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**Modulhandbuch**

**Landscape Ecology - Master's Programme**

**im Winter semester 2024/2025**

erstellt am 16/01/25

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## Wahlpflichtmodule

### lök100 - Data Modelling

<b>Module label</b>	Data Modelling
<b>Module code</b>	lök100
<b>Credit points</b>	9.0 KP
<b>Workload</b>	270 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Peppler-Lisbach, Cord (module responsibility)</li> <li>• Peppler-Lisbach, Cord (Module counselling)</li> <li>• Peppler-Lisbach, Cord (authorised to take exams)</li> <li>• Greskowiak, Janek (authorised to take exams)</li> </ul>
<b>Prerequisites</b>	
<b>Skills to be acquired in this module</b>	<ul style="list-style-type: none"> <li>• Basic methods of explorative statistics and adequate application of statistical tests relevant to ecological data.</li> <li>• To learn, interpret and apply methods of habitat modelling</li> <li>• To understand the fundamentals of spatial explicit analysis of species-environment relationships as well as the fundamentals of spatial prediction of environmental requirements in species</li> <li>• To adequately analyse measured and observed spatial data applying methods of spatial statistics and geostatistics, respectively</li> <li>• To learn and to understand relevant methods of multivariate analysis of vegetation data</li> <li>• To be able to interpret and to assess the results obtained as well as the relevant literature</li> <li>• To be able to apply the treated methods independently</li> <li>• To learn and to improve skills in using the statistics software R</li> </ul>
<b>Module contents</b>	<p>Part 1: Introduction to statistical analysis of ecological data NN (NN)</p> <ul style="list-style-type: none"> <li>• Experimental design</li> <li>• Explorative data analysis</li> <li>• Distribution tests, data transformation</li> <li>• Chi<sup>2</sup> test</li> <li>• Anova, Kruskal-Wallis test</li> <li>• t &amp; U test</li> <li>• Multiple comparisons, post-hoc tests</li> </ul> <p>Part 2: Habitat modelling and spatial statistics (Biedermann)</p> <ul style="list-style-type: none"> <li>• Linear (OLS) regression</li> <li>• GLM (logistic regression, Poisson regression)</li> <li>• Spatial explicit modelling, GIS integration</li> <li>• Spatial statistics</li> </ul> <p>Part 3: Multivariate analysis of vegetation ecological data (Peppler-Lisbach)</p> <p>Classification:</p> <ul style="list-style-type: none"> <li>• Cluster analysis</li> <li>• Statistical degrees of fidelity</li> </ul> <p>Ordination:</p> <ul style="list-style-type: none"> <li>• Indirect procedures: PCA, CA, DCA</li> <li>• Canonical procedures: RDA, CCA</li> </ul>
<b>Recommended reading</b>	Crawley, M.J. (2007): The R Book. 942 S. Wiley & Sons, Chichester.

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Additional literature will be announced during the course.

<b>Links</b>	<a href="https://www.uni-oldenburg.de/en/landeco/">https://www.uni-oldenburg.de/en/landeco/</a>	
<b>Language of instruction</b>	German	
<b>Duration (semesters)</b>	1 Semester	
<b>Module frequency</b>	jährlich	
<b>Module capacity</b>	unlimited	
<b>Examination</b>	<b>Prüfungszeiten</b>	<b>Type of examination</b>
<b>Final exam of module</b>	Before the end of the course	Assignment
<b>Type of course</b>	Exercises	
<b>SWS</b>	6	
<b>Frequency</b>	WiSe	
<b>Workload attendance time</b>	84 h	

