Fakultät für Umwelt und natürliche Ressourcen
Faculty of Environment and Natural Ressources

Modulhandbuch für Wahlpflichtfächer

Module description for Electives

Master of Science (M.Sc.):
Umweltwissenschaften / Environmental Sciences
Forstwissenschaften / Forest Sciences

(Prüfungsordnung 2023 / Examination regulations version 2023)

universität freiburg

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Prolog

(--- Deutsche Version des Prologs ab Seite 6 ---)

Electives

This handbook describes all the electives of the two study programs MSc Environmental Sciences and MSc Forest sciences for one year (Summer 2024 and winter 2024/25). Electives vary in subject, language, duration, type of teaching and frequency. The modules described here may or may not be offered in subsequent semesters. For each semester there will be a list published that encompasses all electives being offered. It will be provided via the mailing lists by the program coordinator as well as on the program websites.
For participating in an elective, students must enroll via the online platform HisInOne within the booking periods that are shown at each module. Participation can be guaranteed only up to a max. number of students for each module.

Language

The electives are offered either in German or English. The language used to describe the individual modules is the language of instruction.

Structure of the modules within the study program

1) Core modules:
Three core modules (15 ECTS) are compulsory for all students. They are offered in the first and third semesters.

2) Major modules:
Major modules are mandatory for the major chosen. In total, 10 major modules accounting for 50 ECTS need to be taken, usually in the first, second and third semester.

3) Electives:
Three electives totaling 15 ECTS must be taken during the program. Students can choose from a variable offer of modules for the two Master's programs MSc Forest Sciences and MSc Environmental Sciences. It is also possible to choose modules from other Master's degree programs of the faculty, the university or outside the university, as long as there is a subject-related connection. The examination board decides on suitability in accordance with the respective major. Language courses are not considered as suitable courses.

Electives offered during the summer semester 2024

In the summer semester the modules are taught in a three-week-block after the lecture period at the end of the semester.

Number	Name	Language
64125	**Marine Ecology**	ENG
64134	**Führung im Forstbetrieb**	DE
64111	**Plants Make Scents**	ENG
13015	**Forest Genetics Research Lab**	ENG

13016	**Agroforestry Systems**	ENG
13017	**Python + GIS basics**	ENG
13018	**Diagnostic Methods for Tree Diseases**	ENG

Electives offered during the winter semester 2024/25

During the winter semester, students have the opportunity to either select block-wise-taught modules or continuous-taught modules during the semester. Here is a list offered in the winter term 2024/25.

Block before the winter semester		
Number	**Name**	**Language**
64073	**Praxiskurs Sattelmühle**	DE
64134	**Biotic and Abiotic Challenges of Urban Trees and Forests**	ENG
64030	**Forest Resources and Forest Management in France and Germany**	ENG
During Semester		
Number	**Name**	**Language**
92982	**Wasserpolitik und Wasserrecht**	DE
64096	**Tropical Forest Ecology** (online)	ENG
12101	**Landwende- & Forstrecht**	DE
13006	**Natural Hazards**	ENG
92952	**Bodenphysik**	DE
64087	**Life Cycle Management**	ENG
13028	**Stable Isotopes**	ENG
13002	**Gender Planning**	DE
13029	**Waldbewirtschaftung im gesellschaftlichen Wandel**	DE
13024	**SPHERE - Sustainable Farming and Pollinator Habitat Restoration for Biodiversity and Food Security**	ENG

13010	**Water in Drylands**	ENG
64132	**GIS in der Forstwirtschaft**	DE
95996	**Introduction to Sustainability Transitions / Energy System Transition II /**	ENG
13011	**Wildbienenbestimmung**	DE
64084	**Economics of Biodiversity and Ecosystem Services**	ENG
13023	**Landscape genomics**	ENG
Block after the winter semester		
Number	**Name**	**Language**
13004	**Insect-Microbe Interactions**	ENG
13027	**Advanced Research in Wildlife Ecology**	ENG
64036	**Führung im Forstbetrieb**	DE
64094	**Human-environment Interactions**	ENG
92924	**Ecohydrology**	ENG
92926	**Global Groundwater - Agriculture Nexus**	ENG
95990	**Technology Assessment**	ENG
97024	**Environmental and Energy Transition Law**	ENG
64097	**Tropical Biology and Conservation**	ENG/DE

Remark

This module handbook only lists the electives. Core and major modules are described in the handbooks of the Master programs Environmental and Forest Sciences separately.

Terms used

This Module handbook is derived automatically from the online platform, which did not translate all terms into English. Here is a list for the terms to enable full comprehension:

DE	ENG
In jedem Wintersemester	Every winter semester
Lehrveranstaltung	Course

Pflicht (P)	Mandatory
Veranstaltung	Event
Wahlpflicht (WP)	Elective

--- **Prolog** Deutsche Version ---

Wahlpflichtfächer (WP)

Dieses Handbuch beschreibt alle Wahlpflichtfächer der beiden Studiengänge MSc Umweltwissenschaften/Environmental Sciences und MSc Forstwissenschaften/Forest Sciences für ein Jahr (Sommer 2024 und Winter 2024/25). Die Wahlpflichtfächer variieren in Bezug auf Thema, Sprache, Dauer, Art des Unterrichtens und Häufigkeit.
Die hier beschriebenen Module können in den folgenden Semestern angeboten werden, müssen es aber nicht. Für jedes Semester wird eine Liste veröffentlicht, die alle angebotenen Wahlpflichtfächer enthält. Sie wird über die Mailinglisten der Programmkoordinatorin sowie auf den Webseiten der Masterprogramme bereitgestellt.
Für die Teilnahme an einem Wahlfach müssen sich die Studierenden über die Online-Plattform HisInOne innerhalb der Belegungszeiträume, die bei jedem Modul angegeben sind, anmelden. Die Teilnahme kann nur bis zu einer maximalen Anzahl von Studierenden pro Modul garantiert werden.

Sprache

Die Wahlpflichtfächer werden entweder in deutscher oder englischer Sprache angeboten. Die Sprache für die Beschreibung der einzelnen Module ist daher die Unterrichtssprache.

Aufbau der Module innerhalb des Studiengangs

1) Kernmodule / Grundlagenbereich:
Drei Kernmodule (15 ECTS) sind für alle Studierenden verpflichtend. Sie werden im ersten und dritten Semester angeboten.

2) Profillinien-Module:
Diese Module sind für die gewählte Profillinie obligatorisch. Insgesamt sind 10 Profillinienmodule im Umfang von 50 ECTS zu belegen, in der Regel im ersten, zweiten und dritten Semester.

3) Wahlpflichtfächer:
Während des Studiums müssen drei Wahlpflichtfächer im Umfang von 15 ECTS belegt werden. Die Studierenden können aus einem variablen Angebot an Modulen für die beiden Masterstudiengänge MSc Forstwissenschaften / Forest Sciences und MSc Umweltwissenschaften / Environmental Sciences wählen. Es können auch Module aus anderen Masterstudiengängen der Fakultät, der Universität oder außerhalb der Universität gewählt werden, sofern ein fachlicher Bezug besteht. Über die Eignung entscheidet der Prüfungsausschuss nach Maßgabe des jeweiligen Studienschwerpunkts. Sprachkurse werden nicht als geeignete Lehrveranstaltungen anerkannt.

Wahlpflichtmodule im Sommersemester 2024

Im Sommersemester werden die Module in einem dreiwöchigen Block nach der Vorlesungszeit am Ende des Semesters angeboten.

Nummer	Name	Sprache

64125	**Marine Ecology**	ENG
64134	**Führung im Forstbetrieb**	DE
64111	**Plants Make Scents**	ENG
13015	**Forest Genetics Research Lab**	ENG
13016	**Agroforestry Systems**	ENG
13017	**Python + GIS basics**	ENG
13018	**Diagnostic Methods for Tree Diseases**	ENG

Wahlpflichtangebot im Wintersemester 2024/25

Im Wintersemester haben die Studierenden die Möglichkeit, entweder Module im 3-wöchigen-Blockunterricht oder Module mit fortlaufendem Unterricht während des Semesters zu wählen. Hier ist eine Übersicht der im Wintersemester 2024/25 angebotenen Module.

Block vor dem Wintersemester		
Nummer	**Name**	**Sprache**
64073	**Praxiskurs Sattelmühle**	DE
64134	**Biotic and Abiotic Challenges of Urban Trees and Forests**	ENG
64030	**Forest Resources and Forest Management in France and Germany**	ENG
Während des Semesters		
Nummer	**Name**	**Sprache**
92982	**Wasserpolitik und Wasserrecht**	DE
64096	**Tropical Forest Ecology** (online)	ENG
12101	**Landwende- & Forstrecht**	DE
13006	**Natural Hazards**	ENG
92952	**Bodenphysik**	DE
64087	**Life Cycle Management**	ENG
13028	**Stable Isotopes**	ENG
13002	**Gender Planning**	DE

13029	**Waldbewirtschaftung im gesellschaftlichen Wandel**	DE
13024	**SPHERE - Sustainable Farming and Pollinator Habitat Restoration for Biodiversity and Food Security**	ENG
13010	**Water in Drylands**	ENG
64132	**GIS in der Forstwirtschaft**	DE
95996	**Introduction to Sustainability Transitions / Energy System Transition II /**	ENG
13011	**Wildbienenbestimmung**	DE
64084	**Economics of Biodiversity and Ecosystem Services**	ENG
13023	**Landscape genomics**	ENG
Block nach dem Wintersemester		
Nummer	**Name**	**Sprache**
13004	**Insect-Microbe Interactions**	ENG
13027	**Advanced Research in Wildlife Ecology**	ENG
64036	**Führung im Forstbetrieb**	DE
64094	**Human-environment Interactions**	ENG
92924	**Ecohydrology**	ENG
92926	**Global Groundwater - Agriculture Nexus**	ENG
95990	**Technology Assessment**	ENG
97024	**Environmental and Energy Transition Law**	ENG
64097	**Tropical Biology and Conservation**	ENG/DE

Bemerkung

In diesem Modulhandbuch sind nur die Wahlpflichtmodule aufgeführt. Kern- und Profillinien-Module sind in den Handbüchern der Masterstudiengänge MSc Umwelt- und Forstwissenschaften gesondert aufgeführt.

Verwendete Begriffe

Dieses Modulhandbuch wurde automatisch von der Online-Plattform übernommen, die nicht alle Begriffe ins Englische übersetzt hat. Hier ist eine Liste der nicht-übersetzten Begriffe, um ein vollständiges Verständnis zu ermöglichen.

DE	**ENG**
In jedem Wintersemester	Every winter semester
Lehrveranstaltung	Course
Pflicht (P)	Mandatory
Veranstaltung	Event
Wahlpflicht (WP)	Elective

Name of node	Number of node
Wahlpflichtbereich	10LE07KT-WPF-2023-13000
Faculty	
Fakultät für Umwelt und natürliche Ressourcen	

Pflicht/Wahlpflicht (P/WP)	Pflicht

↑

Name of module	Number of module
Gender Planning	10LE07MO-M.13002
Responsible	
Prof. Dr. Astrid Möller	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Attendance	50 h
Independent study	100 h
Recommended semester	3
Duration	1 Semester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Gender Planning	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
■ Ansätze und Konzepte der Geschlechterforschung ■ Gender- und Diversityaspekte in der räumlichen Planung ■ Handbücher und Kriterienkataloge für Gender Planning
Qualification
Die Studierende ■ können unterschiedliche analytische Zugänge der Geschlechterforschung unterscheiden und wissen um deren jeweiligen Möglichkeiten und Grenzen. ■ verstehen die Bedeutung von Gender- und Diversityaspekten für die räumliche Planung. ■ sind in der Lage, raumbezogene Gender- und Diversitykriterien zu benennen und anzuwenden. ■ stärken ihre Genderkompetenz. ■ stärken ihre Vortrags- und Präsentationskompetenz.
Examination achievement
Mündliche Präsentation im Januar / Februar (Dauer: 30 Minuten, Gewichtung: 100 %)
Course achievement
Referat

Teaching method
Inputs, Gruppenarbeit, praktische Übungen
Literature
■ Frank, Susanne (2019): Stadt-, Raum- und Geschlechterforschung: Theoretische Konzepte und empirische Befunde. In: Kortendiek, Beate/Riegraf, Birgit/Sabisch, Katja (Hrsg.): Handbuch interdisziplinäre Geschlechterforschung. Bd. 2. Wiesbaden, 1347-1357. ■ Frölich v. Bodelschwingh, Franciska/Bauer, Uta (2017): 30 Jahre Gender in der Stadt- und Regionalentwicklung. Erfahrungen und Perspektiven. Berlin. ■ Senatsverwaltung für Stadtentwicklung Berlin (2011): Gender Mainstreaming in der Stadtentwicklung. Berliner Handbuch. Berlin. ■ Stadtentwicklung Wien, Magistratsabteilung 18 – Stadtentwicklung und Stadtplanung (Hrsg.) (2013): Gender Mainstreaming in der Stadtplanung und Stadtentwicklung. Wien. ■ Zibell, Barbara/Damyanovic, Doris/Sturm, Ulrike (Eds.): Gendered approaches to spatial development in Europe – Perspectives, similarities and differences. Abingdon, New York. Eine Auswahl weiterer weiterführender Literatur wird im Rahmen der Veranstaltung bekannt gegeben.

↑

Name of module	Number of module
Gender Planning	10LE07MO-M.13002
Veranstaltung	
Gender Planning	
Event type	Number
Lehrveranstaltung	10LE07V-M.13002

ECTS-Points	5.0
Workload	150 h
Attendance	50
Independent study	100
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht

Contents

Im Seminar beschäftigen wir uns mit der Frage, was es in theoretischer sowie praktischer Hinsicht bedeutet, Gender- und Diversityaspekte in die räumliche Planung einzubeziehen. Im Mittelpunkt steht die Auseinandersetzung mit dem Konzept Gender Planning. Der Ansatz sieht vor, in allen Phasen des Planungs- und Projektierungsprozesses, unterschiedliche Raumnutzungsansprüche, Ressourcen und Kompetenzen von Akteuren im Blick zu halten. Dazu gehört auch, die Aneignungs- und Raumnutzungsmuster von Frauen und Männern sowie verschiedener gesellschaftlicher Gruppen zu berücksichtigen.
Das Seminar umfasst eine Auseinandersetzung mit unterschiedlichen Konzepten der Geschlechterforschung sowie das Kennenlernen ausgewählter Handbücher und Kriterienkataloge zum Gender Planning. Diese werden in praktischen Übungen anhand ausgewählter Fallbeispiele empirisch erprobt. Ausgehend von den unterschiedlichen Beispielen für gender- und diversity-orientierte Planungen reflektieren wir, inwiefern Gender Planning zu einer (De)Konstruktion der Kategorien Raum und Geschlecht beiträgt.

Qualification

Die Studierende
- können unterschiedliche analytische Zugänge der Geschlechterforschung unterscheiden und wissen um deren jeweiligen Möglichkeiten und Grenzen.
- verstehen die Bedeutung von Gender- und Diversityaspekten für die räumliche Planung.
- sind in der Lage, raumbezogene Gender- und Diversitykriterien zu benennen und anzuwenden.
- stärken ihre Genderkompetenz.

stärken ihre Vortrags- und Präsentationskompetenz.

Examination achievement

Mündliche Präsentation (30 Minuten, 100 %)

Course achievement

Referat

Literature
■ Frank, Susanne (2019): Stadt-, Raum- und Geschlechterforschung: Theoretische Konzepte und empirische Befunde. In: Kortendiek, Beate/Riegraf, Birgit/Sabisch, Katja (Hrsg.): Handbuch interdisziplinäre Geschlechterforschung. Bd. 2. Wiesbaden, 1347-1357. ■ Frölich v. Bodelschwingh, Franciska/Bauer, Uta (2017): 30 Jahre Gender in der Stadt- und Regionalentwicklung. Erfahrungen und Perspektiven. Berlin. ■ Senatsverwaltung für Stadtentwicklung Berlin (2011): Gender Mainstreaming in der Stadtentwicklung. Berliner Handbuch. Berlin. ■ Stadtentwicklung Wien, Magistratsabteilung 18 – Stadtentwicklung und Stadtplanung (Hrsg.) (2013): Gender Mainstreaming in der Stadtplanung und Stadtentwicklung. Wien. ■ Zibell, Barbara/Damyanovic, Doris/Sturm, Ulrike (Eds.): Gendered approaches to spatial development in Europe – Perspectives, similarities and differences. Abingdon, New York. Eine Auswahl weiterer weiterführender Literatur wird im Rahmen der Veranstaltung bekannt gegeben.
Compulsory requirement
None / Keine
Teaching method
Inputs, Gruppenarbeit, praktische Übungen

↑

Name of module	Number of module
Insect-Microbe Interactions	10LE07MO-M.13004
Responsible	
Prof. Dr. Peter Biedermann	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	3 weeks
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Insect-Microbe Interactions	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150h

Contents
Participants will work in groups of 2-3 people on individual topics, based on ongoing research projects in our lab, in the fields of entomology, microbiology and ecology. Each group will develop and conduct their own short research project. At the end you present the outcome of your research and write a report in the form of a scientific article. During the module, there will be regular meetings to discuss your progress and for giving you advice for experimental design, statistical analyses, oral and written reporting. Data collection and experiments in the field (or lab) will take place for about 7-10 days. The rest of the days are for reviewing literature, designing hypotheses and preparation of presentations and the report. If you are interested in doing a MSc thesis at our professorship, this module is the ideal preparation for it.
Qualification
Participants get a first insight into ecological research on forest relevant insects and their microorganisms ■ get first practical experience with entomological and microbiological methods ■ get involved in current scientific questions and research projects in our department ■ learn how to develop and conduct their own experiments ■ learn how to present their own scientific results in written and oral form Overall, you receive a good background for developing and conducting a MSc thesis projects in the fields of ecology, entomology and microbiology
Examination achievement
Project report (60%), oral presentations (20%), oral participation (20%)

Course achievement
Regular presence and participation
Teaching method
Short lectures, practical student projects
Literature
To be found by the students during the module

↑

Name of module	Number of module
Insect-Microbe Interactions	10LE07MO-M.13004
Veranstaltung	
Insect-Microbe Interactions	
Event type	Number
Lehrveranstaltung	10LE07V-M.13004

ECTS-Points	5.0
Workload	150h
Attendance	120h
Independent study	30h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	10

Contents

Participants will work in groups of 2-3 people on individual topics, based on ongoing research projects in our lab, in the fields of entomology, microbiology and ecology. Each group will develop and conduct their own short research project. At the end you present the outcome of your research and write a report in the form of a scientific article.
During the module, there will be regular meetings to discuss your progress and for giving you advice for experimental design, statistical analyses, oral and written reporting. Data collection and experiments in the field (or lab) will take place for about 7-10 days. The rest of the days are for reviewing literature, designing hypotheses and preparation of presentations and the report.

If you are interested in doing a MSc thesis at our professorship, this module is the ideal preparation for it.

