: Prof. Dr. Stefan Schütz
Course frequency: each summer semester	Duration: 1 semester[s]
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 4
Maximum number of students: 25	

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES.304: Protection of renewable resources		
Learning outcome, core skills: The use of chemical methods is commonplace in protection measures at various levels of biological organization in forest protection, plant protection and stored product protection. Students will learn the results of chemo-ecological approaches in integrated pest management based on selected projects and recent literature. Students will be able to critically evaluate benefits and limitations of chemo-ecological approaches in a production and conservation context. Examples will be taken from different geographic and climatic regions.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Protection of renewable resources based on chemical and chemo-ecological methods (Lecture)		1 WLH
2. Assessment of protection measures for renewable resources (Seminar, workshop)		3 WLH
Examination: Oral presentation (approx. 15 minutes) with written outline (5 pages max.)		6 C
Examination requirements: Application of semiochemicals in different ecosystems, quality control, toxicology, integrated pest management, production of renewable resources, nature protection.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Stefan Schütz	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 4	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES.305: Conservation of biodiversity		
Learning outcome, core skills: The use of molecular methods is commonplace in conservation at various levels of biological organization from genes to ecosystems. Students will examine the results of molecular approaches in biodiversity conservation based on selected projects and recent literature. Students will be able to critically evaluate benefits and limitations of molecular studies in a conservation context. Examples will be taken from different geographic and climatic regions.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Conservation of biodiversity based on molecular tools (Lecture) 2. Assessment of molecular diversity for conservation (Seminar, Workshop)		1 WLH 3 WLH
Examination: Oral presentation (approx. 15 minutes) with written outline (5 pages max.)		6 C
Examination requirements: Effective comprehension of scientific literature with regard to conservation of biodiversity, different methods used for conservation of biodiversity and their specific applications, critical evaluation of molecular studies in a conservation context.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: N. N.	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 4	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C 4 WLH
Module B.MES.306: Intraspecific diversity of plants		
Learning outcome, core skills: Students will learn to investigate the dynamics of intraspecific diversity in different types of ecosystems. This involves field sampling of important plants, DNA extraction from different tissues, laboratory analyses with various types of molecular markers, data analyses and interpretation. Students will learn practical steps to assess genetic diversity, and will be able to evaluate the use of DNA-based methods for applications in breeding, conservation, and ecosystem management.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses: 1. Intraspecific diversity of plants (Lecture) 2. DNA based methods to study biodiversity (Workshops, laboratory exercise)		1 WLH 3 WLH
Examination: Term paper (20 pages max.)		6 C
Examination requirements: DNA markers and techniques, estimation of intraspecific diversity in different types of ecosystems, methods used for experimental sampling, DNA extraction from different tissues, laboratory techniques, data analyses and interpretation and application of results.		