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## lök110 - Ecology

<b>Module label</b>	Ecology	
<b>Module code</b>	lök110	
<b>Credit points</b>	6.0 KP	
<b>Workload</b>	180 h	
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>	
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Balke, Thorsten (module responsibility)</li> <li>• Balke, Thorsten (Module counselling)</li> <li>• Nolte, Arne (Module counselling)</li> <li>• Zotz, Gerhard (Module counselling)</li> <li>• Albach, Dirk Carl (authorised to take exams)</li> <li>• Balke, Thorsten (authorised to take exams)</li> <li>• Zotz, Gerhard (authorised to take exams)</li> <li>• Nolte, Arne (authorised to take exams)</li> </ul>	
<b>Prerequisites</b>	Knowledge of phytosociology, zoo-ecology, pedology and ecology, comparable to the corresponding modules of BSc. Environmental Sciences	
<b>Skills to be acquired in this module</b>	<p>Qualification imparted to students: Upon successful completion of the module the students will gain:</p> <ul style="list-style-type: none"> <li>• a thorough knowledge of environmental conditions and biological mechanisms enabling plant species to survive in landscapes</li> <li>• a thorough knowledge of the eco-physiology of plants in landscapes</li> <li>• a thorough knowledge of the environmental conditions and biological mechanisms enabling animals to survive in landscapes</li> </ul> <p>Ranking/position of the module within the course of studies: In the initial phase of the Master programme, this module imparts theories and models of the conditions of survival in plant and animals species as well as of the abiotic/biotic interdependencies in heterogenous landscapes. In combination with other compulsory modules it serves to give students a survey of the special field of Landscape Ecology and to enable them to competently select advanced modules in the following semesters.</p>	
<b>Module contents</b>	Ecology of plants in landscapes Eco-physiology of plants in landscapes Ecology of animals in landscapes	
<b>Recommended reading</b>	Literature will be announced during the course.	
<b>Links</b>	<a href="https://www.uni-oldenburg.de/en/landeco/">https://www.uni-oldenburg.de/en/landeco/</a>	
<b>Language of instruction</b>	German	
<b>Duration (semesters)</b>	1 Semester	
<b>Module frequency</b>	jährlich	
<b>Module capacity</b>	unlimited	
<b>Examination</b>	<b>Prüfungszeiten</b>	<b>Type of examination</b>
<b>Final exam of module</b>	Before the end of the module	a) Written examination (33 %) b) Written examination (33 %) c) Written examination (33 %)
<b>Type of course</b>	Lecture	
<b>SWS</b>	3	
<b>Frequency</b>		
<b>Workload attendance time</b>	42 h	

## Iök120 - Geoecological Processes

<b>Module label</b>	Geoecological Processes			
<b>Module code</b>	Iök120			
<b>Credit points</b>	6.0 KP			
<b>Workload</b>	180 h			
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>			
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Massmann, Gudrun (module responsibility)</li> <li>• Massmann, Gudrun (Module counselling)</li> <li>• Freund, Holger (authorised to take exams)</li> <li>• Kalinina, Olga (authorised to take exams)</li> <li>• Massmann, Gudrun (authorised to take exams)</li> <li>• Maurischat, Philipp (authorised to take exams)</li> </ul>			
<b>Prerequisites</b>				
<b>Skills to be acquired in this module</b>	<p>Upon successful completion of the module the students will gain:</p> <ul style="list-style-type: none"> <li>- advanced skills in analysing a landscape unit</li> <li>- a thorough knowledge of geological, pedological, hydrological, hydrogeological, and botanical relationships within an ecosystem</li> <li>- a thorough knowledge of the genesis and properties of Northwest German soils</li> <li>- a thorough knowledge of hydrological and hydrogeological properties of Northwest Germany</li> <li>- a fundamental knowledge of national and international soil systematics</li> <li>- the qualification to ecologically record and assess soils (including humus form)</li> <li>- the ability to perform soil ecological interpretations</li> </ul>			
<b>Module contents</b>	Landscape unit Spiekeroog (EX/E) Special Pedology (L) Special Hydrogeology (L) Pedological field work (E)			
<b>Recommended reading</b>	Literature will be announced during the lecture.			
<b>Links</b>	<a href="https://uol.de/ibu">https://uol.de/ibu</a>			
<b>Language of instruction</b>	German			
<b>Duration (semesters)</b>	1 Semester			
<b>Module frequency</b>	jährlich			
<b>Module capacity</b>	30			
<b>Examination</b>	Prüfungszeiten		Type of examination	
<b>Final exam of module</b>	Before the end of the module		Written examination	
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2		28
Exercises		2	WiSe	28
<b>Total module attendance time</b>				56 h