Qualification

Participants get a first insight into ecological research on forest relevant insects and their microorganisms
- get first practical experience with entomological and microbiological methods
- get involved in current scientific questions and research projects in our department
- learn how to develop and conduct their own experiments
- learn how to present their own scientific results in written and oral form

Overall, you receive a good background for developing and conducting a MSc thesis projects in the fields of ecology, entomology and microbiology

Examination achievement

Project report, oral presentation

Course achievement

Regular presence and participation

Literature

To be found by the students during the module

Compulsory requirement
None
Teaching method
Short lectures, practical student projects

↑

Name of module	**Number of module**
Natural Hazards	10LE07MO-M.13006
Responsible	
Prof. Dr. Marc Hanewinkel Prof. Dr. Kerstin Stahl	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Attendance	120 h
Independent study	30 h
Recommended semester	3
Duration	1 Semester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Natural Hazards	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150h

Contents
The course deals with the major natural hazards that globally affect ecosystems and human societies such as geohazardsgeological, hydrological, meteorological and climatological hazards. Based on a general framework the students elaborate an annotated bibliography and present a chosen topic (e.g. case study) to the group and discuss it.
Qualification
The students are able: ■ To apply a generalized framework for the identification, evaluation and handling of risks to the different hazards that are presented in the module ■ To assess and evaluate the most important facts and handling tools (such as maps, indices, monitoring systems…) related to the discussed hazard ■ To select relevant information (scientific articles, web-based information…) related to the chosen topical hazards and produce an annotated bibliography for the chosen hazard ■ To present a relevant case study or more complex research topic (e.g. compound hazards) to the group and discuss the topic.

Examination achievement
Presentation of 20 minutes of a specific topic of the course + 10 minutes' discussion – by two students jointly (10 minutes each) - 80% of the mark for the presentation (40% for correctness of the content and 40% for quality of the oral presentation) – 20% for an annotated bibliography and topic proposal)
Course achievement
Presentation + annotated literature list for each chosen topic
Teaching method
Lectures, presentations, discussions, 1 field trip
Literature
General literature will be suggested shortly before the course; specific literature for the different topics will be identified and discussed with the students in the form of a commented literature list.

↑

Name of module	Number of module
Natural Hazards	10LE07MO-M.13006
Veranstaltung	
Natural Hazards	
Event type	Number
Lehrveranstaltung	10LE07V-M.13006

ECTS-Points	5.0
Workload	150h
Attendance	120h
Independent study	30h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht

Contents

The course deals with the major natural hazards that globally affect ecosystems and human societies such as geological, hydrological, meteorological and climatological hazards. Based on the general framework of the risk management process it defines hazard types, definitions and concepts (incl. vulnerability) and introduces into the major steps of the process including risk identification, risk evaluation (assessment), risk handling and differentiates between risk and crisis management. The module then gives more in-depth introductions into hydroclimatic hazards such as heavy floods as well as drought and low floods including processes and characteristics as well as indices and impact based forecasting. It deals as well includes mass movements such as slumps, debris flows and rockfalls as well as sea level rise, coastal erosion, deposition and flooding. Basics regarding earthquakes and tsunamis will be introduced. Climate extremes such as heatwaves, wildfires and strong winds will be dealt with. Abiotic and biotic disturbances to forests such as storm, snow and pest and diseases will be introduced together with management strategies to minimize the impact of these disturbances like integrated pest management. Socio-economic aspects like attitude towards risk and different types of cause- and effect-oriented risk handling strategies will be taught. Methodological topics such as modelling and more detailed management approaches will be developed separately in different topical groups (hydro- geo -and forestry related topics) together with the supervisors. Based on annotated bibliographies that are discussed with supervisors the students prepare individual presentations in small groups that can deal with either case studies or more complex research topics e.g. on compound hazards events that are then presented and discussed in several sessions with whole group of the course.

Qualification

The students are able:

- To apply a generalized framework for the identification, evaluation and handling of risks to the different hazards that are presented in the module
- To assess and evaluate the most important facts and handling tools (such as maps, indices, monitoring systems…) related to the discussed hazard
- To select relevant information (scientific articles, web-based information…) related to the chosen topical hazards and produce an annotated bibliography for the chosen hazard
- To present a relevant case study or more complex research topic (e.g. compound hazards) to the group and discuss the topic.

Examination achievement
Written exam (25%), presentation (65%)
Course achievement
SL
Literature
General literature will be suggested shortly before the course; specific literature for the different topics will be identified and discussed with the students in the form of a commented literature list.
Compulsory requirement
none
Recommended requirement
Reading of suggested literature
Teaching method
Lectures, presentations, discussions, 1 field trip

↑

Name of module	Number of module
Water in Drylands	10LE07MO-M.13010
Responsible	
Prof. Dr. Jens Lange	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Attendance	60 h
Independent study	90 h
Recommended semester	3
Duration	1 Semester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
None

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Water in Drylands	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150h

Contents
This course explains the specific hydrological characteristics of dry regions and exemplifies water management using case studies with real data.
Qualification
■ Students know specific hydrological features of drylands. ■ Students can apply aridity indices to characterize drylands. ■ Students know the best methods to estimate runoff generation, groundwater recharge and potential evaporation in dry regions, can apply them and evaluate their results. ■ Students know under which preconditions irrigation is meaningful in a specific region and which techniques are most sustainable. ■ Students can estimate potentials of roof water harvesting
Examination achievement
Oral Exam (20 min)
Course achievement
none

Teaching method
Lectures, practical exercises
Literature
Simmers, I. (2003): Understanding Water in a Dry Environment, Balkemar

↑

Name of module	Number of module
Water in Drylands	10LE07MO-M.13010
Veranstaltung	
Water in Drylands	
Event type	Number
Lehrveranstaltung	10LE07V-M.13010

ECTS-Points	5.0
Workload	150h
Attendance	60h
Independent study	90h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht

Contents

This course explains the specific hydrological characteristics of dry regions and exemplifies water management using case studies with real data.
In a first theoretical part, the components of the water balance are explained. Dry areas are defined by climatological indices, precipitation and evaporation are characterized. A first exercise determines the aridity of specific locations using real data. A second exercise determines potential evaporation using different approximation methods. Results are evaluated depending on the available data. Then runoff generation is explained in detail and common estimation methods for runoff generation are presented, practiced using real data and finally evaluated. This is followed by the determination of direct and indirect groundwater recharge. For the former, the chloride method is used, for the latter, transmission losses in a wadi system are estimated on the basis of gauged runoff data. Transmission losses are also estimated with the help of empirical estimation methods. Finally, water balances of aquifer systems are presented and exemplified by case studies of stressed (transboundary) systems.
In the second management part, traditional (historical) irrigation concepts (runoff farming) are compared with new irrigation techniques including sustainability aspects, application areas and possible salinization hazards. Roof water harvesting potentials and possible usages are outlined using estimation models and water quality data. Another aspect is the estimation of flood peaks in dry rivers. For this purpose, envelope curves and paleoflood data are explained and applied.

Qualification

Students
- know specific hydrological features of drylands.
- can apply aridity indices to characterize drylands.
- know the best methods to estimate runoff generation, groundwater recharge and potential evaporation in dry regions, can apply them and evaluate their results.
- know under which preconditions irrigation is meaningful in a specific region and which techniques are most sustainable.
- can estimate potentials of roof water harvesting.

Examination achievement

Oral Exam (20min)

Course achievement
none
Literature
Simmers, I. (2003): Understanding Water in a Dry Environment, Balkemar
Compulsory requirement
none
Recommended requirement
Basics in hydrology
Teaching method
Lectures, practical exercises

↑

Name of module	Number of module
Wildbienenbestimmung	10LE07MO-M.13011
Responsible	
Dr. Felix Fornoff	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Attendance	100 h
Independent study	50 h
Recommended semester	3
Duration	1
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Wildbienenbestimmung	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
Fortgeschrittenenkurs zur Bestimmung von Wildbienen. Gemeinsam werden wir die umfangreiche Sammlung des Lehrstuhls einsehen und autodidaktisch Wildbienen in Zweiergruppen an Binokularen bestimmen. Nur durch viel Übung, somit angeeignete Erfahrung und in Referenz zu sicher bestimmten Belegen gelingt die effiziente Bestimmung dieser anspruchsvollen Insektengruppe.
Qualification
■ Bestimmung von Bienengattung ohne Verwendung eines Schlüssels ■ Übersicht über häufige Wildbienenarten ■ Übersicht über schwer bestimmbare Artkomplexe ■ Bestimmung von häufigen Wildbienen auf Artebene
Examination achievement
Erkennen von Bienengattungen ohne Hilfsmittel (50%) Bestimmen von Bienenarten anhand von dichotomen Schlüsseln (50%) Dauer der Prüfung 2h in Präsenz
Course achievement
none

Teaching method
Übung
Literature
Wird bereitgestellt

↑

Name of module	Number of module
Wildbienenbestimmung	10LE07MO-M.13011
Veranstaltung	
Wildbienenbestimmung	
Event type	Number
Lehrveranstaltung	10LE07V-M.13011

ECTS-Points	5.0
Workload	150 h
Attendance	100 h
Independent study	50 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	20

Contents

Fortgeschrittenenkurs zur Bestimmung von Wildbienen. Gemeinsam werden wir die umfangreiche Sammlung des Lehrstuhls einsehen und autodidaktisch Wildbienen in Zweiergruppen an Binokularen bestimmen. Nur durch viel Übung, somit angeeignete Erfahrung und in Referenz zu sicher bestimmten Belegen gelingt die effiziente Bestimmung dieser anspruchsvollen Insektengruppe.

Qualification

- Bestimmung von Bienengattung ohne Verwendung eines Schlüssels
- Übersicht über häufige Wildbienenarten
- Übersicht über schwer bestimmbare Artkomplexe
- Bestimmung von häufigen Wildbienen auf Artebene

Examination achievement

Erkennen von Bienengattungen ohne Hilfsmittel (50%) Gewichtung
Bestimmen von Bienenarten anhand von dichotomen Schlüsseln (50%) Gewichtung
Dauer der Prüfung 2h in Präsenz

Course achievement

keine

Literature

Wird bereitgestellt

Compulsory requirement

Keine / None

Recommended requirement

- Vorkenntnisse Bienenbestimmung, z.B. Einführungskurs von BieNAbest, Heimische Tierarten (BSc Modul), Formenkenntnis, Biodiv., Funktion (MSc Modul)
- Interesse an autodidaktischem Lernen

Teaching method
Übung

↑

Name of module	Number of module
Forest Genetics Research Lab	10LE07MO-M.13015
Responsible	
Prof. Dr. Katrin Heer	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	2
Duration	3 weeks
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Sommersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Forest Genetics Research Lab	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
The students will be introduced to ongoing research projects in the Forest Genetics lab. Afterwards, they will develop their own research projects by creating hypotheses and a study design that are ideally linked to an ongoing project in Forest Genetics. They will collect and analyse the data and write a short report. Ideally, these materials and training can be used as the first step of a Master thesis.
Qualification
After completing this course, students will (have): ■ Knowledge about the different genetic analysis techniques and applications for handling experimental data generated by forest science. ■ Ability to apply these techniques and applications to real-world data, thereby integrating genetic/genomic methods into their professional and/or research work. ■ Ability to critically access publicly- available online information in the specific field of the subject (genomic databases, scientific articles, bioinformatics tools, etc.) and have sufficient knowledge about its interpretation and use. ■ Write, present, and interpret scientific literature. Develop skills to pursue further studies with a high degree of autonomy.
Examination achievement
Written report (on research projects)

Course achievement
(i) Attendance in the course (ii) Short oral presentation
Literature
Will be provided during the course

↑

Name of module	Number of module
Forest Genetics Research Lab	10LE07MO-M.13015
Veranstaltung	
Forest Genetics Research Lab	
Event type	Number
Lehrveranstaltung	10LE07V-M.13015

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	2
Frequency	in jedem Sommersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht

Contents
The students will be introduced to ongoing research projects in the Forest Genetics lab. Afterwards, they will develop their own research projects by creating hypotheses and a study design that are ideally linked to an ongoing project in Forest Genetics. They will collect and analyse the data and write a short report. Ideally, these materials and training can be used as the first step of a Master thesis.
Qualification
After completing this course, students will (have): ■ Knowledge about the different genetic analysis techniques and applications for handling experimental data generated by forest science. ■ Ability to apply these techniques and applications to real-world data, thereby integrating genetic/genomic methods into their professional and/or research work. ■ Ability to critically access publicly- available online information in the specific field of the subject (genomic databases, scientific articles, bioinformatics tools, etc.) and have sufficient knowledge about its interpretation and use. ■ Write, present, and interpret scientific literature. Develop skills to pursue further studies with a high degree of autonomy.
Examination achievement
Written report (on research projects)
Course achievement
(i) Attendance in the course (ii) Short oral presentation
Literature
Will be provided during the course
Compulsory requirement
Basic knowledge in population genetics/forest genetics
Recommended requirement
It is recommended to have used R programming language previously.

↑

Name of module	Number of module
Agroforestry Systems	10LE07MO-M.13016
Responsible	
Dr. Christopher Morhart	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	2
Duration	3 weeks
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Sommersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Agroforestry Systems	Lehrveranstaltung	Pflicht	5.0	4.0	150 h

Contents
We are offering a comprehensive three-week course embracing the topic of agroforestry systems (AFS) with a special focus on central Europe. AFS which combine agricultural components with trees and or shrubs are gaining more and more attention in recent years. They are known to provide a higher level of ecosystem goods and services, can better cope with the prognosed risks of global change compared to classic production systems. However, despite these facts, and that also the IPCC report lists agroforestry as a land use system with a high potential in terms of mitigation and adaptation to counteract desertification and land degradation and to improve food security, it is still of minor importance in central European agriculture. In this course the parcticipants will learn about the principles of agroforestry, assess their advantages and disadvantages and analyse their potential in modern agriculture. Visiting different AFS we will train to analyse ecological, social and economic parameters of such systems, depending on the geographical region they are located in and the production goals of the farm. The three-week course will introduce students to the theory, the methods of assessing AFS as well as the basic principles of planning AFS. In the course students will work in small groups on selected research topics and elaborate a project presentation which is presented in a final workshop discussion.
Qualification
Students will be able: ■ to develop an understanding of the basic principles of AFS (2) ■ to describe environmental factors affecting the interactions in AFS (2) ■ to recognize the influencing pathways of environmental factors on tree growth parameters in AFS (2) ■ to apply methods to quantify tree biomass in AFS (3)

- to analyse site factors and to plan an suitable AFS (4, 5)
- to reflect about new methods and concepts in agroforestry research (5)
- to elaborate an “scientific report” and a “scientific presentation” (6).

Klassifikation der Qualifikations- und Lernziele nach BLOOM (1973):
1= Kenntnisse: Wissen reproduzieren können; 2= Verständnis: Wissen erläutern können; 3= Anwendung: Wissen anwenden können; 4= Analyse: Zusammenhänge analysieren können; 5= Synthese: eigene Problemlösestrategien angeben können; 6= Beurteilung: eigene Problemlösestrategien beurteilen können

Examination achievement
Portfolio: written report (individual, 70 %), oral presentation (group work, 30 %)
Teaching method
Lectures, group work, field exercises, excursions
Literature
A list of relevant texts will be made available at the start of the course; readings will be made available online in electronic form.

↑

Name of module	Number of module
Agroforestry Systems	10LE07MO-M.13016
Veranstaltung	
Agroforestry Systems	
Event type	Number
Lehrveranstaltung	10LE07V-M.13016

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	2
Frequency	in jedem Sommersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht

Contents

We are offering a comprehensive three-week course embracing the topic of agroforestry systems (AFS) with a special focus on central Europe.
AFS which combine agricultural components with trees and or shrubs are gaining more and more attention in recent years. They are known to provide a higher level of ecosystem goods and services, can better cope with the prognosed risks of global change compared to classic production systems. However, despite these facts, and that also the IPCC report lists agroforestry as a land use system with a high potential in terms of mitigation and adaptation to counteract desertification and land degradation and to improve food security, it is still of minor importance in central European agriculture. In this course the parcticipants will learn about the principles of agroforestry, assess their advantages and disadvantages and analyse their potential in modern agriculture. Visiting different AFS we will train to analyse ecological, social and economic parameters of such systems, depending on the geographical region they are located in and the production goals of the farm.
The three-week course will introduce students to the theory, the methods of assessing AFS as well as the basic principles of planning AFS. In the course students will work in small groups on selected research topics and elaborate a project presentation which is presented in a final workshop discussion.

Qualification

Students will be able:
- to develop an understanding of the basic principles of AFS (2)
- to describe environmental factors affecting the interactions in AFS (2)
- to recognize the influencing pathways of environmental factors on tree growth parameters in AFS (2)
- to apply methods to quantify tree biomass in AFS (3)
- to analyse site factors and to plan an suitable AFS (4, 5)
- to reflect about new methods and concepts in agroforestry research (5)
- to elaborate an “scientific report” and a “scientific presentation” (6).

Klassifikation der Qualifikations- und Lernziele nach BLOOM (1973):
1= Kenntnisse: Wissen reproduzieren können; 2= Verständnis: Wissen erläutern können; 3= Anwendung: Wissen anwenden können; 4= Analyse: Zusammenhänge analysieren können; 5= Synthese: eigene Problemlösestrategien angeben können; 6= Beurteilung: eigene Problemlösestrategien beurteilen können

Examination achievement

Portfolio: written report (individual, 70 %), oral presentation (group work, 30 %)

Course achievement
None
Literature
A list of relevant texts will be made available at the start of the course; readings will be made available online in electronic form.
Compulsory requirement
None
Teaching method
Lectures, group work, field exercises, excursions

↑

Name of module	Number of module
Python + GIS Basics	10LE07MO-M.13017
Responsible	
Dr.-Ing. Holger Weinacker	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	2
Duration	3 weeks
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Sommersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Python + GIS Basics	Lehrveranstaltung	Pflicht	5.0	4.0	150 h

Contents
In this modul we will develop Python scripts to fit and automate processing tasks within QGIS. You will learn Python within the Python API of QGIS. Finally you will also learn, how to develop a python plugin for QGIS.
Qualification
Qualification and learning goals: ■ Learning the programming language Python ■ The use of the Python API from QGIS ■ Development of Python plugins for QGIS ■ Extention of GIS knowledge ■ Independent solution of GIS problems using QGIS and Python
Examination achievement
Project work
Course achievement
None
Literature
Handouts and data will be provided

↑

Name of module	Number of module
Python + GIS Basics	10LE07MO-M.13017
Veranstaltung	
Python + GIS Basics	
Event type	Number
Lehrveranstaltung	10LE07V-M.13017

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	2
Frequency	in jedem Sommersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht

Contents
In this modul we will develop Python scripts to fit and automate processing tasks within QGIS. You will learn Python within the Python API of QGIS. Finally you will also learn, how to develop a python plugin for QGIS.
Qualification
■ Learning the programming language Python ■ The use of the Python API from QGIS ■ Development of Python plugins for QGIS ■ Extention of GIS knowledge ■ Independent solution of GIS problems using QGIS and Python
Examination achievement
Project work
Course achievement
None
Literature
Handouts and data will be provided
Compulsory requirement
Basic knowledge in GIS
Teaching method
Lectures, practical exercises, self-studies with homework

↑

Name of module	Number of module
Diagnostic Methods for Tree Diseases	10LE07MO-M.13018
Responsible	
JProf. Dr. Kathrin Blumenstein	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	2
Duration	3 weeks
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Sommersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Diagnostic Methods for Tree Diseases	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
The module "Diagnostic Methods for Tree Diseases," has a special focus on fungal pathogens, integrating theoretical learning with practical application. In the seminar segment of the course, students will learn about various diagnosis methods that are applied in the field of forest pathology and tree disease identification and the theoretical background of these applications. Also, the students will experience how to extract methodological descriptions from scientific articles and how to evaluate their usage. Moving to the practical aspect, the course offers hands-on experience in identifying and analyzing symptoms of biotic damage in trees. Students will be trained in classical methods such as microscopic examination and morphological identification. But a significant portion of the course is dedicated to modern molecular genetic techniques, including Quantitative Polymerase Chain Reaction (qPCR) and Loop-mediated Isothermal Amplification (LAMP). Those methods are going to be applied in the lab and in the field, respectively, by each student, guided by us. These methods are invaluable for their precision in identifying fungal DNA, a key factor in diagnosing and managing tree diseases effectively. Additionally, the course introduces students to techniques like sonic tomography, a non-invasive approach to detecting internal tree damage. The course concludes with students presenting their findings in the seminar and compiling a detailed written report. These exercises are designed not only to reinforce the knowledge gained but also to enhance students' abilities in scientific communication.