Admission requirements: B.MES.103, B.MES.104	Recommended previous knowledge: none	
Language: English	Person responsible for module: N. N.	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester: 4	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Forst.1511: Tropical forest ecology and silviculture		
Learning outcome, core skills: The module enables students to understand the most important ecological processes in zonal and azonal tropical forest formations, to analyse silvicultural systems critically considering their advantages and drawbacks, to design well adapted silvicultural systems, to analyse the ecological consequences of logging in tropical rain forests and finally, to plan and implement plantation programmes in different ecological tropical zones, and they are supposed to acquire a basis for silvicultural management of the different tropical forest formations.		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Tropical forest ecology and silviculture (Lecture) <i>Contents:</i> This course focuses on the ecology of tropical rain forests, the threat to the forest and options for ecologically sound management. Lectures on forest ecology include the analysis of different tropical forest types such as lowland rain forest, montane forest, mangrove forest, the biodiversity of the forest, the role of fire, and the carbon balance of forests. More applied topics will analyse silvicultural systems such as polycyclic and monocyclic management systems.		4 WLH
Examination: Oral examination (approx. 20 minutes)		6 C
Examination requirements: Based on the contents of the lecture students should be able to discuss critically current and important questions in the field of tropical silviculture and forest ecology.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Dirk Hölscher	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester:	
Maximum number of students: not limited		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Forst.1512: International Forest Policy and Economics		
<p>Learning outcome, core skills: Global environmental and forest policy: The objective is that students get basic knowledge of both the key policies related to forests and the application of the policy analysis on such issues. Students acquire comprehension about global forest related policy processes and factual knowledge about forest actors affecting the policy on a global level. The seminar combines a lead-in to global policy theory and its translation in practical, empirical knowledge about actors and processes of high importance in forestry. The different instruments for international policy formulation and implementation are discussed using case studies.</p> <p>International forest economics: The lecture is split in two main areas: 'International Wood Markets' and 'International Environmental and Forest Conservation'. The first part deals with the international trade with wood and wood products. International markets and the consequences of protectionism are analysed. Furthermore, aspects of international wood marketing are shown. In the second part, international environmental problems are described and possibilities as well as constraints for international co-operation are discussed. Finally, relations between environmental conservation and economic development are analysed.</p>		<p>Workload: Attendance time: 56 h Self-study time: 124 h</p>
Course: Global environmental and forest policy (Seminar)		2 WLH
<p>Examination: Written examination (60 minutes) Examination requirements:</p> <ul style="list-style-type: none"> • Knowledge about political theories on forest and environmental policies • Application of the policy analysis on forest and environmental policies 		3 C
Course: International forest economics (Lecture)		2 WLH
<p>Examination: Written examination (60 minutes) Examination requirements:</p> <ul style="list-style-type: none"> • Knowledge about international wood markets, international trade with wood, wood products, aspects of international wood marketing and the consequences of protectionism. • Knowledge about international environmental problems and economic approaches towards their solution as well as knowledge about the relations between forest conservation and economic development. 		3 C
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Dr. Christiane Hubo	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted:	Recommended semester:	

cf. examination regulations	
Maximum number of students: not limited	

Georg-August-Universität Göttingen Module M.Forst.1513: Monitoring of Forest Resources	6 C 4 WLH
Learning outcome, core skills: Familiarize the students with the range of methods and techniques applied to forest monitoring in the preparation, planning, implementation and analysis phase. Objective is that the students are eventually in the position to carry out their own monitoring projects, and that they have the criteria to judge the quality of monitoring projects in general. Focus is on the target-oriented planning and the definition of the most appropriate sampling design and plot design that guarantees the generation of high-quality information for the decision makers in forestry.	Workload: Attendance time: 56 h Self-study time: 124 h
Course: Monitoring of forest resources (Lecture, Exercise) <i>Contents:</i> Forest monitoring is a forestry discipline that aims at the comprehensive and objective characterization of the forests as a production system and/or as an ecological system in a defined geographic area, in terms of status quo and changes. Forest inventories are the core element of monitoring and they generate data and information required by foresters, forest politicians and forest researchers to support decision making. The course module "Monitoring of forest resources" intends to familiarize the students with the range of methods and techniques applied to forest inventories in the preparation, planning, implementation and analysis phase. Objective is that the students are eventually in the position to carry out their own monitoring projects of forests and related resources, and that they know the criteria to judge the quality of monitoring projects in general. Focus is on the target-oriented planning and the definition of the most appropriate sampling design and plot design that guarantees the generation of high-quality information for the decision makers in forestry. That includes comprehensive presentation of statistical sampling. Examples of small and large area inventories and monitoring are presented and critically analysed. The important remote sensing applications for forest monitoring are not dealt with in detail in this module, as this topic is covered in other modules; but the relevance of integrated inventories (combining field sampling and remote sensing) is addressed. The development of forest inventories towards integrated "landscape inventories", "multi-resource inventories", "tree inventories" is also addressed of this course. Prerequisites: Sound basis in "Forest mensuration" and basic statistics.	4 WLH
Examination: Written exam (120 minutes)	6 C
Examination requirements: Target-oriented planning and the definition of the most appropriate sampling design and plot design that guarantees the generation of high-quality information for decision makers in forestry and related fields. Introductory knowledge about remote sensing imagery (aerial photographs and satellite imagery) as one of the data sources employed in forest inventories. The development of forest inventories towards integrated "landscape inventories", "multi-resource inventories", "tree inventories". The students	

should be in the position to plan and carry out their own inventory projects, and that they have the criteria to judge the quality of inventory projects of others.	