## lök130 - Environmental Planning

<b>Module label</b>	Environmental Planning
<b>Module code</b>	lök130
<b>Credit points</b>	9.0 KP
<b>Workload</b>	270 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Schaal, Peter (module responsibility)</li> <li>• Schaal, Peter (Module counselling)</li> <li>• Kalinina, Olga (authorised to take exams)</li> <li>• Lecke-Lopatta, Thomas (authorised to take exams)</li> <li>• Schaal, Peter (authorised to take exams)</li> <li>• Prinz, Markus (authorised to take exams)</li> <li>• Hübotta, Lisa (authorised to take exams)</li> </ul>
<b>Prerequisites</b>	Basic knowledge of environmental planning. Students who have not gained such basic knowledge during the Bachelor course please contact the persons responsible for the module in order to evaluate possibilities for catching up relevant knowledge.
<b>Skills to be acquired in this module</b>	<p>The students will</p> <ul style="list-style-type: none"> <li>• gain advanced knowledge into the formal and informal organization of spatial developmental processes in a combination of disciplinary and interdisciplinary concepts;</li> <li>• get to know the system of privileged planning combined with cross-section planning as well as investigate and assess possible deductions for concrete decision making;</li> <li>• elaborate case studies and typical planning problems in seminar papers and develop their own positions regarding the instruments;</li> <li>• get to know assessment methods for all important ecosystem compartments and gain the skills to deduce ecosystem services from ecosystem functions.</li> </ul> <p>Ranking and position of the module within the course of studies: The module offers fundamental and advanced knowledge in the first semester on the basis of which planning exercises can be performed during the Master courses</p>
<b>Module contents</b>	<p>a) Development of models and assessment of ecosystem functions for environmental planning: Presentation of theoretical concepts and practicable methods applied to assess ecosystem functions</p> <p>b) Actor-oriented planning instruments: Presentation of aims, forms and mechanisms of formal and informal instruments of area and environmental planning considering participative forms of the actor in different frameworks</p> <p>c) Special planning: Presentation of legal grounds, organization, instruments and practical methods of planning institutions including negative or positive impacts on the environmental quality for humans and nature. Possibilities of influencing the planning results from the point of view of precautionary environmental protection</p> <p>d) Conservation and Evaluation of Soils: Presentation of legal grounds, practical methods and opportunities for soil protection and soil evaluation in regional and environmental planning.</p>
<b>Recommended reading</b>	<p>Akademie für Raumforschung und Landesplanung (ed.): Handwörterbuch der Raumordnung, Hannover 1995.</p> <p>Benz, A.: Governance. Regieren in komplexen Regelsystemen. Eine Einführung. 2nd edition. Wiesbaden 2010.</p> <p>Grundwasserbewirtschaftungsplan Hessisches Ried. Darmstadt 1999.</p> <p>Moseley, M.J. (Ed.): Local Partnerships for Rural Development. The European Experience. Cambridge 2003.</p> <p>Pütz, M.; Buchholz, K.-H. (2003): Anzeige- und Genehmigungsverfahren nach dem Bundes-Immissionsschutzgesetz. 7th edition. Berlin.</p> <p>Wikipedia: <a href="http://de.wikipedia.org/wiki/Fachplanung">http://de.wikipedia.org/wiki/Fachplanung</a></p> <p>Additional literature will be announced during the lectures.</p>
<b>Links</b>	<a href="https://www.uni-oldenburg.de/en/landeco/">https://www.uni-oldenburg.de/en/landeco/</a>
<b>Language of instruction</b>	German



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<b>Duration (semesters)</b>	1 Semester	
<b>Module frequency</b>	jährlich	
<b>Module capacity</b>	unlimited	
Examination	Prüfungszeiten	Type of examination
<b>Final exam of module</b>	Before the end of the module	Seminar paper
<b>Type of course</b>	Seminar	
<b>SWS</b>	6	
<b>Frequency</b>		
<b>Workload attendance time</b>	84 h	

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## lök140 - Geographical Information Systems - Applications in Landscape Ecology