Overall, this module is designed to offer a dynamic and comprehensive educational experience, combining theoretical knowledge with practical skills, to prepare students for advanced roles in forest pathology and environmental sciences.

Qualification

Students will be qualified to:

- Understand and apply various diagnostic methods in the field of forest pathology and tree disease identification.
- Extract and evaluate methodological descriptions from scientific literature, enhancing their research and analytical skills.
- Perform classical diagnostic methods such as microscopic examination and morphological identification of tree diseases.
- Utilize modern molecular genetic techniques, including Quantitative Polymerase Chain Reaction (qPCR) and Loop-mediated Isothermal Amplification (LAMP), in both laboratory and field settings.
- Apply non-invasive techniques like sonic tomography for internal tree damage assessment.
- Present research findings effectively and compile comprehensive reports, demonstrating enhanced scientific communication skills.

Learning Aims:

- Provide a thorough understanding of various diagnostic methods used in forest pathology, with a special focus on fungal pathogens.
- Equip students with the ability to critically analyze and apply theoretical knowledge to practical situations in tree disease diagnosis.
- Develop proficiency in classical diagnostic techniques, laying a foundation for understanding tree diseases at a fundamental level.
- Train students in advanced molecular genetic techniques, emphasizing their application for precise identification of fungal DNA in tree diseases.
- Enhance students' research capabilities, enabling them to independently extract and evaluate information from scientific texts.
- Foster skills in scientific communication, through the presentation of findings and report writing, preparing students for professional roles in plant pathology and related fields.

Examination achievement

Presentation (30%), Written Assignment (70%)

Teaching method

Short lectures, practical student projects

Literature

Literature and protocols will be provided during the module, according to the corresponding methods and experiments.

↑

Name of module	Number of module
Diagnostic Methods for Tree Diseases	10LE07MO-M.13018
Veranstaltung	
Diagnostic Methods for Tree Diseases	
Event type	Number
Lehrveranstaltung	10LE07V-M.13018

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	2
Frequency	in jedem Sommersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht

Contents

The module "Diagnostic Methods for Tree Diseases," has a special focus on fungal pathogens, integrating theoretical learning with practical application.

In the seminar segment of the course, students will learn about various diagnosis methods that are applied in the field of forest pathology and tree disease identification and the theoretical background of these applications. Also, the students will experience how to extract methodological descriptions from scientific articles and how to evaluate their usage.

Moving to the practical aspect, the course offers hands-on experience in identifying and analyzing symptoms of biotic damage in trees. Students will be trained in classical methods such as microscopic examination and morphological identification. But a significant portion of the course is dedicated to modern molecular genetic techniques, including Quantitative Polymerase Chain Reaction (qPCR) and Loop-mediated Isothermal Amplification (LAMP). Those methods are going to be applied in the lab and in the field, respectively, by each student, guided by us. These methods are invaluable for their precision in identifying fungal DNA, a key factor in diagnosing and managing tree diseases effectively. Additionally, the course introduces students to techniques like sonic tomography, a non-invasive approach to detecting internal tree damage.

The course concludes with students presenting their findings in the seminar and compiling a detailed written report. These exercises are designed not only to reinforce the knowledge gained but also to enhance students' abilities in scientific communication.

Overall, this module is designed to offer a dynamic and comprehensive educational experience, combining theoretical knowledge with practical skills, to prepare students for advanced roles in forest pathology and environmental sciences.

Qualification

Students will be qualified to:

- Understand and apply various diagnostic methods in the field of forest pathology and tree disease identification.
- Extract and evaluate methodological descriptions from scientific literature, enhancing their research and analytical skills.
- Perform classical diagnostic methods such as microscopic examination and morphological identification of tree diseases.
- Utilize modern molecular genetic techniques, including Quantitative Polymerase Chain Reaction (qPCR) and Loop-mediated Isothermal Amplification (LAMP), in both laboratory and field settings.

- Apply non-invasive techniques like sonic tomography for internal tree damage assessment.
- Present research findings effectively and compile comprehensive reports, demonstrating enhanced scientific communication skills.

Learning Aims:

- Provide a thorough understanding of various diagnostic methods used in forest pathology, with a special focus on fungal pathogens.
- Equip students with the ability to critically analyze and apply theoretical knowledge to practical situations in tree disease diagnosis.
- Develop proficiency in classical diagnostic techniques, laying a foundation for understanding tree diseases at a fundamental level.
- Train students in advanced molecular genetic techniques, emphasizing their application for precise identification of fungal DNA in tree diseases.
- Enhance students' research capabilities, enabling them to independently extract and evaluate information from scientific texts.
- Foster skills in scientific communication, through the presentation of findings and report writing, preparing students for professional roles in plant pathology and related fields.

Examination achievement
Presentation (30%), Written Assignment (70%)
Course achievement
None
Literature
Literature and protocols will be provided during the module, according to the corresponding methods and experiments.
Compulsory requirement
None
Recommended requirement
Interest in microbiology, esp. mycology
Teaching method
Short lectures, practical student projects

↑

Name of module	Number of module
Tropical Forest Ecology	10LE07MO-WP_M.64096
Responsible	
Prof. Dr. Norbert Kunert	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	1 Semester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Tropical Forest Ecology	Seminar	Wahlpflicht	5.0	4.0	150 h

Contents
Tropical forests and their breathtaking variety of unique life forms have fascinated generations of explorers and adventures over centuries. As plentiful as the diversity within and among tropical forests are the concepts and theories originating from observations and studies of tropical ecosystems. In this course, we will look into these concepts and theories and learn that tropical forest ecology is not only about tropical forests, but rather taking us to a new level of understanding ecological and biogeochemical processes on our planet.
Qualification
After finishing this course you will have: ■ an advanced understanding of the main ecological and biogeochemical processes in tropical forests ■ the ability to critically examine important ecological theories and concepts concerning tropical forest ecosystems ■ in-depth understanding of climate change effects on tropical forests and climate feedbacks ■ an appreciation of the influence of human use on tropical ecosystem ■ the tools to assess conservation strategies for different types of tropical forests ■ and finally, the strong desire to go on a tropical adventure yourself.
Examination achievement
Written report
Course achievement
none

Literature
Ghazoul & Sheil 2010, Tropical Rain Forest Ecology, Diversity and Conservation. Kricher 2011, Tropical Ecology.

↑

Name of module	Number of module
Tropical Forest Ecology	10LE07MO-WP_M.64096
Veranstaltung	
Tropical Forest Ecology	
Event type	Number
Seminar	10LE07V-WP_M.64096

ECTS-Points	5.0
Workload	150 h
Attendance	60 h
Independent study	90 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	20

Contents

Tropical forests and their breathtaking variety of unique life forms have fascinated generations of explorers and adventures over centuries. As plentiful as the diversity within and among tropical forests are the concepts and theories originating from observations and studies of tropical ecosystems. In this course, we will look into these concepts and theories and learn that tropical forest ecology is not only about tropical forests, but rather taking us to a new level of understanding ecological and biogeochemical processes on our planet.

We will start looking at the vast diversity of tropical forests, discuss their function within the world's climate. We will find out how they act as the main drivers in the global hydrological and carbon cycles and why tropical forests are considered a buffer for global climate change. Besides this broader view on tropical forests, we will keep our eyes open for all the neat evolutionary stories the forests are telling. We will discover how life within tropical forests is strongly connected, the formation of complex food webs, and how many species live in close symbiosis together.
Unfortunately, we will need to talk about the sad side of tropical forests as well. In all tropical regions, deforestation continues at an alarmingly high rate, and in some regions, a small fraction of the original area remains today. Appropriate conservation and sustainable management strategies are missing, partly due to the high complexity of these ecosystems. Studying the ecology of tropical forests, we can begin to understand and explain this complexity and set strategies to conserve these valuable forests for future generations.

Qualification

After finishing this course you will have:

- an advanced understanding of the main ecological and biogeochemical processes in tropical forests
- the ability to critically examine important ecological theories and concepts concerning tropical forest ecosystems
- in-depth understanding of climate change effects on tropical forests and climate feedbacks
- an appreciation of the influence of human use on tropical ecosystem
- the tools to assess conservation strategies for different types of tropical forests
- and finally, the strong desire to go on a tropical adventure yourself.

Examination achievement
Written report
Course achievement
None
Literature
Ghazoul & Sheil 2010, Tropical Rain Forest Ecology, Diversity and Conservation. Kricher 2011, Tropical Ecology.
Compulsory requirement
None

↑

Name of module	Number of module
Economics of Biodiversity and Ecosystem Services	10LE07MO-M.64084
Responsible	
Prof. Dr. Stefan Baumgärtner	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	1
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
Module “Environmental Economics” (or equivalent)

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Economics of Biodiversity and Ecosystem Services	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
Outline: Part I Motivation: Biodiversity and ecosystem services as an issue of economics Part II Orientation: Measurement and valuation of biodiversity and ecosystem services Part III Explanation: Loss of biodiversity and ecosystem services Part IV Implementation: Governance of biodiversity and ecosystem services
Qualification
Students will have the knowledge and methodological expertise to do a master thesis on a topic in the economics of biodiversity and ecosystem services
Examination achievement
presentation, discussion
Course achievement
none
Teaching method
Lecture, homework problems, tutorial

Literature
There is no single textbook for this course. References to books and journal articles for each chapter will be given in class. References to start with are 1. The TED talk of Dr. Pavan Sukhdev on Put a value on Nature! (16 min): https://www.youtube.com/watch?v=oU9G2E_RYJo 2. TEEB – The Economics of Ecosystems and Biodiversity (www.teebweb.org): ■ Mainstreaming the Economics of Nature: Synthesis of the Approach, Conclusions and Recommendations (2010) ■ Summary for Policy Makers: Responding to the Value of Nature (2009) 3.The Dasgupta Review on the Economics of Biodiversity (2021): https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review

↑

Name of module	Number of module
Economics of Biodiversity and Ecosystem Services	10LE07MO-M.64084
Veranstaltung	
Economics of Biodiversity and Ecosystem Services	
Event type	Number
Lehrveranstaltung	10LE07S-M.64084

ECTS-Points	5.0
Workload	150 h
Attendance	60 h
Independent study	90 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	15

Contents
In this course, students will study biodiversity and ecosystem services from an economic perspective. Biodiversity is understood here as “the variability among living organisms from all sources ... and the ecological complexes of which they are part” (United Nations Convention on Biodiversity 1992). Ecosystem services are “the benefits people obtain from ecosystems” (Millennium Ecosystem Assessment 2005). This includes provisioning services (e.g. the provision of food, fiber, fuels or clean drinking water), regulating services (e.g. climate regulation, erosion control, or the regulation of pests and diseases), and cultural services (e.g. aesthetic satisfaction, education, recreation, or spiritual fulfillment). While biodiversity is an issue of biology in the first place, the economic perspective can add valuable insights into why we are currently loosing biodiversity and ecosystem services at unusually high rates, why this is a problem that we should be concerned about, and what we can do in order to conserve and sustainably use biodiversity and ecosystem services in an efficient manner. To this end, students in this course will learn advanced concepts and methods from ecological, environmental and resource economics, and integrate them in an interdisciplinary manner with concepts and methods from ecology, to gain an encompassing and methodologically sound economic understanding of biodiversity and ecosystem services. Outline: Part I Motivation: Biodiversity and ecosystem services as an issue of economics Part II Orientation: Measurement and valuation of biodiversity and ecosystem services Part III Explanation: Loss of biodiversity and ecosystem services Part IV Implementation: Governance of biodiversity and ecosystem services
Qualification
Students will have the knowledge and methodological expertise to do a master thesis on a topic in the economics of biodiversity and ecosystem services
Examination achievement
presentation, discussion

Course achievement
none
Literature
There is no single textbook for this course. References to books and journal articles for each chapter will be given in class. References to start with are 1. The TED talk of Dr. Pavan Sukhdev on Put a value on Nature! (16 min): https://www.youtube.com/watch?v=oU9G2E_RYJo 2. TEEB – The Economics of Ecosystems and Biodiversity (www.teebweb.org): ■ Mainstreaming the Economics of Nature: Synthesis of the Approach, Conclusions and Recommendations (2010) ■ Summary for Policy Makers: Responding to the Value of Nature (2009) 3.The Dasgupta Review on the Economics of Biodiversity (2021): https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review
Compulsory requirement
Module “Environmental Economics” (or equivalent)
Teaching method
Lecture, homework problems, tutorial

↑

Name of module	Number of module
Introduction to Sustainability Transitions	10LE07MO-M.95996
Responsible	
Prof. Dr. Dierk Bauknecht	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Attendance	50 h
Independent study	100 h
Recommended semester	3
Duration	1 Semester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Introduction to Sustainability Transitions	Veranstaltung	Wahlpflicht	5.0	4.0	150h

Contents
This seminar introduces the field of Sustainability Transitions. We will learn about main concepts and frameworks for systemic change. We will mainly use the example of the energy transition to discuss and apply theoretical insights, but other sectors and a comparison between sectors will be discussed as well. In order to better understand the example of the energy transition, main system implications of the transition towards an energy system based on renewable energies will be introduced and discussed. Moreover, we will evaluate in how far theory can inform and help practitioners and decision-makers to guide and govern (energy) transitions in the making.
Qualification
In this module students acquire knowledge on the following levels: ■ Getting familiar with the field of sustainability transition research: Understanding prominent concepts and frameworks in the field of socio-technical sustainability transitions ■ Applying these concepts to transitions in the making ■ Energy system knowledge: What are key system implications of renewables, options to deal with them and related regulatory approaches? What are the implications of system transformation? This includes technical, economic, social and policy knowledge. ■ How can theoretical insights inform practitioners and policy-makers and how this can be presented.
Examination achievement
Policy brief (50%), Presentation (50%)

Course achievement
none
Teaching method
Socratic lectures, group work, presentations
Literature
See previous module Energy System Transition. **For newcomers:** ■ Köhler, Jonathan; Geels, Frank W.; Kern, Florian; Markard, Jochen; Onsongo, Elsie; Wieczorek, Anna et al. (2019): An agenda for sustainability transitions research: State of the art and future directions. In: Environmental Innovation and Societal Transitions 31, S. 1–32. DOI: 10.1016/j.eist.2019.01.004. ■ Markard, Jochen; Raven, Rob; Truffer, Bernhard (2012): Sustainability transitions: An emerging field of research and its prospects. In: Research Policy 41 (6), S. 955–967. DOI: 10.1016/j.respol.2012.02.013. ■ IEA-RETD (2015) Integration of Variable Renewables (RE-integration), [A. Conway; Mott MacDonald] IEA Implementing Agreement for Renewable Energy Technology Deployment (IEA-RETD), Utrecht, Netherlands http://iea-retd.org/archives/publications/re-integration

↑

Name of module	Number of module
Introduction to Sustainability Transitions	10LE07MO-M.95996
Veranstaltung	
Introduction to Sustainability Transitions	
Event type	Number
Veranstaltung	10LE07V-M.95996

ECTS-Points	5.0
Workload	150h
Attendance	50
Independent study	100
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	25

Contents

This module continues with the content of the previous module „Energy System Transition“. We will a further transition concepts and further systemic aspects of renewable energy systems.
Today we face a variety of environmental and societal challenges such as climate change or environmental pollution. These challenges are wicked problems: they are normative both in terms of problem- and solutions-defining, characterised by a high degree of complexity and uncertainty, value-laden and highly-contested, and they are context-dependent (Markard et al. 2012; Köhler et al. 2019). To solve those problems, systemic changes are necessary that alter our ways of producing and consuming, go beyond technological fixes, and include changes on multiple dimensions. This is true for a number of socio-technical systems such as the energy system.
In recent years, Sustainability Transition Studies evolved as a new research agenda and multidisciplinary research community to contribute to solving these challenges. It has two main aims: (1) gaining a better understanding of transition dynamics, and (2) generating an impact for today’s transitions in process (governance of transitions).
This seminar introduces the field of Sustainability Transitions. We will learn about main concepts and frameworks for systemic change. We will mainly use the example of the energy transition to discuss and apply theoretical insights, but other sectors and a comparison between sectors will be discussed as well.
In order to better understand the example of the energy transition, main system implications of the transition towards an energy system based on renewable energies will be introduced and discussed.
Moreover, we will evaluate in how far theory can inform and help practitioners and decision-makers to guide and govern (energy) transitions in the making.

Qualification

In this module students acquire knowledge on the following levels:

- Getting familiar with the field of sustainability transition research: Understanding prominent concepts and frameworks in the field of socio-technical sustainability transitions
- Applying these concepts to transitions in the making
- Energy system knowledge: What are key system implications of renewables, options to deal with them and related regulatory approaches? What are the implications of system transformation? This includes technical, economic, social and policy knowledge.

How can theoretical insights inform practitioners and policy-makers and how this can be presented.
Examination achievement
Policy brief (50%), Presentation (50%)
Course achievement
none
Literature
See previous module Energy System Transition. For newcomers: ■ Köhler, Jonathan; Geels, Frank W.; Kern, Florian; Markard, Jochen; Onsongo, Elsie; Wieczorek, Anna et al. (2019): An agenda for sustainability transitions research: State of the art and future directions. In: Environmental Innovation and Societal Transitions 31, S. 1–32. DOI: 10.1016/j.eist.2019.01.004. ■ Markard, Jochen; Raven, Rob; Truffer, Bernhard (2012): Sustainability transitions: An emerging field of research and its prospects. In: Research Policy 41 (6), S. 955–967. DOI: 10.1016/j.respol.2012.02.013. ■ IEA-RETD (2015) Integration of Variable Renewables (RE-integration), [A. Conway; Mott MacDonald] IEA Implementing Agreement for Renewable Energy Technology Deployment (IEA-RETD), Utrecht, Netherlands http://iea-retd.org/archives/publications/re-integration
Compulsory requirement
None
Recommended requirement
Module "Energy System Transition"
Teaching method
Socratic lectures, group work, presentations

↑

Name of module	Number of module
Führung im Forstbetrieb	10LE07MO-M.64036
Responsible	
Dr. Thomas Fillbrandt	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Attendance	60 h
Independent study	90 h
Recommended semester	3
Duration	3 Wochen Block
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
keine

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Führung im Forstbetrieb	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
Das Ziel dieses Moduls ist, den Studierenden Kenntnisse in Theorien, Grundlagen und Methoden der Projektleitung und Personalführung sowie auch die Bedeutung der eigenen Haltung im Führungsprozess zu vermitteln und bewusst zu machen. Alle Beispiele haben einen engen Bezug zum Forstbetrieb.
Qualification
Die Studierenden ■ haben Grundkenntnisse im persönlichen Zeit- und Selbstmanagement. ■ kennen wesentliche Techniken der Präsentation und Selbstpräsentation. ■ kennen die Grundlagen der subjektiven Wahrnehmung als Voraussetzung erfolgreicher Gesprächsführung und Moderation. ■ kennen unterschiedliche Führungsverhalten, deren Anwendungsbereiche und ihre Wirkung auf Mitarbeiter. Sie sind mit der situativen Führung vertraut. ■ können verschiedene Führungsstile identifizieren und kennen die damit verbundenen Vor- und Nachteile. ■ kennen die Grundlagen des Arbeitsrechtes und des Personalvertretungsrechtes. ■ kennen unterschiedliche Führungsaufgaben und Führungsinstrumente sowie Mechanismen zur Mitarbeitermotivation. ■ wissen um die Bedeutung und Vorbildfunktion von Führungskräften im Führungsprozess ■ kennen Verfahren zum Konfliktmanagement am Arbeitsplatz (Lösung von Konflikten in Kleingruppen).