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Admission requirements: none	Recommended previous knowledge: none
Language: English	Person responsible for module: Prof. Dr. Christoph Kleinn
Course frequency: each winter semester	Duration: 1 semester[s]
Number of repeat examinations permitted: cf. examination regulations	Recommended semester:
Maximum number of students: not limited	

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Forst.1514: Forest utilization and wood processing		
Learning outcome, core skills: Knowledge of technological relevant wood properties of important commercial timbers. Technology of major forest products in tropics (lumber, veneer, plywood, wood-based panels, pulp and paper) and their significance for forest utilisation. Enables students to analyse situations where forest operations take place and to select and quantify the optimal course of action. It puts forest operations into the broader context of society and forest ecosystems and stresses the human factor involved. Emphasis is directed to systems analysis and long-term perspectives		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Forest utilization and wood processing (Lecture) <i>Contents:</i> The modul consists of two parts: Work Systems and Methods in Forest Utilization. It puts forest operations into the broader context of society and forest ecosystems and stresses the human factor involved. Emphasis is directed to systems analysis and long-term perspectives. Contents: Overview of the role of forestry, forest products, forest areas, removals and general tendencies as basic information. The importance of the human factor: indigenous knowledge, training, ergonomics, occupational safety and health, work studies. Basic elements of road planning, construction and maintenance. Fuelwood, simple methods for charcoal production. Harvesting technologies: overview, reduced impact logging, case studies. Technologies outside harvesting. Appropriate technologies. Cost control in forest operations. Recent developments (information technology, GIS, logistics).		4 WLH
Examination: Written examination (120 minutes)		6 C
Examination requirements: Kenntnis der beschriebenen Lehrinhalte, Erreichung der festgelegten Lernziele und Nachweis der angestrebten Kompetenzen.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Dr. forest. Gerhard Büttner	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester:	
Maximum number of students: not limited		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Forst.1521: Ecopedology of the tropics and subtropics		
Learning outcome, core skills: General understanding of the most important aspects of tropical and subtropical soils, their occurrence, genesis, geography, properties and use. Understanding the principles of the international FAO soil profile description and classification.		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Ecopedology of the tropics and subtropics (Lecture) <i>Contents:</i> Part I: General introduction in soils of the tropics and subtropics, their functions, genesis, geography and properties. Objective: general understanding of the most important aspects of tropical soils, their occurrence, genesis, properties and use. The following topics will be discussed: Introduction; Climate, water and vegetation; Weathering and weathering products, clay minerals; Soil organic matter, C and N dynamic; Soil chemical reactions, variable charge; Soil forming processes and development of soils; Water and nutrient cycling of land use systems; Tropical shield areas (example: Amazon basin); Arid shields and platforms (example: West Africa); Tropical mountain areas (example: Andes); Fluvial and coastal areas in the tropics (example: coastal areas in Asia). Part II: Introduction in the description and classification of soils, using in international system (FAO). Objective: understanding the principles of the FAO soil profile description and classification. The course consists of introductory lectures in which the principles of the FAO soil description and classification will be explained. This knowledge will be practiced using examples of soil profiles from different tropical countries. The second part consists of a practical week during which soil profile descriptions and evaluations will be exercised in the field. We will visit three contrasting sites around Göttingen where a site and soil description will be made. The work will be done in small groups. Students discuss their results in a report.		4 WLH
Examination: Term paper (10 pages max.) and written exam (2 hours)		6 C
Examination requirements: Kenntnis der beschriebenen Lehrinhalte, Erreichung der festgelegten Lernziele und Nachweis der angestrebten Kompetenzen.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Edzo Veldkamp	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester:	