<b>Module label</b>	Geographical Information Systems - Applications in Landscape Ecology
<b>Module code</b>	lök140
<b>Credit points</b>	6.0 KP
<b>Workload</b>	180 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li></ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"><li>• Schaal, Peter (module responsibility)</li><li>• Schaal, Peter (Module counselling)</li><li>• Aden, Christian (Module counselling)</li><li>• Schaal, Peter (authorised to take exams)</li><li>• Aden, Christian (authorised to take exams)</li></ul>
<b>Prerequisites</b>	Grundlegende GIS-Kenntnisse (Basiswissen). Studierende, die diese im Bachelor-Studiengang nicht erhalten haben, wenden sich bitte an die Dozenten, die mit ihnen Möglichkeiten für das Nachholen der Kenntnisse festlegen.
<b>Skills to be acquired in this module</b>	<p>Vermittelte Qualifikation: Mit diesem Modul werden im Masterstudium Basiskompetenzen zur Analyse von raumbezogenen Daten und zur Modellierung von landschaftsökologischen Aufgabenstellungen ausgebildet. Die Kenntnisse sind sowohl im Bereich der Vektordatenanalyse als auch im Bereich der Rasterdatenanalyse angesiedelt und umfassen das Spektrum der Anwendungen der ArcGIS-Toolbox. Stellenwert/Verortung Modul im Studiengang Das Modul bietet im ersten Semester grundlegende und vertiefende Kenntnisse, auf denen das Master - Folgemodul „GIS Datenmanagement und geostatistische Analysen“ aufbaut.</p> <p>+ Erkennen und analysieren komplexer ökologischer Interdependenzen und Zusammenhänge im Rahmen eines landschaftsökologischen Systemverständnisses</p> <p>++ Befähigung zum Transfer, d.h. Übertragen, Anpassen und Erweitern von erlerntem Wissen auf neue Problemstellungen und Kompetenz zur Problemlösung</p> <p>++ Erlernen und selbständiges, zielgerichtetes Anwenden von Methodenkenntnissen in wissenschaftlichen Forschungsarbeiten: Erfassungs-, Mess-, Auswertungs-, Modellierungs-, Bewertungs- und Planungsmethoden</p> <p>+ Befähigung zur (auch englischsprachigen) fachlichen und fachübergreifenden Präsentation und Kommunikation von Arbeitsergebnissen gegenüber unterschiedlichen Adressatengruppen</p> <p>+ Soziale und interkulturelle Kompetenz zur Zusammenarbeit in Teams unterschiedlicher Zusammensetzung</p> <p>++ Verantwortungsvolles Anwenden der erlernten Kompetenzen, Fähigkeiten und Fertigkeiten in verschiedenen Feldern der landschaftsökologischen Berufspraxis</p>
<b>Module contents</b>	<ul style="list-style-type: none"><li>• a) Praktisches Arbeiten mit GIS (Ü) Die Studierenden erlernen die Entwicklung von Geodatenbanken sowie die Nutzung komplexerer geographischer Analysewerkzeuge im Bereich der Vektor- und Rasteranalyse.</li><li>• b) Analysen und Modelle (Se/Ü) Die Studierenden werden dazu befähigt, raumbezogene bzw. landschaftsökologische Fragestellungen anhand von komplexen GIS-Analysen (Erosionsmodelle, Routenplanung) zu beantworten und in die räumliche Modellierung von Daten einzusteigen.</li></ul>
<b>Recommended reading</b>	GI Geoinformatik GmbH (Hrsg.) ArcGIS 10.3: Das deutschsprachige Handbuch für ArcGIS for Desktop Basic und Standard mit Funktionen von ArcGIS Online für Desktopanwender– 2015 Law, Michael; Collins, Amy: Getting to Know ArcGIS (Englisch), 2015. Liebig, W.; Mummert, R.-D.: ArcGIS-ArcView. Band 2 ArcGIS-Analysen. Norden. 2005. Liebig, W.: ArcGIS-ArcView 9 - Personal Geodatabase. Norden. 2006. Bill, R.: Grundlagen der Geo-Informationssysteme. Band 2. Analysen, Anwendungen und neue Entwicklungen. 5. Aufl. Heidelberg. 2010. Albers, J.: Einführung in die Fernerkundung. 3. Aufl. Darmstadt. 2007. Haverkamp, Wegener: Methodenentwicklung zur GIS-gestützten Modellierung des Landschaftswasserhaushaltes. Gießen. 2000. Berkhoff, K.: GIS-basierte Modellierung der Grundwasserempfindlichkeit in einer agrarischen Intensivregion. 2008.
<b>Links</b>	
<b>Language of instruction</b>	German

<b>Duration (semesters)</b>	1 Semester	
<b>Module frequency</b>	jährlich	
<b>Module capacity</b>	30	
Examination	Prüfungszeiten	Type of examination
<b>Final exam of module</b>	Veranstaltungsende	Ü
<b>Type of course</b>	Exercises	
<b>SWS</b>	4	
<b>Frequency</b>	SuSe or WiSe	
<b>Workload attendance time</b>	56 h	