■ kennen die Grundlagen des Arbeitsschutzes und der Gesundheitsvorsorge bei der Waldarbeit sowie die Aufgaben von Führungspersonal zur Umsetzung des Arbeitsschutzes am Arbeitsplatz. ■ kennen die Grundlagen des Projektmanagements und können ein komplexes Projekt mit Hilfe verschiedener Methoden abbilden und steuern. ■ haben ein Grundverständnis über die Funktionen und Einsatzmöglichkeiten von Projektmanagement-Software.
Examination achievement
Schriftliche Ausarbeitung: Berichte (100 %)
Course achievement
keine
Teaching method
Vorlesungen, Übungen, Gruppenarbeiten
Literature
Aktuelle Literatur wird modulbegleitend zur Verfügung gestellt

↑

Name of module	Number of module
Führung im Forstbetrieb	10LE07MO-M.64036
Veranstaltung	
Führung im Forstbetrieb	
Event type	Number
Lehrveranstaltung	10LE07Ü-M.64036

ECTS-Points	5.0
Workload	150 h
Attendance	60 h
Independent study	90 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	16

Contents

Das Ziel dieses Moduls ist, den Studierenden Kenntnisse in Theorien, Grundlagen und Methoden der Projektleitung und Personalführung sowie auch die Bedeutung der eigenen Haltung im Führungsprozess zu vermitteln und bewusst zu machen. Alle Beispiele haben einen engen Bezug zum Forstbetrieb. Das Modul besteht aus drei thematischen Blöcken (Wochen), wobei die zeitliche Abfolge der Blöcke variieren kann.
In einer Woche werden Methoden des Projekt- und Zeitmanagements zusammen mit Kommunikationstechniken (Grundsätze der Gesprächs- und Verhandlungsführung, Moderation, Kritik- und Mitarbeitergespräche) sowie Präsentationstechniken vorgestellt. Verschiedene Formen des individuellen Führungsverhaltens werden hinsichtlich ihrer Wirkungen auf MitarbeiterInnen analysiert und bewertet. Die Vermittlung der Grundsätze wird ergänzt durch Übungen, die deren Wirkung im Miteinander der Führung verdeutlichen. Ebenfalls in dieser Woche behandeln Vorträge von externen Fachleuten weitere aktuelle Themen der Personalführung (z.B. Konfliktmanagement am Arbeitsplatz, Umgang mit Mobbing und Sucht, Arbeitsrecht und Personalvertretungsrecht).
In einer zweiten Modulwoche werden in Zusammenarbeit mit dem Forstlichen Bildungszentrum Königsbronn die Aufgaben von Führungskräften bei der Umsetzung des Arbeitsschutzes und der Gesundheitsvorsorge im Forstbetrieb vorgestellt sowie Methoden zur erfolgreichen Umsetzung von Arbeitsschutzkonzepten erarbeitet und diskutiert. Dieser Teil findet im Forstlichen Bildungszentrum in Königsbronn statt.
Thema der dritten Modulwoche ist das Projektmanagement. Dazu werden anhand eines Beispiels die Grundlagen, Chancen und Risiken des Projektmanagements für die zielgerichtete Abwicklung von Aufgaben im Forstbetrieb vermittelt und teilweise gemeinsam erarbeitet. Eine Einführung in entsprechende Software soll die Studierenden in die Lage versetzen, komplexe Projekte abzubilden und zu steuern.

Hinweise:
Das Modul ist wegen mehrerer Aufenthalte in Naturverjüngungsbeständen für Schwangere nur bedingt geeignet (Gefahr von Zecken, Absprache erforderlich).
Es wird eine Kostenbeteiligung für Fahrt, Unterkunft und Vollverpflegung in Königsbronn erhoben

Qualification

Die Studierenden
- haben Grundkenntnisse im persönlichen Zeit- und Selbstmanagement.
- kennen wesentliche Techniken der Präsentation und Selbstpräsentation.

- kennen die Grundlagen der subjektiven Wahrnehmung als Voraussetzung erfolgreicher Gesprächsführung und Moderation.
- kennen unterschiedliche Führungsverhalten, deren Anwendungsbereiche und ihre Wirkung auf Mitarbeiter. Sie sind mit der situativen Führung vertraut.
- können verschiedene Führungsstile identifizieren und kennen die damit verbundenen Vor- und Nachteile.
- kennen die Grundlagen des Arbeitsrechtes und des Personalvertretungsrechtes.
- kennen unterschiedliche Führungsaufgaben und Führungsinstrumente sowie Mechanismen zur Mitarbeitermotivation.
- wissen um die Bedeutung und Vorbildfunktion von Führungskräften im Führungsprozess
- kennen Verfahren zum Konfliktmanagement am Arbeitsplatz (Lösung von Konflikten in Kleingruppen).
- kennen die Grundlagen des Arbeitsschutzes und der Gesundheitsvorsorge bei der Waldarbeit sowie die Aufgaben von Führungspersonal zur Umsetzung des Arbeitsschutzes am Arbeitsplatz.
- kennen die Grundlagen des Projektmanagements und können ein komplexes Projekt mit Hilfe verschiedener Methoden abbilden und steuern.
- haben ein Grundverständnis über die Funktionen und Einsatzmöglichkeiten von Projektmanagement-Software.

Examination achievement
Schriftliche Ausarbeitung: Berichte (100 %)
Course achievement
keine
Literature
Aktuelle Literatur wird modulbegleitend zur Verfügung gestellt
Compulsory requirement
keine
Recommended requirement
keine
Teaching method
Vorlesungen, Übungen, Gruppenarbeiten

↑

Name of module	Number of module
Plants make Scents	10LE07MO-M.64111
Responsible	
PD Dr. Jürgen Kreuzwieser	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Attendance	60 h
Independent study	90 h
Recommended semester	3
Duration	3 Wochen Block
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Sommersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Plants make Scents	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
Plants emit a wide range (some thousands) of volatile compounds into the atmosphere (=biogenic vola tile organic compounds, BVOC). BVOCs include isoprenoids (isoprene, monoterpenes, sesquiterpenes, diterpenes) as well as alkanes, alkenes, carbonyls, alcohols, esters, ethers, and acids. Emission invento ries show isoprene and monoterpenes as the most prominent compounds. Alcohols and carbonyls follow the isoprenoids as the most predominant groups. Emission occurs mainly from the leaves of vegetation alt hough stems and roots can also release BVOCs into the environment.BVOC fulfill a plethora of functions within plants, mainly in defence againt biotic and abiotic stress. For example, they seem to protect plants against heat stress as well as other oxidative stress factors (ozone, drought). Moreover they protect plant against herbivores and are involved in plant-plant, plant-microbia and plant-animal interaction.In the module, students will participate in different lectures on the ecology as well as biosynthesis and fun ctions of BVOCs. An additional focus will be on analytical aspects. We will perform simple experiments in which we will analyze typical plant-released volatiles. Sets of raw data will thereafter be analyzed and emis sion rates and plant-internal contents of typical compounds will be calculated.
Qualification
Students will ■ deepen the knowledge on plant primary and secondary metabolisms ■ understand the functions and physiology of volatile organic compounds in plants ■ learn and apply modern analytical instruments (e.g. thermodesorption-gas chromatography-mass spec

■ trometry) ■ gain thorough understanding of GC-Ms technique, analysis of complex sets of raw data ■ gain a critical view on measuring data, deliberating the pros and cons of different measuring techniques
Examination achievement
Written assignment: Protocol (10-15 pages)
Course achievement
None
Teaching method
Lectures, exercises
Literature
■ Kesselmeier J, Staudt M (1999) Biogenic Volatile Organic Compounds (VOC): An Overview on Emission, Physiology and Ecology. Journal of Atmospheric Chemistry 33, Issue 1, 23–88. ■ More literature will be handed out during the course

↑

Name of module	Number of module
Plants make Scents	10LE07MO-M.64111
Veranstaltung	
Plants make Scents	
Event type	Number
Lehrveranstaltung	10LE07Ü-M.64111

ECTS-Points	5.0
Workload	150 h
Attendance	60 h
Independent study	90 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht

Contents

Plants emit a wide range (some thousands) of volatile compounds into the atmosphere (=biogenic vola tile organic compounds, BVOC). BVOCs include isoprenoids (isoprene, monoterpenes, sesquiterpenes, diterpenes) as well as alkanes, alkenes, carbonyls, alcohols, esters, ethers, and acids. Emission invento ries show isoprene and monoterpenes as the most prominent compounds. Alcohols and carbonyls follow the isoprenoids as the most predominant groups. Emission occurs mainly from the leaves of vegetation alt hough stems and roots can also release BVOCs into the environment.BVOC fulfill a plethora of functions within plants, mainly in defence againt biotic and abiotic stress. For example, they seem to protect plants against heat stress as well as other oxidative stress factors (ozone, drought). Moreover they protect plant against herbivores and are involved in plant-plant, plant-microbia and plant-animal interaction.In the module, students will participate in different lectures on the ecology as well as biosynthesis and fun ctions of BVOCs. An additional focus will be on analytical aspects. We will perform simple experiments in which we will analyze typical plant-released volatiles. Sets of raw data will thereafter be analyzed and emis- sion rates and plant-internal contents of typical compounds will be calculated.

Qualification

Students will
- deepen the knowledge on plant primary and secondary metabolisms
- understand the functions and physiology of volatile organic compounds in plants
- learn and apply modern analytical instruments (e.g. thermodesorption-gas chromatography-mass spec- trometry)
- gain thorough understanding of GC-Ms technique, analysis of complex sets of raw data
- gain a critical view on measuring data, deliberating the pros and cons of different measuring techniques

Examination achievement

Written assignment: Protocol (10-15 pages)

Course achievement

None

Literature

- Kesselmeier J, Staudt M (1999) Biogenic Volatile Organic Compounds (VOC): An Overview on Emis- sion, Physiology and Ecology. Journal of Atmospheric Chemistry 33, Issue 1, 23–88.

■ More literature will be handed out during the cours
Compulsory requirement
none
Teaching method
Lectures, exercises

↑

Name of module	Number of module
Marine Ecology	10LE07MO-M.64125
Responsible	
Prof. Dr. Carsten Dormann	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Attendance	100 h
Independent study	50 h
Recommended semester	3
Duration	3 Wochen Block
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	einmalig oder unregelmäßig

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Marine Ecology	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
The module introduces students to the marine system, fosters them to think about a specific issue in the seminar and gives first-hand experience during a 8-day excursion to the North Sea (Helgoland and Cuxhaven). ■ Lectures on oceanography; ■ primary productivity and forms of algae ■ secondary productivity and forms of marine animals; sex in the ocean; food webs ■ the oceanic carbon cycle ■ ocean habitats/systems ■ human use of the marine environment The seminar will focus on selected topics, e.g. microplastics, algal blooms, ocean acidification etc., which will be presented by the students.
Qualification
■ Knowledge about the ocean as a physico-chemical and biological system (1, 2) ■ Comparing terrestrial and marine systems (4, 5) ■ Application to specific scientific topics (3, 5, 6) ■ Identification of common species of the Wadden Sea (1, 2)

- laboratory work on selected species and their ecology (1, 2, 3)
- small ecological projects on marine topics (3, 5, 6)
- Klassifikation der Qualifikations- und Lernziele nach BLOOM (1973):
  1= Kenntnisse: Wissen reproduzieren können; 2= Verständnis: Wissen erläutern können; 3= Anwendung: Wissen anwenden können; 4= Analyse: Zusammenhänge analysieren können; 5= Synthese: eigene Problemlösestrategien angeben können; 6= Beurteilung: eigene Problemlösestrategien beurteilen können

Examination achievement
Written report, oral presentation in seminar
Course achievement
None
Teaching method
Lectures Seminar Excursion
Literature

- Levinton, J. (2017). Marine Biology: Function, Biodiversity, Ecology (5th edition). Oxford University Press Inc.
- Dormann & Schröder (2022) Marine Ecology Notes. https://open.umn.edu/opentextbooks/textbooks/1011

↑

Name of module	Number of module
Marine Ecology	10LE07MO-M.64125
Veranstaltung	
Marine Ecology	
Event type	Number
Lehrveranstaltung	10LE07V-M.64125/B.3108

ECTS-Points	5.0
Workload	150 h
Attendance	100 h
Independent study	50 h
Hours of week	4.0
Recommended semester	3
Frequency	einmalig oder unregelmäßig
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	20

Contents

The module introduces students to the marine system, fosters them to think about a specific issue in the seminar and gives first-hand experience during a 8-day excursion to the North Sea (Helgoland and Cuxhaven).

- Lectures on oceanography;
- primary productivity and forms of algae
- secondary productivity and forms of marine animals; sex in the ocean; food webs
- the oceanic carbon cycle
- ocean habitats/systems
- human use of the marine environment

The seminar will focus on selected topics, e.g. microplastics, algal blooms, ocean acidification etc., which will be presented by the students.

Qualification

- Knowledge about the ocean as a physico-chemical and biological system
- Comparing terrestrial and marine systems
- Application to specific scientific topics
- Identification of common species of the Wadden Sea
- laboratory work on selected species and their ecology
- small ecological projects on marine topics

Examination achievement

Written report, oral presentation in seminar

Course achievement

None

Literature

- Levinton, J. (2017). Marine Biology: Function, Biodiversity, Ecology (5th edition). Oxford University Press Inc.

■ Dormann & Schröder (2022) Marine Ecology Notes. https://open.umn.edu/opentextbooks/text-books/1011
Compulsory requirement
None
Recommended requirement
Foundations in ecology and geography
Teaching method
Lectures Seminar Excursion

↑

Name of module	Number of module
Landscape Genomics	10LE07MO-M.13023
Responsible	
Jill Sekely	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Attendance	60 h
Independent study	90 h
Recommended semester	3
Duration	1 Semester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Landscape Genomics	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
■ Landscape genomics approach for a forest tree species ■ Analysis of genetic and environmental data using R and Linux ■ Learn to present your results in oral and written form
Qualification
Students will understand how to characterize local adaptation using the landscape genomics approach, which is a statistics-based method for finding correlations among genetic and environmental data. By the end of the course, students will have learned: 1. The theory and practice behind collecting and handling forest genetic data (single nucleotide polymorphisms) and environmental data. 2. Coding in various programming languages (e.g. bash, R) and genetics-specific software and packages (e.g. vcftools, LEA, pcadapt) to run their own landscape genomics assessment. 3. How to create and interpret genetics-related graphics and statistics. 4. Considerations for designing landscape genomics studies. 5. How to present their results using scientific language and figures.
Examination achievement
Written report (data analysis, max. 10 pages)

Course achievement
Oral presentation of their results (max 15 minutes)
Teaching method
■ Lectures ■ Supervised practicals with data analysis in R and Linux
Literature
Scientific literature will be provided during the course

↑

Name of module	Number of module
Landscape Genomics	10LE07MO-M.13023
Veranstaltung	
Landscape Genomics	
Event type	Number
Lehrveranstaltung	10LE07V-M.13023

ECTS-Points	5.0
Workload	150 h
Attendance	60 h
Independent study	90 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	10

Contents

Local adaptation of tree species is a widespread phenomenon that allows populations to thrive in their home environment and drives speciation in the long term. Characterizing local adaptation can help us understand the evolutionary forces and selection drivers that have shaped that adaptation, assess which functional genes might be under selection, and even predict maladaptation risk that populations might face under future climate change. To characterize adaptation, we can use the landscape genomics approach to assess allele frequency differences among a species' subpopulations and search for correlations between allele frequency clines and environmental clines using statistical methods. In this course, we will present both the theory and concepts behind the landscape genomics discipline, as well as its application using an empirical dataset and a data processing pipeline that was developed in a recent study of an endemic tree species in southern South America. Finally, they will write a scientific report about the landscape genomics application, with emphasis on methodology decisions and result interpretation. They will also present a brief summary of their reported findings in an oral presentation.

In the lecture portion of this course, we will present the theory behind landscape genomics approach to characterizing local adaptation, including background information, study design considerations, and interpretation of output statistics. This will include the statistical methods used to identify how spatial and environmental factors have structured genetic variation among populations. In the practical section of the course, students will learn how to apply landscape genomics methods in a strictly digital environment. They will use a data processing pipeline that includes genetics-specific software and packages to filter and transform the data for various downstream analyses. They will apply critical thinking about the user decisions that can impact results. They will learn programming, mainly in the R Studio environment, with other languages as necessary. In the seminar section of the course, students will read relevant literature and critically discuss various aspects of the landscape genomics method.

Qualification

Students will understand how to characterize local adaptation using the landscape genomics approach, which is a statistics-based method for finding correlations among genetic and environmental data. By the end of the course, students will have learned:

1. The theory and practice behind collecting and handling forest genetic data (single nucleotide polymorphisms) and environmental data.

2. Coding in various programming languages (e.g. bash, R) and genetics-specific software and packages (e.g. vcftools, LEA, pcadapt) to run their own landscape genomics assessment. 3. How to create and interpret genetics-related graphics and statistics. 4. Considerations for designing landscape genomics studies. How to present their results using scientific language and figures.
Examination achievement
Written report (data analysis, max. 10 pages)
Course achievement
Oral presentation of their results (max 15 minutes)
Literature
Scientific literature will be provided during the course
Compulsory requirement
Basic understanding of molecular biology and genetics
Recommended requirement
Basic knowledge of programming, particularly R language
Teaching method
Lectures, Supervised practicals with data analysis in R and Linu

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Name of module	Number of module
SPHERE - Sustainable Farming and Pollinator Habitat Restoration for Biodiversity and Food Security	10LE07MO-M.13024
Responsible	
Prof. Dr. Alexandra-Maria Klein	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	1 Semester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
SPHERE - Sustainable Farming and Pollinator Habitat Restoration for Biodiversity and Food Security	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
The course will be a one-semester opportunity aiming to address 4 major challenges: ■ Agricultural sustainable practices to ensure food security and balancing socio-economic values. ■ Habitat restauration and maintenance of restauration to improve pollinator and environmental health. ■ Co-designing multi-actor approaches to facilitate stakeholder's interests following a systemic approach to optimize agricultural landscapes for biodiversity and productivity. ■ The relationship between ecosystem functioning and ecosystem services to reveal sustainable agricultural ecosystems that improves biodiversity.
Qualification
This Master course will provide a novel learning method with an interdisciplinary focus on: ■ Knowledge exchange: to bridge socio-economic, conservation and biodiversity challenges across Europe and beyond identifying the main objective to optimize sustainable food production practices and to ensure the maintenance of biodiversity. ■ Research and innovation: to learn novel methodological design to develop knowledge of multi-actor co-design and research techniques across disciplines and scales including spatial and temporal dynamics of a changing agricultural landscape. ■ Communication: to work in multidisciplinary teams and improve technical and soft skills from ecologists, economists, agricultural scientists and social scientists.