Maximum number of students: not limited		

Georg-August-Universität Göttingen		6 C
Module M.Forst.1522: Project planning and evaluation		4 WLH
<p>Learning outcome, core skills:</p> <p>“Political evaluation”: Insights into the political framework of evaluation and the power and information based processes which drive any procedure of evaluation and application of the results in practice.</p> <p>The students conduct a case study in political evaluation based on literature and an interactive game.</p> <p>“Evaluation of rural development projects and policies”: In cooperation with the chair of „International Food Economics and Rural Development“ this submodule teaches and trains the standard methods for the evaluation of rural development projects and policies. In particular, this includes impact assessment as well as cost-benefit analysis.</p> <p>The students learn how to use the methods and instruments and recognise advantages and limitations of the different evaluation techniques.</p> <p>A deeper understanding of the subject-matter is achieved by examples presented by guest lecturers and practitioners.</p>		<p>Workload:</p> <p>Attendance time: 56 h</p> <p>Self-study time: 124 h</p>
Courses:		
1. Political evaluation (Lecture)		1 WLH
2. Evaluation of rural development projects and policies (Lecture, Seminar)		3 WLH
Examination: Written examination (90 minutes)		6 C
Examination requirements:		
Kenntnis der beschriebenen Lehrinhalte, Erreichung der festgelegten Lernziele und Nachweis der angestrebten Kompetenzen.		
Admission requirements:	Recommended previous knowledge:	
none	none	
Language:	Person responsible for module:	
English	Prof. Dr. Bernhard Möhring	
Course frequency:	Duration:	
each summer semester	1 semester[s]	
Number of repeat examinations permitted:	Recommended semester:	
cf. examination regulations		
Maximum number of students:		
not limited		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Forst.1523: Biometrical research methods		
Learning outcome, core skills: Understanding and application of basic techniques of descriptive and confirmative statistics, as well as basic experimental designs and sampling techniques. Analysis of experimental data sets by an appropriate statistical programme package (at present: Statistica). Skills in describing and estimating forest stand parameters, forest structure and tree shape, and modelling of forest growth and development.		Workload: Attendance time: 56 h Self-study time: 124 h
Courses:		
1. Biometric data analysis and experimental design (Lecture, Exercise)		2 WLH
2. Forest dynamics (Lecture, Exercise)		2 WLH
Examination: PC based written exam (120 minutes)		6 C
Examination requirements: Understanding and application of basic techniques of descriptive and confirmative statistics, as well as basic experimental designs and sampling techniques. Analysis of experimental data sets by an appropriate statistical programme package. Quantitative methods to describe forest density, forest structure and tree morphology, modelling tree growth, calculating sustainable harvests for even-aged and continuous cover forests and the biological role of insects in forest ecosystems.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: N. N.	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester:	
Maximum number of students: 30		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Forst.1524: Biotechnology and forest genetics		
Learning outcome, core skills: Biotechnology is a fast developing field with many aspects and options in efficient and environmentally friendly bioresource production and utilization of bioresources including plant biomass. Sustainable management of tropical forests requires an understanding of the spatial and temporal dynamics of genetic information both in natural and man-made tropical forest ecosystems. The teaching module gives introductory lectures into biotechnology and into forest genetics.		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Biotechnology (Lecture) <i>Contents:</i> Students will be introduced into subjects of microbiology, biochemistry and molecular biology being basics for biotechnology. With the gained knowledge, modern biotechnological applications in the forest and the wood industry sectors and the progress of biotechnological biomass conversion will be discussed, as well as other environmental problems that might be solved by biotechnological approaches on industrial scales and, particularly in tropical countries, also by small family business.		2 WLH
Examination: Oral examination (approx. 15 minutes)		3 C
Course: Tropical forest genetics (Lecture) <i>Contents:</i> Basic principles of population genetics are introduced, factors shaping genetic diversity of tropical forest species are discussed with emphasis on the reproduction system of tropical forest plants, and genetic diversity patterns of tropical forest trees are described. Main applications of forest genetics are mentioned: provenance research and tree breeding, genetic implications of forest management, forest reproductive material, and conservation of forest genetic resources.		2 WLH
Examination: Oral examination (approx. 15 minutes)		3 C
Examination requirements: Kenntnis der beschriebenen Lehrinhalte, Erreichung der festgelegten Lernziele und Nachweis der angestrebten Kompetenzen.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Ursula Kües	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted:	Recommended semester:	

cf. examination regulations	
Maximum number of students: not limited	

Georg-August-Universität Göttingen		6 C (Anteil SK: 6 C)
Module M.Forst.1601: Bioclimatology and global change		4 WLH
Learning outcome, core skills: Scientific basis of climate and climate change, trace gas budgets of soils and whole ecosystems and the potential to sequester carbon and nitrogen in managed and unmanaged terrestrial ecosystems.		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Bioclimatology and global change (Lecture) <i>Contents:</i> The module "Bioclimatology and Global Change" will introduce the students to the global climate system and its interaction with the biosphere. A lecture course will focus on the scientific basis of climate and climate change covering basic physical and chemical processes governing the climate system, climate zones, modelling as well as global and regional climate phenomena with a focus on tropical climates. A seminar course will highlight trace gas budgets of soils and whole ecosystems and their potential to sequester carbon and nitrogen in managed and unmanaged terrestrial ecosystems and their vulnerability to climate change. Using journal literature the students will work out oral presentations concerning current research topics concerning the global climate system and its interaction with the biosphere.		4 WLH
Examination: Written exam (90 minutes) and oral presentation (approx. 20 minutes)		6 C
Examination requirements: Understanding the most relevant processes at the biosphere-atmosphere interface and of biogeochemical cycles. Being able to find, read, evaluate, and present scientific literature related to Global Change.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Alexander Knohl	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester:	
Maximum number of students: not limited		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Forst.1602: Dryland Forestry and Methods in Silviculture		
Learning outcome, core skills: Knowledge of the specifics of dryland forestry. Students will learn to use and apply different plant ecological and silvicultural methods.		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Dryland forestry and methods in silviculture (Lecture, Exercise, Seminar) <i>Contents:</i> The lecture focuses on landuse options with special emphasis on the management of dry deciduous forests on a global scale. With 30% share of global land surface drylands play an important role in terms of ecological and economical aspects and require a specific way of management. The second focus of this module is the application of different plant ecological and silvicultural methods, especially for the analysis of gap dynamics. Management of tropical forest is largely based on the extraction of single large trees that create canopy gaps. In the seminar, we analyze predictions of ecological theory for tree establishment in forest gaps and will do an empirical study on regrowth characteristics in gaps of a species rich temperate forest. The method spectrum will include field measurements of canopy openness, leaf area, soil moisture, leaf water potential and leaf traits.		4 WLH
Examination: Oral presentation (approx. 15 minutes) with written outline (10 pages max.)		6 C
Examination requirements: Kenntnis der beschriebenen Lehrinhalte, Erreichung der festgelegten Lernziele und Nachweis der angestrebten Kompetenzen.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Dirk Hölscher	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester:	
Maximum number of students: not limited		

Georg-August-Universität Göttingen Module M.Forst.1605: Forest Protection and Agroforestry	6 C 4 WLH
Learning outcome, core skills: Assessment of forest protection problems and available methods of insect or pathogen control with special emphasis on sustainable methods. Basic understanding of agroforestry systems in the tropics.	Workload: Attendance time: 56 h Self-study time: 124 h