- Networking: to prepare for a professional work environment and connect with students and researchers around the globe in a facilitating and inspiring work atmosphere.

Detailed learning opportunities:
- Students can independently design and set up exchange courses with invited guest speakers (scientific and non-scientific) to carry out qualitative analysis of multi-actor co-designed knowledge exchange.
- Students can evaluate and record scientific research studies of guest speakers in the field to critically discuss and summarize in form of small reports.
- Students can learn about ecological methods to quantify plant-pollinator interactions in agricultural landscapes.
- Groups of 4-5 students have to write an individual summary of the course, including key citations. First groups within their institution and later mixed between institutions.
- Students will form new groups of 4-5 to select a guest speaker's topic and create a poster presentation based on the highlighted research or topic. The final course involves presenting the poster and receiving oral feedback. The poster's content will also be evaluated.
- Evaluations will consider the individual summaries, the oral poster presentation, and the overall quality of the poster. The collected summaries will be compiled into a review manuscript.

Examination achievement
33% Organization of Meetings and Discussions with short written report, 33% Poster designing, 33% Poster presentation
Course achievement
Active participation

↑

Name of module	Number of module
SPHERE - Sustainable Farming and Pollinator Habitat Restoration for Biodiversity and Food Security	10LE07MO-M.13024
Veranstaltung	
SPHERE - Sustainable Farming and Pollinator Habitat Restoration for Biodiversity and Food Security	
Event type	Number
Lehrveranstaltung	10LE07V-M.13024

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	20

Contents

One of the greatest challenges of the 21st century is the conservation of biodiversity. Human-influenced landscapes often negatively affect pollinator health and diversity at various scales resulting in limiting pollination services, which is crucial for our food security and the maintenance of biodiversity. SPHERE is an innovative Master course that connects international Master students from the University of Freiburg and the University of Montpellier within the EU HORIZON RestPoll project to learn how to deal with these issues of biodiversity decline and environmental degradation in agricultural landscapes. Thus, the course focuses on promoting multi-actor approaches to study the socio-economic dynamics in agriculture and environmental sciences, with a special emphasis on the role of pollinators. Through this program, students will explore how pollinators (bees, hoverflies and butterflies) contribute to sustainable agricultural practices and conservation efforts. This collaborative initiative provides an invaluable learning experience, combining theoretical knowledge with practical applications to address real-world challenges in food security and biodiversity conservation. The course will be a one-semester opportunity aiming to address 4 major challenges:

1. Agricultural sustainable practices to ensure food security and balancing socio-economic values.
2. Habitat restauration and maintenance of restauration to improve pollinator and environmental health.
3. Co-designing multi-actor approaches to facilitate stakeholder's interests following a systemic approach to optimize agricultural landscapes for biodiversity and productivity.
4. The relationship between ecosystem functioning and ecosystem services to reveal sustainable agricultural ecosystems that improves biodiversity.

How does the Master course work?
Stakeholders such as researchers, individual land managers to governments representing diverse genders, academic stages, and interdisciplinary fields, are invited by students as guest speakers every two weeks to present their work. Students will organize and engage in discussions about challenges and advancements in ecology, economy, social sciences with the guest speakers during these sessions. Students have therefore the opportunity to interact and learn within a pan-European transdisciplinary project (RestPoll) together with stakeholders to co-design, evaluate, and refine measures and cross-sectoral approaches to face opportunities, obstacles and risks of enhancing biodiversity, environmental and pollinator health and additionally securing food security

Qualification

This Master course will provide a novel learning method with an interdisciplinary focus on:

- Knowledge exchange: to bridge socio-economic, conservation and biodiversity challenges across Europe and beyond identifying the main objective to optimize sustainable food production practices and to ensure the maintenance of biodiversity.
- Research and innovation: to learn novel methodological design to develop knowledge of multi-actor co-design and research techniques across disciplines and scales including spatial and temporal dynamics of a changing agricultural landscape.
- Communication: to work in multidisciplinary teams and improve technical and soft skills from ecologists, economists, agricultural scientists and social scientists.
- Networking: to prepare for a professional work environment and connect with students and researchers around the globe in a facilitating and inspiring work atmosphere.

Detailed learning opportunities:
- Students can independently design and set up exchange courses with invited guest speakers (scientific and non-scientific) to carry out qualitative analysis of multi-actor co-designed knowledge exchange.
- Students can evaluate and record scientific research studies of guest speakers in the field to critically discuss and summarize in form of small reports.
- Students can learn about ecological methods to quantify plant-pollinator interactions in agricultural landscapes.
- Groups of 4-5 students have to write an individual summary of the course, including key citations. First groups within their institution and later mixed between institutions.
- Students will form new groups of 4-5 to select a guest speaker's topic and create a poster presentation based on the highlighted research or topic. The final course involves presenting the poster and receiving oral feedback. The poster's content will also be evaluated.
- Evaluations will consider the individual summaries, the oral poster presentation, and the overall quality of the poster. The collected summaries will be compiled into a review manuscript.

Examination achievement
33% Organization of Meetings and Discussions with short written report, 33% Poster designing, 33% Poster presentation
Course achievement
Active participation
Compulsory requirement
None
Recommended requirement
Background in Ecology

↑

Name of module	Number of module
Advanced Research in Wildlife Ecology	10LE07MO-M.13027
Responsible	
Prof. Dr. Marco Dietmar Heurich	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	3 weeks
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
None

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Advanced Research in Wildlife Ecology	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
Overview on different research methods in wildlife ecology and their applications ■ Tracking and monitoring of wildlife (telemetry, camera trapping and other monitoring methods) ■ Estimation of population size and density as well as other population dynamic parameters (Capture-Mark-Recapture, Mark-Resight) ■ Sampling design, data analysis and interpretation ■ Developing individual research projects
Qualification
In this module, the students obtain an overview on different methods and approaches which are applied in wildlife research. The aim of the course is to give insight in the diversity of research approaches, their backgrounds and areas of application. The students will work on case studies, read original literature as well as gain practical experience based on field work, excursions and analysis of real data sets. The strengths and weaknesses of different research methods will be discussed. Special focus is laid on wildlife monitoring and its recent developments, e.g. genetic approaches. The course will qualify students for advanced education in conservation biological and wildlife biology research (PhD programmes) and provides the scientific background for careers in wildlife ecology.
Examination achievement
Written assignment

Course achievement
oral presentation + other SL

↑

Name of module	Number of module
Advanced Research in Wildlife Ecology	10LE07MO-M.13027
Veranstaltung	
Advanced Research in Wildlife Ecology	
Event type	Number
Lehrveranstaltung	10LE07V-M.13027

ECTS-Points	5.0
Workload	150 h
Attendance	60 h
Independent study	90 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	16

Contents
Overview on different research methods in wildlife ecology and their applications 1. Tracking and monitoring of wildlife (telemetry, camera trapping and other monitoring methods) 2. Estimation of population size and density as well as other population dynamic parameters (Capture-Mark-Recapture, Mark-Resight) 3. Sampling design, data analysis and interpretation 4. Developing individual research projects
Qualification
In this module, the students obtain an overview on different methods and approaches which are applied in wildlife research. The aim of the course is to give insight in the diversity of research approaches, their backgrounds and areas of application. The students will work on case studies, read original literature as well as gain practical experience based on field work, excursions and analysis of real data sets. The strengths and weaknesses of different research methods will be discussed. Special focus is laid on wildlife monitoring and its recent developments, e.g. genetic approaches. The course will qualify students for advanced education in conservation biological and wildlife biology research (PhD programmes) and provides the scientific background for careers in wildlife ecology.
Examination achievement
Written assignment
Course achievement
Field trip to the Bavarian National Park, oral presentations
Literature
Lectures, field work, group assignments
Compulsory requirement
Wildlife & Biodiversity (major)

The following necessary skills are essential:

- Basic theoretical knowledge of R: installing and loading R and R packages, saving and loading the workspace, main R objects (i.e. vectors, matrix, data frames, lists), basic functions, loops and conditions, e.g. c(), cbind(), rbind(), for(), if();
- Handling datasets: importing and modifying a data frame for your purpose;
- Basic statistic knowledge, e.g. t and p values, model variance, quantiles and percentiles, standard errors;
- Basic knowledge on modeling with R: writing model formulas (y ~ x1 + x2...), running and interpreting linear models, e.g. lm(), glm();
- Showing statistics of datasets and results of models: datasets and models summaries, charts.

If you don´t have these skills yet, you need to obtain them before the course. We will run a short test before the course starts.

Teaching method
Lectures, field work, group assignments

↑

Name of module	Number of module
Landwende- und Forstrecht	10LE07MO-M.12101
Responsible	
Prof. Dr. Cathrin Zengerling	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen	

ECTS-Points	5.0
Workload	150h
Hours of week	4.0
Attendance	60 h
Independent study	90 h
Recommended semester	3
Duration	1 Semester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
Keine / None

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Landwende- und Forstrecht	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents

- Einführung in multiple Umweltkrisen mit Wurzeln in der Landnutzung, Notwendigkeit einer „Landwende“ (auch auf Waldflächen), Bezüge zum Rechtsrahmen
- Landnutzungsformen und deren spezifische Herausforderungen
- Einführung in verschiedene Zugänge (rechtsphilosophisch, rechtstheoretisch, rechtssoziologisch) und Methoden rechtswissenschaftlicher Analyse und Fallbearbeitung
- Wiederholung und Vertiefung: Grundlagen des Umweltrechts und deren Bedeutung für die Regulierung verschiedener Landnutzungsformen
- Einführung in die Rechtsbereiche, die die genannten Landnutzungsformen primär regulieren
- Möglichkeit der Vertiefung in den einzelnen Teilbereichen je nach Interessenschwerpunkt in der Abschlussarbeit;

Qualification

Die Studierenden
- kennen zentrale rechtliche Grundlagen und Herausforderungen verschiedener Landnutzungsformen mit Relevanz für Klimawandel, Verlust an Biodiversität und Umweltverschmutzung.
- sind mit wichtigen Zugängen und Methoden rechtswissenschaftlicher Analyse und Fallbearbeitung vertraut.
- kennen beispielhaft konkrete Rechtstexte aus der Legislative, Exekutive und Judikative, die Landnutzungskonflikte adressieren.

■ können rechtliche Fragestellungen in diesen Kontexten rechtlich einordnen und in Ansätzen selbständig bearbeiten. ■ haben sich vertieft und kritisch mit denkenn rechtlichen Rahmenbedingungen eines konkreten Konfliktfalls oder eines Themengebiets im Bereich des Landwende- oder Forstrechts auseinandergesetzt.
Examination achievement
Schriftliche Ausarbeitung
Course achievement
Präsentation
Teaching method
Socratic teaching, aktives Lernen, Einzel- und Gruppenarbeiten
Literature
■ Koch, H.-J., Hoffmann, E., Reese M. (2023). Handbuch Umweltrecht, 6. Auflage, Beck. ■ Schlacke, S. (2023). Umweltrecht, 9. Auflage, Nomos. ■ Ausgewählte Textexzerpte via ILIAS

↑

Name of module	Number of module
Landwende- und Forstrecht	10LE07MO-M.12101
Veranstaltung	
Landwende- und Forstrecht	
Event type	Number
Lehrveranstaltung	10LE07V-M.12101

ECTS-Points	5.0
Workload	150 h
Attendance	60 h
Independent study	90 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	30

Contents

- Einführung in multiple Umweltkrisen mit Wurzeln in der Landnutzung (insbesondere: Klimawandel, Verlust an Biodiversität, Umweltverschmutzung), Notwendigkeit einer „Landwende“ (auch auf Waldflächen), Bezüge zum Rechtsrahmen
- Landnutzungsformen und deren spezifische Herausforderungen in Bezug auf die drei genannten Krisen: Agrarflächen, Waldflächen, Siedlungs- und Verkehrsflächen, Wasserflächen; lokale und globale Bezüge, inkl. „environmental footprints“, also extraterritorialer Wirkungen lokaler Nutzung/telecoupling und Herausforderungen des Rechtsrahmens, diese zu adressieren
- Einführung in verschiedene Zugänge (rechtsphilosophisch, rechtstheoretisch, rechtssoziologisch) und Methoden rechtswissenschaftlicher Analyse und Fallbearbeitung
- Wiederholung und Vertiefung: Grundlagen des Umweltrechts (u.a. Verfassungsrecht, Einbettung in das Mehrebenensystem, Gewaltenteilung, Verwaltungsrecht, Prinzipien des Umweltrechts) und deren Bedeutung für die Regulierung verschiedener Landnutzungsformen
- Einführung in die Rechtsbereiche, die die genannten Landnutzungsformen primär regulieren (also insbesondere das Agrar(umwelt)-, Forst-, Naturschutz-, Klima-, Immissionsschutz-, Bau- und Planungs- sowie das Wasserrecht); grundsätzlich mit Blick auf das Mehrebenensystem und transnationale Bezüge, Arbeit mit konkreten Gesetzestexten und Beispielen aus Gesetzgebung, Verwaltung und Rechtsprechung
- Möglichkeit der Vertiefung in den einzelnen Teilbereichen je nach Interessenschwerpunkt in der Abschlussarbeit; Studierende wählen dazu einen konkreten Konfliktfall oder ein Themengebiet sowie die eingeführten Zugänge und Methoden rechtswissenschaftlicher Analyse und Fallbearbeitung; Vorstellung von Fragestellung, Analysezugang und ersten Ergebnissen der Abschlussarbeiten sowie deren Diskussion im letzten Drittel des Semesters.

Qualification

Die Studierenden

- kennen zentrale rechtliche Grundlagen und Herausforderungen verschiedener Landnutzungsformen mit Relevanz für Klimawandel, Verlust an Biodiversität und Umweltverschmutzung.
- sind mit wichtigen Zugängen und Methoden rechtswissenschaftlicher Analyse und Fallbearbeitung vertraut.
- kennen beispielhaft konkrete Rechtstexte aus der Legislative, Exekutive und Judikative, die Landnutzungskonflikte adressieren.

■ können rechtliche Fragestellungen in diesen Kontexten rechtlich einordnen und in Ansätzen selbständig bearbeiten. ■ haben sich vertieft und kritisch mit denkenn rechtlichen Rahmenbedingungen eines konkreten Konfliktfalls oder eines Themengebiets im Bereich des Landwende- oder Forstrechts auseinandergesetzt.
Examination achievement
Schriftliche Ausarbeitung
Course achievement
Präsentation
Literature
■ Koch, H.-J., Hoffmann, E., Reese M. (2023). Handbuch Umweltrecht, 6. Auflage, Beck. ■ Schlacke, S. (2023). Umweltrecht, 9. Auflage, Nomos. ■ Ausgewählte Textexzerpte via ILIAS
Compulsory requirement
None (Keine)
Recommended requirement
Idealerweise verfügen die Studierenden bereits über Grundkenntnisse in den Bereichen des Umwelt- und Planungsrechts, der Umweltplanung und/oder der Umweltpolitik, erforderlich ist dies jedoch nicht.
Teaching method
Socratic teaching, aktives Lernen, Einzel- und Gruppenarbeiten

↑

Name of module	Number of module
Stable Isotopes	10LE07MO-M.13028
Responsible	
Dr. Simon Haberstroh Prof. Dr. Christiane Werner Pinto	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Attendance	60 h
Independent study	90 h
Recommended semester	3
Duration	1 Semester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Stable Isotopes	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150h

Contents
■ Overview on theoretical and methodological principles of stable isotope ecology and environmental applications ■ Practical application of isotope analysis for environmental diagnostics ■ Conducting small experiments (isotope mass spectrometry / laser spectroscopy) ■ Seminar presentations from students covering a broad range of topic of stable isotope applications in different fields
Qualification
Students will ■ comprehensively understand applications of stable isotopes for the ■ analysis of biogeochemical cycles, ecosystem processes and environmental diagnostics ■ gain an introduction to isotope laser spectroscopy and isotope ratio mass spectrometry ■ work with and critically analyze original English-language literature ■ select a freely chosen topic in any scientific or applied area and summarize and present original papers. ■ present a seminar presentation on the chosen topic
Examination achievement
Seminar presentation

Course achievement
Attendance
Teaching method
Lecture, seminar, exercise
Literature
Will be handed out during the course

↑

Name of module	Number of module
Stable Isotopes	10LE07MO-M.13028
Veranstaltung	
Stable Isotopes	
Event type	Number
Lehrveranstaltung	10LE07V-M.13028

ECTS-Points	5.0
Workload	150h
Attendance	60 h
Independent study	90 h
Hours of week	4.0
Recommended semester	3
Frequency	einmalig oder unregelmäßig
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	20

Contents
Environmental problems are often not only local or regional, but affect the delicate balance of ecosystems on a global scale. Problems such as pollution, food scandals or the effects of global climate change require new methods of analysis. Stable (non-radioactive) isotopes are very sensitive, natural markers for tracing biological and chemical processes and are a suitable tool for investigating environmental impacts. Possible applications include analysis of the origin of plant material (from fodder to cocaine), water use (rain/soil water), food chains, migration routes of various animals, long-term study of climate change using tree rings or ice cores, and global climate change (changes in the atmosphere). The aim of the course is to provide students with an understanding of the theoretical and methodological basis for the use of isotopes in the study of biogeochemical processes and material fluxes, as well as practical examples of their use in ecology and environmental research. In addition to a lecture component, presentations will be given on a variety of topics with emphasis on the potential applications of isotope analysis for environmental diagnostics. The course also includes an introduction to the practical analysis of isotope mass spectrometry and new methods of laser isotope spectroscopy in the laboratory, and own small experiments.
Qualification
■ Students can comprehensively understand possible applications of stable isotopes for the analysis of biogeochemical cycles, ecosystem processes and environmental diagnostics ■ Students have an overview and can apply isotope laser spectroscopy and isotope ratio Mass Spectrometry ■ Students can work with and critically analyze original English-language literature ■ Students can summarize and present original papers. ■ Students can present in the form of scientific publications
Examination achievement
Seminar presentation
Course achievement
Attendance

Literature
Will be handed out during the course
Compulsory requirement
none
Recommended requirement
none
Teaching method
Lecture, seminar, exercise

↑

Name of module	Number of module
Wasserpolitik und Wasserrecht	10LE07MO-M.92982
Responsible	
Dr. Sylvia Isabelle Kruse Prof. Dr. Cathrin Zengerling	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Attendance	50 h
Independent study	80 h
Recommended semester	3
Duration	1 Semester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Wasserpolitik und Wasserrecht	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
Das Modul vermittelt Grundlagen in Wasserpolitik und Wasserrecht. Es führt ein in Ursachen und Lösungsansätze für Wasserprobleme und Wasserkonflikte, Konzepte der Wasserpolitik, sowie zentrale nationale, europäische und internationale politische und rechtliche Regelungsansätze,. Im Bereich des Wasserrechts werden insbesondere Regulierung im Mehrebenensystem, Grundzüge der Wasserrahmen-Richtlinie und des Wasserhaushaltsgesetzes sowie die Integration wasserrechtlicher Belange in Planungsverfahren adressiert. Die Modulinhalte werden anhand ausgewählter Fallstudien und Fachfragen vertieft.
Qualification
Die Studierenden ■ haben ein Verständnis für die wichtigsten Konfliktfelder und entsprechende politische und rechtliche Regelungsansätze der Wasserpolitik und des Wasserrechts entwickelt; ■ kennen die wichtigsten politischen Konzepte und rechtlichen Regelungen des Wasserrechts; ■ können politische Prozesse und rechtliche Regelungen sowie deren Implementierung und Durchsetzung analysieren und kritisch würdigen.
Examination achievement
Schriftliche Ausarbeitung (40%), mündliche Präsentation: Posterpräsentation (60%)

Course achievement
Regelmäßige Teilnahme
Teaching method
Inputs, Gruppenarbeit, praktische Übungen
Literature
■ Pahl-Wostl, C. (2015). Water Governance in the Face of Global Change: From Understanding to Transformation. Springer International Publishing. https://doi.org/10.1007/978-3-319-21855-7 ■ Laskowski, S., Reese, M., Ziehm, C. (2024). Wasserrecht. In Koch/Hofmann/Reese, Handbuch Umweltrecht. Beck. Eine Liste mit relevanten Texten wird zu Beginn des Kurses verteilt.