Course: Forest protection and agroforestry (Lecture) <i>Contents:</i> Forest protection is aimed at protecting natural, near natural and plantation forests from disease and pests. Diseases do include abiotic diseases (damage from lack and excess of nutrients, fire, drought pollution, etc.) and biotic diseases caused by microorganisms including viruses and protozoa, and parasitic plants. Forest protection deals also with damage from animal pests, meaning arthropods and there specially insects, but also damage from mammalians. The matter is presented in a concept of integrated pest and disease management, here pests and diseases affecting specific tree species (mahogany, teak, Pinus, Dipterocarpaceae, Acacia, Eucalyptus, etc.) are treated together. Beside this core lectures. A prerequisite for the lectures and practical training, is knowledge of basic subjects of phytomedicine. However, if necessary, missing, incomplete and not up to date knowledge may be supplemented in lectures such as: Overview of abiotic diseases, theoretical approach to integrated pest and disease management, biological, bio-technical and chemical control of pests and diseases. The main focus of the module is explanation of specific (and for forest protection important) features of the individual tree species and/or forest types, diagnostic of the disease and pest attack and explanation of strategies for the integrated management of the disease or pest. Possible control strategies include. Experiences of the lecturers are in Germany and abroad (South and Central America, North Africa and South East Asia) and advice can be provided also in Spanish. silvicultural based measures, i. e. displacing the attack of diseases and pests by changing planting distance, managing shadow, managing thinning, establishing mixed stands, change of logging practises. Reducing spread of disease or pest by eradication of individual trees or group of trees or certain areas of the forest (hot spots) or manual collecting of specific insect stages. Genetic based measures i. e. resistant species, subspecies, f. sp., varieties and different provenience, and, if available, genetic engineered plants trimmed for resistance to diseases and pests. Chemical oriented plant protection. Applied according to the principles of integrated pest management, which includes economic threshold, consideration of the residue problems and health of the applying forester. Basic knowledge are required, but may be supplied in a specific lectures. Biological and biotechnical oriented plant protection. In this context experiences and possibilities of applying these measures in the field are being discussed. Specific examples are treated and possible approaches to new problems are discussed. The influence of different factors (including the above listed approaches) on the biological and biotechnical plant protection are considered. Basic knowledge is required, but may be supplied in specific lectures. Agroforestry systems are land-use systems and practises in which woody perennials are deliberately grown	4 WLH

<p>on the same land management unit as crops and/or animal husbandry, either in some form of spatial arrangement or in a time sequence, and in which there is a significant interaction between the woody perennials and the crops or animals. Starting with general considerations in agroforestry systems, a selection of systems in which trees or other woody perennials play an important role are discussed: The classical Taungya System, the tumpangsari system in Java, the Malang and Magelang system, the Juhm system of Nagaland, different home and forest gardens of S-E-Asia. In detail discussed are the role of trees in agroforestry systems and a selection of suitable tree species for agroforestry systems.</p>		
Examination: Written exam (120 minutes)		6 C
<p>Examination requirements: Kenntnis der beschriebenen Lehrinhalte, Erreichung der festgelegten Lernziele und Nachweis der angestrebten Kompetenzen.</p>		
<p>Admission requirements: none</p>	<p>Recommended previous knowledge: none</p>	
<p>Language: English</p>	<p>Person responsible for module: Prof. Dr. Stefan Schütz</p>	
<p>Course frequency: each summer semester</p>	<p>Duration: 1 semester[s]</p>	
<p>Number of repeat examinations permitted: cf. examination regulations</p>	<p>Recommended semester:</p>	
<p>Maximum number of students: not limited</p>		

Georg-August-Universität Göttingen Module M.Forst.1606: Forestry in Germany		6 C 4 WLH
Learning outcome, core skills: Understanding of forestry and related industries in Germany.		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Forestry in Germany (Excursion, Seminar) <i>Contents:</i> Important aspects of German Forestry are introduced to foreign students interested in the forest management as practised in Germany as well as the wood-processing industry. Contents are forest management, silviculture, forest utilization, labor science and process technology, forest economics, tree improvement and genetics, forest inventory and remote sensing (forest management inventories in Germany, the German National Forest Inventory, applications of remote sensing in forestry planning in Germany) The module provides a basic understanding of the forest management in Germany including actual trends and perspectives. It is strongly suggested for foreign students who are going to undertake their project in Germany (Project: 70130 "Managing sustainable forestry systems in Germany"). The module includes various excursions.		4 WLH