↑

Name of module	Number of module
Wasserpolitik und Wasserrecht	10LE07MO-M.92982
Veranstaltung	
Wasserpolitik und Wasserrecht	
Event type	Number
Lehrveranstaltung	10LE07V-M.92982

ECTS-Points	5.0
Workload	150 h
Attendance	60 h
Independent study	90 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht

Contents

Das Modul vermitelt Grundlagen in Wasserpolitik und Wasserrecht. Es führt ein in Konzepte der Wasserpolitik, nationale und internationale Regelungsansätze, Ursachen und Lösungsansätze für Wasserprobleme und Wasserkonflikte. Im Bereich Wasserpolitik findet ein Überblick über relevante rechtliche Regelungen, inklusive Einführung und Grundzüge WHG und LWG, EG-Richtlinien, Zuständigkeiten, Föderalismus, Berücksichtigung des Aquatischen Naturschutzes in der Nutzungsplanung sowie Planfeststellung und Raumordnungsverfahren statt. Die Modulinhalte werden an ausgewählten Fallstudien und Fachfragen vertieft.

Qualification

Die Studierenden
- haben ein Verständnis für die wichtigsten Konfliktfelder und entsprechende politische und rechtliche Regelungsansätze der Wasserpolitik und des Wasserrechts entwickelt;
- kennen die wichtigsten politischen Konzepte und rechtlichen Regelungen des Wasserrechts;
- können politische Prozesse und rechtliche Regelungen sowie deren Implementierung und Durchsetzung analysieren und kritisch würdigen.

Examination achievement

Schriftliche Ausarbeitung (40%), mündliche Präsentation: Posterpräsentation (60%)

Course achievement

Regelmäßige Teilnahme

Literature

- Pahl-Wostl, C. (2015). Water Governance in the Face of Global Change: From Understanding to Transformation. Springer International Publishing. https://doi.org/10.1007/978-3-319-21855-7
- Laskowski, S., Reese, M., Ziehm, C. (2024). Wasserrecht. In Koch/Hofmann/Reese, Handbuch Umweltrecht. Beck.

Eine Liste mit relevanten Texten wird zu Beginn des Kurses verteilt.

Compulsory requirement
keine
Recommended requirement
Hydrologie-Module und Grundkenntnisse der Umweltpolitik hilfreich, aber nicht zwingend.
Teaching method
Inputs, Gruppenarbeit, praktische Übungen

↑

Name of module	Number of module
Praxiskurs Sattelmühle: Anwendung Forstwissenschaftlicher Erkenntnisse	10LE07MO-M.64073
Responsible	
Prof. Dr. Dr. h.c. Heinrich Spiecker	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Attendance	60 h
Independent study	90 h
Recommended semester	3
Duration	3 Wochen Block
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Praxiskurs Sattelmühle - Anwendung Forstwissenschaftlicher Erkenntnisse	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents

In dem privaten Forstbetrieb „Forstgut Sattelmühle“ im Pfälzer Wald wenden die Studierenden die während des Studiums erworbenen Fachkenntnisse und Fertigkeiten in der Praxis an. Die Aufgaben reichen von der Darstellung der strategischen Ausrichtung des Betriebs, der Erarbeitung und Festlegung von Produktionszielen, bis hin zur detaillierten Vorbereitung und Planung konkreter Maßnahmen in Waldbeständen (u.a. Hiebsprioritäten, Ernteverfahren, Bestandsbegründung, Feinerschließung, positives und negatives Auszeichnen, Berechnung des Hiebsvolumens, Sortenschätzung, Formulierung von Arbeitsaufträgen und Prognosen zur künftigen Natural- und Wertentwicklung). Dazu werden Mess- und Aufnahmearbeiten in Kleingruppen im Wald, Waldbegänge, Expertenbefragungen und Exkursionen genauso durchgeführt wie Schreib- und Auswertearbeiten im Büro sowie Präsentationen im Seminarraum.

Qualification

Die Studierenden
- sind in der Lage forstbetrieblich relevante Informationen auf normativer, strategischer, taktischer und operationaler Ebene zu sammeln, auszuwerten, und zu bewerten
- können forstwissenschaftliche Erkenntnisse in praktischen Entscheidungssituationen anwenden.
- können selbständig Inventuraufgaben in Waldbeständen planen, konzipieren und umsetzen.
- können auf der Grundlage der Waldzustandserfassung und strategischen Planung waldbauliche Planungsvarianten für Waldbestände erarbeiten und bewerten.

■ können die Auswirkungen verschiedener Planungsvarianten auf Bestandesebene und betrieblicher Ebene in kurz-, mittel- und langfristiger Perspektive sowie in naturaler und ökonomischer Hinsicht abschätzen. ■ erwerben Fach- und Methodenwissen sowie Problemlösungskompetenzen und Fertigkeiten die sie für die Führung eines Forstbetriebs qualifizieren
Examination achievement
Schriftliche Ausarbeitung (10 Seiten, individuelle Benotung, 50 %), mündliche Abschlusspräsentation (30 Minuten, Gruppenbenotung, 50 %)
Course achievement
Mündliche Zwischenpräsentationen (30 Minuten)
Literature
Literatur, betriebliche Daten und Informationen sowie weitere relevante Arbeitsmaterialien werden im Modul bereitgestellt

↑

Name of module	Number of module
Praxiskurs Sattelmühle: Anwendung Forstwissenschaftlicher Erkenntnisse	10LE07MO-M.64073
Veranstaltung	
Praxiskurs Sattelmühle - Anwendung Forstwissenschaftlicher Erkenntnisse	
Event type	Number
Lehrveranstaltung	10LE07S-M.64073

ECTS-Points	5.0
Workload	150 h
Attendance	60 h
Independent study	90 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	13

Contents

Spezielle Inhalte u.a.:
- Formulierung strategischer Ziele und Festlegen von Produktionszielen in ausgewählten Beständen
- Berücksichtigung und Planung von Ökosystemdienstleistungen (Schutz- und Erholungsfunktionen)
- Nachhaltigkeitskontrolle
- Festlegen notwendiger Maßnahmen und Ernteverfahren
- Positives und negatives Auszeichnen
- Berechnung des Hiebsvolumens, Sortenschätzung
- Planung von Feinerschließung und Polterplätzen
- Holzabfuhrplanung, u.a. Festlegen von Abfuhrrichtung
- Planung von Arbeitskapazität und -volumen, Formulierung von Arbeitsaufträgen
- Prognose der künftigen Natural- und Wertentwicklung
- Präsentation der Ergebnisse vor Entscheidungsträgern.

Qualification

Die Studierenden
- sind in der Lage forstbetrieblich relevante Informationen auf normativer, strategischer, taktischer und operationaler Ebene zu sammeln, auszuwerten, und zu bewerten
- können forstwissenschaftliche Erkenntnisse in praktischen Entscheidungssituationen anwenden.
- können selbständig Inventuraufgaben in Waldbeständen planen, konzipieren und umsetzen.
- können auf der Grundlage der Waldzustandserfassung und strategischen Planung waldbauliche Planungsvarianten für Waldbestände erarbeiten und bewerten.
- können die Auswirkungen verschiedener Planungsvarianten auf Bestandesebene und betrieblicher Ebene in kurz-, mittel- und langfristiger Perspektive sowie in naturaler und ökonomischer Hinsicht abschätzen.

Examination achievement

Schriftliche Ausarbeitung (10 Seiten, individuelle Benotung, 50 %), mündliche Abschlusspräsentation (30 Minuten, Gruppenbenotung, 50 %)

Course achievement
Mündliche Zwischenpräsentationen (30 Minuten)
Literature
Literatur, betriebliche Daten und Informationen sowie weitere relevante Arbeitsmaterialien werden im Modul bereitgestellt
Compulsory requirement
Recommended requirement
BSc Forst-/Waldwirtschaft, zwei Semester im Masterstudium Forstwissenschaften
Teaching method
Lehrgespräche, Seminare, betreute und nicht-betreute Übungen im Wald und im Büro, Exkursionen

↑

Name of module	**Number of module**
Biotic and Abiotic Challenges of Urban Trees and Forests	10LE07MO-M.64134
Responsible	
JProf. Dr. Kathrin Blumenstein	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	3 Wochen Block
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Biotic and Abiotic Challenges of Urban Trees and Forests	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150h

Contents
This module consists of a seminar part where theoretical knowledge about tree species in urban areas and forests, including their characteristics, habitat requirements, and the environmental factors that influence them, will be introduced. Additionally, students will learn about the increased stress that urban trees face, such as drought caused by extreme weather conditions resulting from climate change. They will also be introduced to challenges faced by urban trees, including limited space, poor soil conditions, and air pollution. The module will provide students with an understanding of the dangers posed by mechanical instability of trees due to pathogen infections, which is crucial for ensuring safety and preventing incidents such as falling branches or trees during storms. A special focus of this module will be on pest and pathogen damages, covering topics such as their biology, epidemiology, and infection strategies. Priority will be given to the study of both native and invasive fungal pathogens. Additionally, the module will cover city planning and tree species of the future that exhibit higher resistance to drought and pathogen attacks.
Qualification
The students ■ learn about the biotic and abiotic factors influencing the health conditions of urban trees ■ develop a basic understanding of the dynamics of pest and pathogen diseases and can assess the role of fungi in endangering trees ■ acquire the ability to choose suitable diagnostic methods ■ get insights into planning, legal and economic aspects of dealing with urban trees ■ practise their skills in presenting and discussing a self-prepared study topic

Examination achievement
Group presentation (30%) Poster preparation and presentation (30%) Group debate (40%)
Course achievement
none
Literature
The relevant literature is going to be provided prior to the corresponding lectures.

↑

Name of module	Number of module
Biotic and Abiotic Challenges of Urban Trees and Forests	10LE07MO-M.64134
Veranstaltung	
Biotic and Abiotic Challenges of Urban Trees and Forests	
Event type	Number
Lehrveranstaltung	10LE07V-M.64134

ECTS-Points	5.0
Workload	150h
Attendance	60h
Independent study	90h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	20

Contents

This module includes a seminar segment that imparts theoretical knowledge on tree species in urban and forested environments, focusing on their distinct traits, habitat needs, and the environmental factors affecting them. Students will explore the heightened stress urban trees endure, such as drought from extreme weather due to climate change. The curriculum will address urban trees' unique challenges, like constrained growth space, suboptimal soil quality, and air pollution.

A critical aspect of the module is understanding the risks of mechanical failure in trees caused by pathogens, which is essential for public safety and mitigating incidents like falling branches or trees during storms. Emphasis will be placed on the biology, epidemiology, and infection mechanisms of pests and pathogens, with special attention to both native and invasive fungal species. The module also integrates urban planning discussions and examines future tree species that are more resistant to drought and diseases.

Field trips will provide hands-on experience in identifying disease symptoms and implementing practical pest and pathogen control strategies. The module introduces cutting-edge technologies, including sonic tomography, for tree health assessment.

Students will also engage in independent projects, presenting their findings on urban tree health monitoring to their peers for discussion. Collaborative efforts will culminate in poster presentations, synthesizing key topics, which will be showcased on the module's final day. The program concludes with group studies and a debate on the multifaceted challenges facing urban trees.

Qualification

The students
- learn about the biotic and abiotic factors influencing the health conditions of urban trees
- develop a basic understanding of the dynamics of pest and pathogen diseases and can assess the role of fungi in endangering trees
- acquire the ability to choose suitable diagnostic methods
- get insights into planning, legal and economic aspects of dealing with urban trees
- practise their skills in presenting and discussing a self-prepared study topic

Examination achievement
Group presentation (30%) Poster preparation and presentation (30%) Group debate (40%)
Course achievement
None
Literature
The relevant literature is going to be provided prior to the corresponding lectures.
Compulsory requirement
none
Teaching method
Lecture, Seminar, Excursions, Fieldstudies

↑

Name of module	Number of module
Forest Resources and Forest Management in France and Germany	10LE07MO-M.64030
Responsible	
Dr. Dominik Sperlich	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	3 weeks
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Forest Resources and Forest Management in France and Germany	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
The two-week course will be performed jointly with the Faculty of Environment and Natural Resources of the University of Freiburg in Germany with one week in Freiburg, one week in Nancy and one week of remote self-study/group work. The core idea is to look beyond national borders and learn from the neighbour that may share some similarities but also surprising differences. This course will bring together students with diverse backgrounds and benefit from a mutual exchange and exploration of research, teaching and personal experiences in forest science.
Qualification
Students will learn to ■ get and exchange information on forest resources and management differences in different countries with focus on France and Germany. ■ develop research questions from a research problem, deduce scientific objectives and answer questions / follow objectives by conducting a literature review according to standards of scientific publication ■ get the capability to work in groups on forest related problems in English language and arrange with students from different backgrounds, viewpoints and opinions ■ develop critical thinking and analyses skills of complicated forest related problems ■ do oral and written presentation of forest related problems and solutions aiming at different target groups.
Examination achievement
Written Report (7-10 pages) 60 % and oral presentation 40 %

Course achievement
Literature review based on a self-determined research problem and questions, objectives definition. Results will be presented and discussed at the end of the module. With the given feedback during the oral presentation, a report on the topic shall be written summarizing the findings applying scientific publication standards.
Teaching method
Lectures, self-study, reading and analysing scientific publications, excursions, exercises, discussions
Literature
Standard textbooks in forest management, lecture material, lecture scripts will be distributed at the beginning of the course

↑

Name of module	Number of module
Forest Resources and Forest Management in France and Germany	10LE07MO-M.64030
Veranstaltung	
Forest Resources and Forest Management in France and Germany	
Event type	Number
Lehrveranstaltung	10LE07Ü-M.64030

ECTS-Points	5.0
Workload	150 h
Attendance	75 h
Independent study	75 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	15

Contents

This module is common course between Nancy (France) and Freiburg. The core idea is to provide insights into recent findings of forest science, forests management and resources in the context of climate and environmental changes in France and Germany with special emphasis on:
■ Wood production (area, species, stand structure, sites, growth potential, cutting rates),
■ Past and present management practices in France and Germany (changes in management objectives, cutting rates, age of cutting, regeneration methods, tending and thinning),
■ Challenges for future forest resource governance subject to anthropogenic environmental changes (adaptation), wildlife, and
■ Role of forests in producing/mitigating GHG emissions including economic and ecological aspects.
■ Cover a broad range of topics of all fields including current activities to handle novel risks and challenges
In the first week, the Nancy students will visit Freiburg while in the second week, the Freiburg students will visit Nancy. The third week is remote self-study and group work.
Costs one week in Nancy (France):
- Accommodation will be organised and the costs can to some degrees be covered. However, there will be a small contribution by the students necessary depending on the group size as we have a fix budget.
- Transportation to Nancy and back will be organised together with the students (no fees). However, we need one or two students willing to drive to Nancy. Otherwise more costs may arise because of the train tickets.
Method: Literature review about a given sub-topic related to the overall course topic and the lectures in mixed groups (Freiburg-Nancy) highlighting the differences and similarities between France and Germany, or potentially other countries (depending on experience and background).

Qualification

Students will learn to
- get and exchange information on forest resources and management differences in different countries with focus on France and Germany.
- develop research questions from a research problem, deduce scientific objectives and answer questions / follow objectives by conducting a literature review according to standards of scientific publication

- get the capability to work in groups on forest related problems in English language and arrange with students from different backgrounds, viewpoints and opinions
- develop critical thinking and analyses skills of complicated forest related problems
- do oral and written presentation of forest related problems and solutions aiming at different target groups.

Examination achievement
Written Report (7-10 pages) 60 % and oral presentation 40%
Course achievement
Literature review, presentation
Literature
Standard textbooks in forest management, lecture material, lecture scripts will be distributed at the beginning of the course
Compulsory requirement
None
Teaching method
Lectures, self-study, reading and analysing scientific publications, excursions, exercises, discussions

↑

Name of module	Number of module
Bodenphysik	10LE07MO-M.92952
Responsible	
PD Dr. Helmer Schack-Kirchner	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	1 Semester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Bodenphysik	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents

- Untersuchungsdesign und Technik der Bodenprobennahme (Geländeübung findet bereits Ende Oktober im Rahmen des hydrologischen Eingangsprojekts statt; Interessierte Forst- bzw. Umweltwissenschaftler bitte rechtzeitig Kontakt mit dem Modulkoordinator aufnehmen)
- Stellung der Bodenphysik im Umfeld Bodenschutz, Hydrologie und Standortkunde
- Definition bodenphysikalischer Untersuchungsgegenstände
- Genese, Morphologie und Funktion der Bodenstruktur
- Theorie und Praxis bodenphysikalischer Standardmethoden: Durchführung eines kompletten Analysegangs (pF-Kurve, Porosität, luftgefülltes Porenvolumen, Lagerungsdichte, Textur, Wasserleitfähigkeit, Gasdiffusivität, intrinsische Permeabilität)
- Beurteilung der Messgenauigkeit und Kalibrierungsfragen bei der Messung der Bodenfeuchte und des Wasserpotentials (thermogravimetrisch, frequency domain, time domain reflectometry, Tensiometrie, Matrix Sensoren)
- Gashaushalt von Böden
- Lösung von partiellen Differentialgleichungen (Wärme-/Wassertransport) mit finiten Differenzen in R.

Qualification

Die Studierenden können

- bodenphysikalische Zusammenhänge auf akademischem Niveau erläutern
- bodenphysikalische Analysen durchführen und organisieren
- bodenphysikalische Datenbestände beurteilen
- einfache bodenphysikalische Modelle zur Problemlösung entwickeln
- Grenzen bodenphysikalischer Laborergebnisse in der Hierarchie terrestrischer Ökosysteme einordnen

Examination achievement
Schriftliche Ausarbeitung
Course achievement
keine
Literature
■ Hartge & Horn (2009): Die physikalische Untersuchung von Böden ■ Hillel (1998): Environmental Soil Physics ■ Dirksen (1999): Soil Physics Measurements

↑

Name of module	Number of module
Bodenphysik	10LE07MO-M.92952
Veranstaltung	
Bodenphysik	
Event type	Number
Lehrveranstaltung	10LE07V-M.92952

ECTS-Points	5.0
Workload	150 h
Attendance	60 h
Independent study	90 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	20

Contents

- Untersuchungsdesign und Technik der Bodenprobennahme (Geländeübung findet bereits Ende Oktober im Rahmen des hydrologischen Eingangsprojekts statt; Interessierte Forst- bzw. Umweltwissenschaftler bitte rechtzeitig Kontakt mit dem Modulkoordinator aufnehmen)
- Stellung der Bodenphysik im Umfeld Bodenschutz, Hydrologie und Standortkunde
- Definition bodenphysikalischer Untersuchungsgegenstände
- Genese, Morphologie und Funktion der Bodenstruktur
- Theorie und Praxis bodenphysikalischer Standardmethoden: Durchführung eines kompletten Analysegangs (pF-Kurve, Porosität, luftgefülltes Porenvolumen, Lagerungsdichte, Textur, Wasserleitfähigkeit, Gasdiffusivität, intrinsische Permeabilität)
- Beurteilung der Messgenauigkeit und Kalibrierungsfragen bei der Messung der Bodenfeuchte und des Wasserpotentials (thermogravimetrisch, frequency domain, time domain reflectometry, Tensiometrie, Matrix Sensoren)
- Gashaushalt von Böden
- Lösung von partiellen Differentialgleichungen (Wärme-/Wassertransport) mit finiten Differenzen in R.

Qualification

Die Studierenden können
- bodenphysikalische Zusammenhänge auf akademischem Niveau erläutern
- bodenphysikalische Analysen durchführen und organisieren
- bodenphysikalische Datenbestände beurteilen
- einfache bodenphysikalische Modelle zur Problemlösung entwickeln
- Grenzen bodenphysikalischer Laborergebnisse in der Hierarchie terrestrischer Ökosysteme einordnen

Examination achievement

Schriftliche Ausarbeitung

Course achievement

keine

Literature
■ Hartge & Horn (2009): Die physikalische Untersuchung von Böden ■ Hillel (1998): Environmental Soil Physics ■ Dirksen (1999): Soil Physics Measurements
Compulsory requirement
keine
Recommended requirement
halbtägige Schulung: Bodenprobenentnahme im Rahmen des hydrologischen Eingangsprojekts
Teaching method
Vorlesung, praktische Übungen, Laborarbeit

↑

Name of module	Number of module
Human-Environment Interactions	10LE07MO-WP_ M.64094
Responsible	
Prof. Dr. Michael Pregernig	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	3 weeks
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Human-Environment Interactions	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Qualification
Students are expected ■ to gain an understanding of the ways in which societies organize and manage human-environment relationships ■ to recognize the necessity of an interdisciplinary approach to manage human-environment systems ■ to develop the capacity to assess institutional arrangements ■ to reflect about approaches to manage human-environment interactions ■ to improve problem solving skills and time management ■ to demonstrate a high level of creativity during group work
Examination achievement
Exam, presentation
Course achievement
None

↑

Name of module	Number of module
Human-Environment Interactions	10LE07MO-WP_ M.64094
Veranstaltung	
Human-Environment Interactions	
Event type	Number
Lehrveranstaltung	10LE07V-WP_ M.64094

ECTS-Points	5.0
Workload	150 h
Attendance	55 h
Independent study	95 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	15

Contents
To be given in the Ilias learning platform
Examination achievement
Exam, presentation
Course achievement
None
Compulsory requirement
None
Recommended requirement
None

↑

Name of module	Number of module
Life Cycle Management	10LE07MO-M.64087
Responsible	
Johan Andrés Vélez Henao	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Attendance	50 h
Independent study	100 h
Recommended semester	3
Duration	1 Semester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Life Cycle Management	Lehrveranstaltung	Wahlpflicht	5.0	4.0	

Contents
The course enables participants to conduct, interpret, document, and present life cycle assessment studies of products or technical installations using state-of-the-art tools and databases. The following core content will be covered: ■ History of life cycle thinking ■ Systems thinking ■ Computational structure of the LCA ■ LCA standards ISO 14040 and 14044 ■ Life cycle costing and social life cycle assessment ■ Life cycle inventory ■ Life cycle assessment ■ LCA databases (ecoinvent) ■ System models, allocation ■ Uncertainty and sensitivity analysis in LCA ■ Recent developments in LCA The participants will have the opportunity in small groups of 2-3 to choose a product or installation, and to perform a life cycle management case study.

Qualification
The students will be familiarized with the history, the core principles, the application, and state-of-the-art databases and software of the life cycle assessment (LCA) method. They will be able to understand the computational structure of the method and will become familiar with the main principles of the LCA (ISO 14040 ad 14044). Additionally, they will be familiar with some core concepts such as system thinking and key elements of an LCA (goal and scope, life cycle inventory, life cycle assessment, and interpretation). Students gain a basic knowledge of complementary assessment methods such as life cycle costing and social life cycle assessment. In addition, the students will be able to understand the different allocation and LCA assessment methods, use databases (e.g., ecoinvent), and to conduct an LCA with uncertainty and/or scenario analysis.
Examination achievement
Written exam (2h, individual): Counts for 33% of the final grade Term paper (group work, last 5 weeks of the module): Counts for 67% of the final grade
Course achievement
none
Teaching method
Integrated lectures, exercises, and seminars
Literature
■ LCA Textbook: http://www.lcatextbook.com/. Much of the basic material of the course will be based on this book. ■ OpenLCA tutorials (http://www.openlca.org/videos). ■ Manual of the ReCiPe impact assessment method (http://www.lcia-recipe.net/file-cabinet/ReCiPe_main_report_MAY_2013.pdf). Additional literature such as book chapters, journal articles and reports will be shared via ILIAS

↑

Name of module	Number of module
Life Cycle Management	10LE07MO-M.64087
Veranstaltung	
Life Cycle Management	
Event type	Number
Lehrveranstaltung	10LE07V-M.64087

ECTS-Points	5.0
Attendance	50 h
Independent study	100 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	40

Contents

The course enables participants to conduct, interpret, document, and present life cycle assessment studies of products or technical installations using state-of-the-art tools and databases. The following core content will be covered:

- History of life cycle thinking
- Systems thinking
- Computational structure of the LCA
- LCA standards ISO 14040 and 14044
- Life cycle costing and social life cycle assessment
- Life cycle inventory
- Life cycle assessment
- LCA databases (ecoinvent)
- System models, allocation
- Uncertainty and sensitivity analysis in LCA
- Recent developments in LCA

The participants will have the opportunity in small groups of 2-3 to choose a product or installation, and to perform a life cycle management case study.

Qualification

The students will be familiarized with the history, the core principles, the application, and state-of-the-art databases and software of the life cycle assessment (LCA) method. They will be able to understand the computational structure of the method and will become familiar with the main principles of the LCA (ISO 14040 ad 14044). Additionally, they will be familiar with some core concepts such as system thinking and key elements of an LCA (goal and scope, life cycle inventory, life cycle assessment, and interpretation). Students gain a basic knowledge of complementary assessment methods such as life cycle costing and social life cycle assessment. In addition, the students will be able to understand the different allocation and LCA assessment methods, use databases (e.g., ecoinvent), and to conduct an LCA with uncertainty and/or scenario analysis.

Examination achievement
Written exam (2h, individual): Counts for 33% of the final grade Term paper (group work, last 5 weeks of the module): Counts for 67% of the final grade
Course achievement
none
Literature
■ LCA Textbook: http://www.lcatextbook.com/. Much of the basic material of the course will be based on this book. ■ OpenLCA tutorials (http://www.openlca.org/videos). ■ Manual of the ReCiPe impact assessment method (http://www.lcia-recipe.net/file-cabinet/ReCiPe_main_report_MAY_2013.pdf). ■ Additional literature such as book chapters, journal articles and reports will be shared via ILIAS
Compulsory requirement
Recommended requirement
Calculations are partly carried out with Excel, Basic knowledge on vectors, matrices, matrix multiplication, and matrix inversion is required. Important: This course requires each participant to work on her/his own laptop with the openLCA software (http://www.openlca.org/) and the ecoinvent database installed. openLCA is freeware. A copy of the ecoinvent database will be provided via ILIAS at the beginning of the course.
Teaching method
Integrated lectures, exercises, and seminars

↑

Name of module	Number of module
Ecohydrology	10LE07MO-M.92924
Responsible	
Dr. Simon Haberstroh	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	3 Wochen Block
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
None

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Ecohydrology	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
The module Ecohydrology deals comprehensively with the role of plants in the ecosystem water balance. With the help of experimental sampling and model applications, students learn how to plan, carry out and evaluate experimental and model-based investigations in an ecohydrological context using various case studies.
Qualification
■ Students are able to independently plan, carry out and evaluate practical or theoretical experiments. ■ Students are able to create model input data for a process-based ecosystem model and apply simulations. ■ Students can summarize and present their results in an oral presentation and discuss their results critically and reflectively. ■ Students can independently place their measurement and modeling results in the context of recent literature.
Examination achievement
Oral presentation of results (min. 30 min)
Course achievement
Attendance
Teaching method
Seminar, Lectures, practical exercises

↑

Name of module	Number of module
Ecohydrology	10LE07MO-M.92924
Veranstaltung	
Ecohydrology	
Event type	Number
Lehrveranstaltung	10LE07Ü-M.92924

ECTS-Points	5.0
Workload	150 h
Attendance	50 h
Independent study	100 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht

Contents
The module Ecohydrology deals comprehensively with the role of plants in the ecosystem water balance. With the help of experimental sampling and model applications, students learn how to plan, carry out and evaluate experimental and model-based investigations in an ecohydrological context using various case studies.
Qualification
■ Students are able to independently plan, carry out and evaluate practical or theoretical experiments. ■ Students are able to create model input data for a process-based ecosystem model and apply simulations. ■ Students can summarize and present their results in an oral presentation and discuss their results critically and reflectively. ■ Students can independently place their measurement and modeling results in the context of recent literature.
Examination achievement
Oral presentation of results (min. 30 min)
Course achievement
Attendance
Literature
Will be handed out during the module
Compulsory requirement
none
Recommended requirement
none
Teaching method
Seminar, Lectures, practical exercises

↑

Name of module	Number of module
Technology Assessment	10LE07MO-M.95990
Responsible	
Prof. Dr. Philipp Späth	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	3 weeks
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Technology Assessment	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150h

Contents
We study the promises, methods and practices involved in systematic Technology Assessments (TA) and their role in problematizing the potentials and risks involved in technological change.
Qualification
In this module students learn to: ■ describe various objectives and institutional forms of technology assessment; ■ understand the assumptions and world views that influenced various approaches to TA; ■ be fluent with TA terminology and practices; ■ identify different challenges and dilemmas of expertise or consensus-oriented methods for TA; ■ evaluate and criticize TA studies of various scopes; ■ apply research methods (analysis of literature, interview techniques etc.); ■ position themselves with regard to different approaches to technology assessment; ■ assess the potentials and risks potentially involved in various forms of H2 generation and partnerships.
Examination achievement
■ Literature Review (Individual assessment of a self-chosen TA study along guiding questions), max. 2500 words (4 pages) (50%) ■ Group Research Report, 15-40 pages (50%)
Course achievement
Participation in discussions & presentations is obligatory; not graded

Teaching method
lectures, plenary discussions, group work
Literature
A list of relevant texts will be made available at the start of the course; readings themselves will be made available online via Ilias. Introductory reading (pdf available on request): Grunwald, A. (2019). "Technology assessment in practice and theory". Oxford, Routledge. pp. 1-12.

↑

Name of module	Number of module
Technology Assessment	10LE07MO-M.95990
Veranstaltung	
Technology Assessment	
Event type	Number
Lehrveranstaltung	10LE07S-M.95990

ECTS-Points	5.0
Workload	150h
Attendance	60h
Independent study	90h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht

Contents
As environmental limitations of current economic regimes and lifestyles are increasingly recognized, hope is often directed towards technological innovations (e.g. resource efficiency, ‘green’ technologies). Assumptions about the ‘superiority’ of certain technologies are a precondition for any attempt to accelerate the development and diffusion of these technologies by means of science, technology and innovation governance. However, to what extent particular technological innovations can in fact alleviate pressure on natural resources or societal groups is hard to assess, particularly in the early stages of their development. We study the promises, methods and practices involved in systematic Technology Assessments (TA) and their role in problematizing the potentials and risks involved in technological change. Starting from an overview of approaches, institutions and methods of TA, we aim to understand the dilemmas of such endeavors and how people tried to overcome them. You will first evaluate a self-chosen TA study that has been published by a recognized TA institution against common criteria. The second and third week of the module are dedicated to the development of your own technology assessment of a specific aspect important to an international hydrogen economy as promoted by the German Government: https://www.bmz.de/en/issues/green-hydrogen. You will develop a TA study on a self-chosen aspect of a future hydrogen economy in a team of three to sixteen students. On the way, you will gain insights into how parliamentary TA is conducted by the German TAB (which has been commissioned with a study on opportunities and risks of hydrogen partnerships and technologies in developing countries, too: https://www.tab-beim-bundestag.de/english/projects_opportunities-and-risks-of-hydrogen-partnerships-and-technologies-in-developing-countries.php).
Examination achievement
Literature Review (Individual assessment of a self-chosen TA study along guiding questions), max. 2500 words (4 pages) (50%) Group Research Report, 15-40 pages (50%)
Course achievement
Participation in discussions & presentations is obligatory; not graded
Literature
A list of relevant texts will be made available at the start of the course; readings themselves will be made available online via Ilias. Introductory reading (pdf available on request): Grunwald, A. (2019). "Technology assessment in practice and theory". Oxford, Routledge. pp. 1-12.

Compulsory requirement
none
Recommended requirement
none
Teaching method
lectures, plenary discussions, group works

↑

Name of module	Number of module
Environmental and Energy Transition Law	10LE07MO-M.97024
Responsible	
Prof. Dr. Cathrin Zengerling	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Attendance	60 h
Independent study	90 h
Recommended semester	3
Duration	3 weeks
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
None

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Environmental and Energy Transition Law	Seminar	Wahlpflicht	5.0	4.0	150 h

Contents
In this module students gain fundamental knowledge of environmental and energy transition law from multi-level governance and international comparative perspectives. They acquire sector-specific knowledge of environmental law in the fields of climate change, air pollution, water, oceans, biodiversity, nature protection, chemicals and waste/circular economy law. With regard to energy transition law, students become familiar with energy and planning law directed to energy efficiency and the switch from fossil fuel based to renewable energy in the sectors of electricity, heating/cooling and mobility.
Qualification
In this module students learn to: ■ identify the main types and instruments of environmental and energy transition law and their distinctive characteristics; ■ understand interactions and conflicts between different types, sources and instruments of environmental and energy transition law; ■ assess the inherent strengths and limitations of environmental and energy transition law for environmental and energy governance; ■ realize that there are alternative ways of structuring environmental and energy transition responsibilities and powers through law; ■ formulate legal and policy arguments relevant to future environmental and energy transition law development; ■ critically and intelligently evaluate arguments for legal change;

- understand the relationship between scientific knowledge, social movements, and environmental/ energy transition law;
- apply basic skills of legal research and legal arguments to relevant case studies.

Examination achievement
Written exercise (50%, 90 minutes), Written individual report (3000 words) OR group presentation and report (60 minutes / group and 750 words / person, 50%)
Teaching method
Socratic lectures, group and individual work, presentations, discussions
Literature

- Sands, P., & Peel, J. (2018). Principles of international environmental law. Cambridge University Press.
- Meidinger, Errol (2008), "Property Law for Development Policy and Institutional Theory: Problems of Structure, Choice and Change." In David Mark, Barry Smith, and Isaac Ehrlich, The Mystery of Capital and the New Philosophy of Social Reality. Chicago: Open Court Publishing, pp.193-227.
- Reading material will be provided during the course via the e-learning platform ILIAS

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Name of module	Number of module
Environmental and Energy Transition Law	10LE07MO-M.97024
Veranstaltung	
Environmental and Energy Transition Law	
Event type	Number
Seminar	10LE07-M.97024

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Frequency	einmalig oder unregelmäßig
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht

Contents

In this module students gain fundamental knowledge of environmental and energy transition law from multi-level governance and international comparative perspectives. They acquire sector-specific knowledge of environmental law in the fields of climate change, air pollution, water, oceans, biodiversity, nature protection, chemicals and waste/circular economy law. With regard to energy transition law, students become familiar with energy and planning law directed to energy efficiency and the switch from fossil fuel based to renewable energy in the sectors of electricity, heating/cooling and mobility.

Throughout the course, students learn about different legal instruments and their strengths and weaknesses in reaching regulatory goals. Both, public and private law perspectives as well as different legal traditions such as common and civil law approaches are covered. Students also get insights into the role of environmental protection and the energy transition in other international legal regimes such as world trade, investment and human rights law.

The course is taught interactively and active participation of students is encouraged. Students become familiar with various primary legal documents such as (excerpts of) international treaties, European directives, constitutions, national laws, administrative permits, land use plans as well as decisions of the judiciary, and learn how to work with them. Students apply and deepen their knowledge under guidance of the instructors in their specific fields of interest via case studies. Throughout the course, various soft skills such as debating in socratic discussions, scientific writing, interdisciplinary and intercultural teamwork are imparted.

Qualification

In this module students learn to:

- identify the main types and instruments of environmental and energy transition law and their distinctive characteristics (1)(2);
- understand interactions and conflicts between different types, sources and instruments of environmental and energy transition law (2);
- assess the inherent strengths and limitations of environmental and energy transition law for environmental and energy governance (5);
- realize that there are alternative ways of structuring environmental and energy transition responsibilities and powers through law (2)(4);
- formulate legal and policy arguments relevant to future environmental and energy transition law development (6);
- critically and intelligently evaluate arguments for legal change (4);
- understand the relationship between scientific knowledge, social movements, and environmental/ energy transition law (2);

- apply basic skills of legal research and legal arguments to relevant case studies (3)(6).

Classification of cognitive skills following Bloom (1956):
- 1 = Knowledge: recalling facts, terms, basic concepts and answers; 2 = Comprehension: understanding something; 3 = Application: using a general concept to solve problems in a particular situation; 4 = Analysis: breaking something down into its parts; 5 = Synthesis: creating something new by putting parts of different ideas together to make a whole; 6 = Evaluation: judging the value of material or methods.

Examination achievement

Written exercise (50%, 90 minutes),
Written individual report (3000 words) OR group presentation and report (60 minutes / group and 750 words / person, 50%)

Course achievement

None

Literature

- Sands, P., & Peel, J. (2018). Principles of international environmental law. Cambridge University Press.
- Meidinger, Errol (2008), "Property Law for Development Policy and Institutional Theory: Problems of Structure, Choice and Change." In David Mark, Barry Smith, and Isaac Ehrlich, The Mystery of Capital and the New Philosophy of Social Reality. Chicago: Open Court Publishing, pp.193-227.
- Reading material will be provided during the course via the e-learning platform ILIAS. erwerben Fach- und Methodenwissen sowie Problemlösungskompetenzen und Fertigkeiten die sie für die Führung eines Forstbetriebs qualifizieren.