Examination: Oral presentation (approx. 15 minutes) with written outline (15 pages max.)		6 C
Examination requirements: Kenntnis der beschriebenen Lehrinhalte, Erreichung der festgelegten Lernziele und Nachweis der angestrebten Kompetenzen.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: N. N.	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester:	
Maximum number of students: not limited		

Georg-August-Universität Göttingen Module M.Forst.1607: Biodiversity, NTFP's and wildlife management	6 C 4 WLH
<p>Learning outcome, core skills:</p> <p>Course objectives: Non-timber forest products (NTFPs) are important sources of income and nutrition in many regions. While the harvesting of these products is commonly based on traditional knowledge, a systematic approach to a sustainable management is often not in place. Moreover the use of NTFPs is often in conflict with other forest use (e.g. timber extraction, protected areas) or extraction of NTFPs exceeds sustainable levels. A rigorous ecological / economic assessment of the resource thus represents a first important step towards the understanding and development of sustainable management systems. A wide range of NTFPs is introduced that are relevant in different regions of the world. In the second part of this module, we will discuss recent topics in international forest conservation.</p> <p>Course contents: The taxonomy, ecology, and economic and cultural importance of major NTFPs are described. Different assessment and monitoring approaches are presented and discussed.</p> <p>The course covers the basic concepts of wildlife ecology and conservation, including habitat requirements, population dynamics, and predator-prey relationships. Commonly-used methods for estimating wildlife-habitat relationships and population parameters will be explained through practical exercises. Examples from the published literature will then serve to illustrate the use of these basic concepts and method for the sustainable management of wildlife resources. These examples will include case studies dealing with population estimation, setting harvesting quote, mitigating human-wildlife conflicts, and identifying priority areas for habitat conservation. The presentation of different nature conservation strategies and nature reserve systems in Europe and Non-European foreign countries qualify and enlarge the knowledge of nature conservation. The contents comprises topics of assessment of biodiversity, international categories of protected areas and assessment of conservation status, conservation problems and priorities in the temperate and boreal forests and in tropical forests as well, hot spots, deforestation, selective logging, rehabilitation of exploited forests, poaching, national parks, ecotourism, conservation problems in grasslands, hunting tourism, economic use of game resources, conservation problems of islands and exotic species.</p> <p>Teaching and learning methods: Lectures; paper presentations by students on specific topics;</p> <p>Competences acquired: The students are familiar with a wide range of NTFPs and wildlife and have a good command of the relevant assessment and monitoring techniques.</p>	<p>Workload:</p> <p>Attendance time: 56 h</p> <p>Self-study time: 124 h</p>
<p>Courses:</p> <p>1. Non timber forest products and biodiversity conservation (Lecture, Exercise)</p> <p>2. Wildlife management (Lecture, Exercise)</p>	<p>2 WLH</p> <p>2 WLH</p>
<p>Examination: Oral presentation (approx. 25 minutes) and oral exam (approx. 10 minutes)</p>	<p>6 C</p>

Examination requirements: Familiarity with a wide range of NTFPs and wildlife; good command of the relevant assessment and monitoring techniques.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Niko Balkenhol	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester:	
Maximum number of students: 30		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Forst.1609: Remote Sensing Image Processing with Open Source Software		
Learning outcome, core skills: This combined lecture and lab makes the student familiar with principles of digital image processing and GIS integration, with a focus on applications in forestry and ecology. The software GRASS is used which is freely available as open source software. Students are encouraged to bring their own notebook computers, if available.		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Remote sensing image processing with open source software (Lecture, Exercise) <i>Contents:</i> Notions of remote sensing and digital imagery are briefly addressed. General characteristics of open source software are presented. The software GRASS is introduced and being used for typical tasks of digital image processing of remote sensing imagery, such as image enhancement, geometric corrections, cloud masking, 3D visualization, vector to raster transformation, and eventually image classification. If teaching progress allows, case studies and the integration of sampling and image interpretation are presented and discussed.		4 WLH