Compulsory requirement

None

Teaching method

Socratic lectures, group and individual work, presentations, discussions

↑

Name of module	Number of module
Waldbewirtschaftung im gesellschaftlichen Wandel	10LE07MO-M.13029
Responsible	
Dr. Andrea Heidemarie Seim	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	1 Semester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Waldbewirtschaftung im gesellschaftlichen Wandel	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
Im Rahmen dieser Veranstaltung werden verschiedene Formen der Waldbewirtschaftung kritisch analysiert und anhand gesellschaftlicher Diskurse, Machtkonstellationen und (wirtschafts-) politischer Rahmenbedingungen bewertet. Die historisch-politisch konzipierte Studie deckt waldbezogene Interessenskonflikte unterschiedlicher Bevölkerungsgruppen auf und gewährt somit Aussagen über die gesellschaftliche Akzeptanz historischer und aktueller Waldbewirtschaftung. Ein besonderes Augenmerk wird hierbei auf das kritische Bewerten des Nachhaltigkeitsaspekts gelegt, d.h. ob und in welchem Maße eine forstlich ausgerichtete Waldbewirtschaftung den gesellschaftlichen Nachhaltigkeitsansprüchen an den Wald gerecht wurde bzw. heute noch gerecht werden kann.
Qualification
Studierende können ■ verschiedene Formen der Waldbewirtschaftung erklären ■ verschiedene Methoden der Waldgeschichtsforschung erklären und anwenden ■ historische Quellen interpretieren und analysieren ■ Ergebnisse wissenschaftlich präsentieren und diskutieren ■ gemeinsam mit anderen Aufgaben planen und erfüllen
Examination achievement
Präsentation (Poster) (Gruppe, 50%), Diskussion/Debatte (individuell, 50%)

Course achievement
keine
Teaching method
Vorlesung, Gruppen- und Einzelarbeit, Präsentation, Debatte
Literature
Wird zu Beginn der Veranstaltung bekannt gegeben.

↑

Name of module	Number of module
Waldbewirtschaftung im gesellschaftlichen Wandel	10LE07MO-M.13029
Veranstaltung	
Waldbewirtschaftung im gesellschaftlichen Wandel	
Event type	Number
Lehrveranstaltung	10LE07V-M.13029

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	15

Contents
Im Rahmen dieser Veranstaltung werden verschiedene Formen der Waldbewirtschaftung kritisch analysiert und anhand gesellschaftlicher Diskurse, Machtkonstellationen und (wirtschafts-) politischer Rahmenbedingungen bewertet. Die historisch-politisch konzipierte Studie deckt waldbezogene Interessenskonflikte unterschiedlicher Bevölkerungsgruppen auf und gewährt somit Aussagen über die gesellschaftliche Akzeptanz historischer und aktueller Waldbewirtschaftung. Ein besonderes Augenmerk wird hierbei auf das kritische Bewerten des Nachhaltigkeitsaspekts gelegt, d.h. ob und in welchem Maße eine forstlich ausgerichtete Waldbewirtschaftung den gesellschaftlichen Nachhaltigkeitsansprüchen an den Wald gerecht wurde bzw. heute noch gerecht werden kann.
Examination achievement
Präsentation (Poster) (Gruppe, 50%), Diskussion/Debatte (individuell, 50%)
Course achievement
Keine / None
Literature
Wird zu Beginn der Veranstaltung bekannt gegeben.
Compulsory requirement
Keine / None
Teaching method
Vorlesung, Gruppen- und Einzelarbeit, Präsentation, Debatte

↑

Name of module	Number of module
Global Groundwater - Agriculture Nexus	10LE07MO-M.92926
Responsible	
Prof. Dr. Markus Weiler	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	3 weeks
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Global Groundwater Agriculture Nexus	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
Many of the most productive groundwater basins around the globe are closely linked with agricultural activities. Therefore, this module provides the basic knowledge to understand and sustainably manage groundwater resources in agricultural regions.
Qualification
Students will ■ get a deep understanding of groundwater hydrology by investigating issues specifically related to agriculture ■ understand and learn to apply key principles of physical groundwater hydrology ■ understand and learn key policy and regulatory approaches to managing groundwater, and apply appropriate technical-scientific tools to support groundwater management ■ gain familiarity with and apply a variety of modeling and field observation tools ■ refresh and apply fundamental knowledge from various modules already taken during the M.Sc. Studies to date ■ gain professional practice: implement a mock consulting project
Examination achievement
Oral presentation: Report about the situation in a particular region (20 min)
Course achievement
none

Teaching method
Lectures, discussion groups, field trips
Literature
■ Groundwater in Agriculture, 2009 ■ California SBX2 1 Study on Nitrate in Drinking Water ■ California Nitrogen Assessment (NA), US NA, EU NA ■ Scientific articles and other literature sources (provided through instructor) ■ Robbins, Paul (2012): Political Ecology: A Critical Introduction [2nd ed.]. Chichester; Malden, MA: J. Wiley & Sons.

↑

Name of module	Number of module
Global Groundwater - Agriculture Nexus	10LE07MO-M.92926
Veranstaltung	
Global Groundwater Agriculture Nexus	
Event type	Number
Lehrveranstaltung	10LE07V-M.92926

ECTS-Points	5.0
Workload	150 h
Attendance	55 h
Independent study	95 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	25

Contents

Many of the most productive groundwater basins around the globe are closely linked with agricultural activities. Therefore, this module provides the basic knowledge to understand and sustainably manage groundwater resources in agricultural regions.
The module first provides an overview of global geography of agriculture and groundwater, introduces groundwater dynamics in agricultural regions and basics of laws in agricultural groundwater management, i.e. quantity/extraction of groundwater. Then groundwater quality issues in agricultural regions are discussed with a special focus on animal farming and manure management. The module also discusses how non-point source pollution of groundwater is assessed and how agricultural groundwater quality can be monitored and regulated. Then room is given for the groundwater-surface water nexus in agriculture and how both can be used conjunctively. Finally, livelihood and environmental justice in groundwater-dependent agricultural regions is highlighted. The module consists of lectures and connected group activities. One or two day-long field trips are also included.

Qualification

Students will
- get a deep understanding of groundwater hydrology by investigating issues specifically related to agriculture
- understand and learn to apply key principles of physical groundwater hydrology
- understand and learn key policy and regulatory approaches to managing groundwater, and apply appropriate technical-scientific tools to support groundwater management
- gain familiarity with and apply a variety of modeling and field observation tools
- refresh and apply fundamental knowledge from various modules already taken during the M.Sc. Studies to date
- gain professional practice: implement a mock consulting project

Examination achievement

Oral presentation: Report about the situation in a particular region (20 min)

Course achievement
none
Literature
■ Groundwater in Agriculture, 2009 ■ California SBX2 1 Study on Nitrate in Drinking Water ■ California Nitrogen Assessment (NA), US NA, EU NA ■ Scientific articles and other literature sources (provided through instructor)Robbins, Paul (2012): Political Ecology: A Critical Introduction [2nd ed.]. Chichester; Malden, MA: J. Wiley & Sons.
Compulsory requirement
none
Recommended requirement
none
Teaching method
Lectures, discussion groups, field trips

↑

Name of module	Number of module
GIS in der Forstwirtschaft	10LE07MO-M.64132
Responsible	
Prof. Dr. Thomas Frank Purfürst	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	1
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
(GIS Grundkenntnisse auf Bachelor-Niveau)

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
GIS in der Forstwirtschaft	Lehrveranstaltung	Wahlpflicht	5.0	4.0	150 h

Contents
GIS spielt in der Forstwirtschaft eine immer entscheidendere Rolle. Das Modul gibt einen Überblick über aktuelle Konzepte, gängige Geodaten, Geodatenerhebung/Digitalisierung, Methoden, Software, Verfahren und Geschäftsprozesse mit GIS-Relevanz in der Forstwirtschaft. Der Fokus liegt dabei auf dem GIS-Einsatz in der deutschen Forstwirtschaft.
Qualification
Die Studierenden ■ kennen die Grundlagen und Einsatzgebiete von GIS. ■ kennen grundsätzlich den Einsatz von GIS in typischen Geschäftsprozessen der Forstwirtschaft. ■ können gängige GIS-Software bedienen. ■ kennen Formen und Zugänge zu GIS-Datenquellen. ■ können Geo- und Sachdaten im Feld/Wald selbständig erheben und diese im GIS verfügbar machen. ■ haben Grundkenntnisse der gängigen Geoprozessing-Methoden und im Geodatenmanagement. ■ haben Grundkenntnisse in der statistischen Bewertung und Automatisierung von Geodaten. ■ können vorhandene Geodaten verwendungsorientiert aufbereiten und anschaulich darstellen.
Examination achievement
Schriftliche Ausarbeitung
Course achievement
none

Teaching method
Vorlesungen, Übungen, Geländeaufnahmen, Exkursion, Selbststudium
Literature
Pflichtlektüre und ergänzende Lektüre werden zu Beginn der Veranstaltung bekannt gegeben.

↑

Name of module	Number of module
GIS in der Forstwirtschaft	10LE07MO-M.64132
Veranstaltung	
GIS in der Forstwirtschaft	
Event type	Number
Lehrveranstaltung	10LE07V-M.64132

ECTS-Points	5.0
Workload	150 h
Attendance	60 h
Independent study	90 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Group size	14

Contents

GIS spielt in der Forstwirtschaft eine immer entscheidendere Rolle. Das Modul gibt einen Überblick über aktuelle Konzepte, gängige Geodaten, Geodatenerhebung/Digitalisierung, Methoden, Software, Verfahren und Geschäftsprozesse mit GIS-Relevanz in der Forstwirtschaft. Der Fokus liegt dabei auf dem GIS-Einsatz in der deutschen Forstwirtschaft.
Das Modul gliedert sich in drei Teile
Teil 1: GIS-Grundlagen

- Vermittlung von GIS-Grundlagenwissen
- Verwendung von GIS in der Forstwirtschaft/GIS-unterstützte Geschäftsprozesse
- Externe Referenten aus der Forst-GIS-Praxis
- Exkursion zu Forst-GIS-Praxispartnern (z.B. LGL)
- Datengrundlagen (Datenherkunft, Datenqualität, Datentypen, OpenData, ISPIRE)
- Software und Apps in der Forstwirtschaft

Teil 2: Geodatenerhebung und -aufbereitung

- Software und Methoden zur Geodatenerhebung
- Praktische Geodatenerhebung im Wald (Terrestrisch, Fernerkundung)
- Praktische Vermessung im Wald (Terrestrisch, GNSS, Fernerkundung)
- Durchführung von Datenaufbereitung (eigene Daten), Geodatenmanagement, Geodatenanalyse

Teil 3: Geodatenauswertung, -bewertung und -darstellung.

- Vermittlung und Anwendung von Geoprozessing-Methoden
- Anwendungs-/verwendungsbezogene Geodatenaufbereitung
- Automatisierung von Geodatenprozessen
- Analyse, Statistik und Bewertung von Geodaten
- Anwendungs-/verwendungsbezogene Darstellung und Präsentation von Geodaten

Das Modul stützt sich vor allem auf die verschiedenen Softwareprodukte (Desktop, Server, Apps, Cloud) der Firma ESRI.
Das Modul beinhaltet eine mehrtägige Exkursion

Qualification
Die Studierenden ■ kennen die Grundlagen und Einsatzgebiete von GIS. ■ kennen grundsätzlich den Einsatz von GIS in typischen Geschäftsprozessen der Forstwirtschaft. ■ können gängige GIS-Software bedienen. ■ kennen Formen und Zugänge zu GIS-Datenquellen. ■ können Geo- und Sachdaten im Feld/Wald selbständig erheben und diese im GIS verfügbar machen. ■ haben Grundkenntnisse der gängigen Geoprozessing-Methoden und im Geodatenmanagement. ■ haben Grundkenntnisse in der statistischen Bewertung und Automatisierung von Geodaten. ■ können vorhandene Geodaten verwendungsorientiert aufbereiten und anschaulich darstellen.
Examination achievement
Schriftliche Ausarbeitung
Course achievement
none
Literature
Pflichtlektüre und ergänzende Lektüre werden zu Beginn der Veranstaltung bekannt gegeben.
Compulsory requirement
GIS Grundkenntnisse auf Bachelor-Niveau
Recommended requirement
none
Teaching method
Vorlesungen, Übungen, Geländeaufnahmen, Exkursion, Selbststudium

↑

Name of module	Number of module
Tropical Biology and Conservation	10LE07MO-M.64097
Responsible	
Dr. Johannes Benedikt Walter Penner	
Faculty	
Fakultät für Umwelt und natürliche Ressourcen Albert-Ludwigs-Universität Freiburg	

ECTS-Points	5.0
Workload	150 h
Hours of week	4.0
Recommended semester	3
Duration	3 Wochen Block
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht
Frequency	in jedem Wintersemester

Compulsory requirement
none

Assigned Courses					
Name	Type	P/WP	ECTS	HoW	Workload
Tropical Biology and Conservation	Übung	Wahlpflicht	5.0	4.0	150 h

Contents
1. Introduction into tropical biology 2. Challenges of conservation in tropical regions 3. Introduction into selected faunal & floral elements of Borneo 4. Conservation on Borneo 5. Designing own field studies 6. Excursion to Danau Girang Field Centre, Borneo, Malaysa (excursion done in cooperation with field centre which is run by Sabah Wildlife Department und Cardiff University)
Qualification
■ Studierende sind in der Lage sich in neue komplexe Themen zu Tropen, Biodiversität und Naturschutz einzuarbeiten und diese wissenschaftlich zu präsentieren. ■ Studierende können ein eigenes, kleines Forschungsprojekt aufgrund einer wissenschaftlichen Fragestellung (oder Hypothese) entwickeln und unter den Gegebenheiten vor Ort durchführen. ■ Studierende erarbeiten sich den Unterschied zwischen temperaten und tropischen Ökosystemen und deren Schutz. ■ Studierende werden ermutigt sich Gedanken zur intrinsischen Motivation zur Wahl ihres Studiums und der späteren Berufswahl zu machen.

Examination achievement
1. Zwei Präsentationen (1x im Block „Tropical Biology & Conservation“ und 1x im Block „Selected groups of fauna, flora and fungi“) (die Benotung einer Präsentation wird zu 25% in der Gesamtnote gewichtet; Dies setzt sich zusammen aus 20% Stil, 60% Inhalt und 20% Handout) 2. Zwei Handouts (1x im Block „Tropical Biology & Conservation“ und 1x im Block „Selected groups of fauna, flora and fungi“) 3. Ein Datenblatt (Metadaten & Rohdaten zum eigenen Mini-Forschungsprojekt im Rahmen der Exkursion) (Die Feldarbeit wird mit 50% der Gesamtnote gewichtet)
Course achievement
■ Eigenständige Einarbeitung zu zwei Themen im Rahmen des Seminars (Wahl aus einer Liste vorgegebener Themen; Block 1: Tropical Biology & Conservation; Block 2: Selected groups of fauna, flora and fungi of Borneo) ■ Unter Anleitung eigenständiges Design und Durchführung eines Mini-Forschungsprojektes, welches im Rahmen der Exkursion durchgeführt wird
Teaching method
In general: Classification of cognitive skills following Bloom (1956): 1. Knowledge: recalling facts, terms, basic concepts and answers 2. Comprehension: understanding something 3. Application: using a general concept to solve problems in a particular situation 4. Analysis: breaking something down into its parts 5. Synthesis: creating something new by putting parts of different ideas together to make a whole 6. Evaluation: judging the value of material or methods. Specific: ■ Classical seminar with presentations, handouts and discussions ■ Individual discussions with teaching staff (Dr. Johannes Penner & staff from Danau Grinag Field Centre ■ Literature review ■ Active participation in current research at Danau Girang Field Centre ■ Active participation in individual research projects at Danau Girang Field Centre (in small groups and as large group; under the instruction of teaching staff from Uni Freiburg and Danau Girang Field Centre) ■ Collection of field data ■ Entering of field data ■ Brief analysis of field data in Danau Girang Field Centre ■ - Brief presentation of results from field work
Literature
■ Tropical Conservation Biology by NJ Sodhi, BW Brook and CJA Bradshaw ■ An Introduction to Tropical Rain Forests by TC Whitmore ■ The Ecology of Tropical East Asia by RT Corlett ■ Tropical Ecology by J Kricher ■ Selected field guides to fauna, flora and fungi of Borneo

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Name of module	Number of module
Tropical Biology and Conservation	10LE07MO-M.64097
Veranstaltung	
Tropical Biology and Conservation	
Event type	Number
Übung	10LE07V-M.64097

ECTS-Points	5.0
Workload	150 h
Attendance	60 h
Independent study	90 h
Hours of week	4.0
Recommended semester	3
Frequency	in jedem Wintersemester
Pflicht/Wahlpflicht (P/WP)	Wahlpflicht

Contents

In this module the students will gain unique insights into a completely different system compared to the one they are used to (temperate regions) due to their studies in Freiburg („Blick über den Tellerrand“). Tropical regions are significantly different and harbour exceptional biodiversity. Furthermore, many tropical regions face different conservation challenges than the Western world. The students will conduct two brief literature reviews, read original literature and work in groups to familiarize themselves with these topics. The final aim is to interactively get to know an example of a tropical system and learn how to design an individual field project in a tropical region which informs conservation measures.
A two day block seminar before the excursion will set the knowledge base. Afterwards, a two week trip to the field station “Danau Girang Field Centre” and ist surroundings on Borneo, Sabah, Malaysia will allow unique insights into a unique and highly threatened ecosystem, local scientific efforts (short & long term) and its conservation challenges.
The course will add a differentiated viewpoint to the existing curriculum and highlight the similarities and differences between tropical and temperate systems.

Qualification

- Studierende sind in der Lage sich in neue komplexe Themen zu Tropen, Biodiversität und Naturschutz einzuarbeiten und diese wissenschaftlich zu präsentieren.
- Studierende können ein eigenes, kleines Forschungsprojekt aufgrund einer wissenschaftlichen Fragestellung (oder Hypothese) entwickeln und unter den Gegebenheiten vor Ort durchführen.
- Studierende erarbeiten sich den Unterschied zwischen temperaten und tropischen Ökosystemen und deren Schutz.
- - Studierende werden ermutigt sich Gedanken zur intrinsischen Motivation zur Wahl ihres Studiums und der späteren Berufswahl zu machen.

Examination achievement
1. Zwei Präsentationen (1x im Block „Tropical Biology & Conservation“ und 1x im Block „Selected groups of fauna, flora and fungi“) (die Benotung einer Präsentation wird zu 25% in der Gesamtnote gewichtet; Dies setzt sich zusammen aus 20% Stil, 60% Inhalt und 20% Handout) 2. Zwei Handouts (1x im Block „Tropical Biology & Conservation“ und 1x im Block „Selected groups of fauna, flora and fungi“) 3. Ein Datenblatt (Metadaten & Rohdaten zum eigenen Mini-Forschungsprojekt im Rahmen der Exkursion) (Die Feldarbeit wird mit 50% der Gesamtnote gewichtet)
Course achievement
■ Eigenständige Einarbeitung zu zwei Themen im Rahmen des Seminars (Wahl aus einer Liste vorgegebener Themen; Block 1: Tropical Biology & Conservation; Block 2: Selected groups of fauna, flora and fungi of Borneo) ■ Unter Anleitung eigenständiges Design und Durchführung eines Mini-Forschungsprojektes, welches im Rahmen der Exkursion durchgeführt wird
Literature
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Compulsory requirement
none
Recommended requirement
none
Teaching method
Presentations, group work, excursion

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