Examination: Oral exam (approx. 15 minutes) and practical exam (approx. 15 minutes)		6 C
Examination requirements: The students should give evidence that they know the application-oriented technical bases of remote sensing and the possibilities and limitations of remote sensing when applied to problems of forest management and conservation. They shall also prove that they have acquired sufficient insight and skills in using the software of the lecture so that they are able to solve basic image processing problems and they should give evidence that they can systematically approach larger problems.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Christoph Kleinn	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester:	
Maximum number of students: not limited		

Maximum number of students:	
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25	
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Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Forst.1611: Exercises in Forest Inventory		
Learning outcome, core skills: The students shall learn to design, to implement, to document and to cause forest inventory projects autonomously and on a scientific basis. Further on, they shall develop the abilities to optimize and to develop measuring methods related to forests. Therefore, it is crucial to handle common measuring instruments and methods safely.		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Exercises in forest inventory (Lecture, Exercise) <i>Contents:</i> <ul style="list-style-type: none"> • Short repetition about the use of instruments for measuring DBH, upper diameters and heights. • Planning, preparation and implementation of a sample based forest inventory, including the designing of an inventory instruction. • Data management (Excel) and analysis after given tasks. • Formulating a project report. • Presentation of results in small groups within a seminar for examination. 		4 WLH
Examination: Oral presentation (approx. 15 minutes) with written outline (15 pages max.)		6 C
Examination requirements: Kenntnis der beschriebenen Lehrinhalte, Erreichung der festgelegten Lernziele und Nachweis der angestrebten Kompetenzen.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Christoph Kleinn	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester:	
Maximum number of students: 10		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Forst.1615: Forest growth and tree-based land use in the tropics		
Learning outcome, core skills: Understanding of forest dynamics and growth research approaches in the tropics. Participants will become familiar with sampling, measurement, and analysis methods for age determination and increment measurement of trees and forest stands. The seminar will enable students to direct discussions on scientific topics.		Workload: Attendance time: 28 h Self-study time: 152 h
Course: Forest growth and tree-based land use in the tropics (Lecture, Exercise) <i>Contents:</i> The lecture include the following topics: geographical distribution of the tropics and their climatological characterization, dendrological and site characteristics of forests types, structure and dynamics of forests, status of tropical forests and situation of deforestation, climate growth relations of trees and stands, wood anatomical features of selected tree species, implications of growth studies on sustainable management systems and carbon flux estimations in tropical forests. This seminar focuses on the impact of natural and human perturbations on tropical forest ecosystems. Disturbances such as fire, harvesting, land-uses change and global warming to tropical forests will be evaluated. Through a series of student-led discussions founded on case studies from the lecture 'Tropical forest ecology and silviculture' and recent literature, we will address the effects of perturbations on ecological characteristics of forests such as net primary productivity, nutrient cycling and plant communities.		4 WLH
Examination: 2 Subexams: Written exam (60 minutes) and term paper (15 pages max.)		6 C
Examination requirements: Kenntnis der beschriebenen Lehrinhalte, Erreichung der festgelegten Lernziele und Nachweis der angestrebten Kompetenzen.		
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Dr. Sophie Graefe	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: cf. examination regulations	Recommended semester:	
Maximum number of students: not limited		