## lök145 - Geographical Information Systems - Data Management and Geostatistical Analysis

<b>Module label</b>	Geographical Information Systems - Data Management and Geostatistical Analysis
<b>Module code</b>	lök145
<b>Credit points</b>	6.0 KP
<b>Workload</b>	180 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Schaal, Peter (module responsibility)</li> <li>• Schaal, Peter (Module counselling)</li> <li>• Aden, Christian (authorised to take exams)</li> <li>• Schaal, Peter (authorised to take exams)</li> </ul>
<b>Prerequisites</b>	Wer in seinem Bachelorstudium keine vertiefenden GIS-Kenntnisse erworben hat, sollte das vorlaufende Modul „lök140 GIS-Anwendungen in der Landschaftsökologie“ absolviert haben.
<b>Skills to be acquired in this module</b>	<p>Vermittelte Qualifikation: Basiswissen über die Ziele und Nutzen von Geodateninfrastrukturen und internationalen Standards für Geodaten und Geodatendienste Implementieren und Anwenden von Standards für die Publikation von Geodaten und Geodatendiensten (WMS, WPS, CSW) Einsatz von Geodatenbanken für das Management von Geodaten und deren Analyse Verwendung geostatistischer Verfahren und GIS-Analysen mittels GIS und Statistik-Software Stellenwert/Verortung Modul im Studiengang Das Modul baut auf dem vorlaufenden Master - Modul „GIS-Anwendungen in der Landschaftsökologie“ auf.</p> <p>++ An aktuellen Forschungsfragen orientierte sowie theoriegestützte Vertiefung von Grundlagenwissen sowie Aneignung von Detailwissen in den Einzeldisziplinen der Landschaftsökologie</p> <p>++ Erkennen und analysieren komplexer ökologischer Interdependenzen und Zusammenhänge im Rahmen eines landschaftsökologischen Systemverständnisses</p> <p>++ Befähigung zum Transfer, d.h. Übertragen, Anpassen und Erweitern von erlerntem Wissen auf neue Problemstellungen und Kompetenz zur Problemlösung</p> <p>++ Erlernen und selbständiges, zielgerichtetes Anwenden von Methodenkenntnissen in wissenschaftlichen Forschungsarbeiten: Erfassungs-, Mess-, Auswertungs-, Modellierungs-, Bewertungs- und Planungsmethoden</p> <p>+ Befähigung zur (auch englischsprachigen) fachlichen und fachübergreifenden Präsentation und Kommunikation von Arbeitsergebnissen gegenüber unterschiedlichen Adressatengruppen</p> <p>+ Soziale und interkulturelle Kompetenz zur Zusammenarbeit in Teams unterschiedlicher Zusammensetzung</p> <p>++ Verantwortungsvolles Anwenden der erlernten Kompetenzen, Fähigkeiten und Fertigkeiten in verschiedenen Feldern der landschaftsökologischen Berufspraxis</p>
<b>Module contents</b>	<p>a) WebGIS und Datenmanagement (Ü) Einführung in Geodateninfrastrukturen, Web Mapping, WebGIS und internationale Standards Arbeiten mit (Geo-)Datenbanken für Vektor- und Rasterdaten Aufbereitung, Integration und Vorhaltung von Geodaten in verschiedenen Formaten und Geodatenbanken Gezielte Abfragen von Vektordaten und Einbindung von GIS-Analysen mit der Structured Query Language (SQL) und PostGIS-Funktionen Einsetzen von MapClients in Webseiten, Erfassen von Geodaten mit Hilfe von Formularen und digitalen Karten sowie Speicherung der Daten in Geodatenbanken Herstellen und Abbilden von Karten in MapClients und interoperablen GIS auf Basis von Standards des Open Geospatial Consortiums (OGC), einschl. Symbologie, Labels, Charts, Datenabfragen, ...</p> <p>b) Rasteranalysen und Geostatistik (Se/Ü) Geostatistische Verfahren und Herstellung von Rasterdaten Rastermanagement (Aufbereitung, Integration und Vorhaltung in Geodatenbanken, Export von Rasterformaten) Verarbeitung und Analyse von Rasterdaten mit Hilfe von • PostGIS (Rasterstatistiken und Manipulation) • GRASS GIS (Surface-Analysen und Interpolationen analog zu ArcGIS) • R for Statistics (Integration von Rasterdaten, Reklassifizieren, Clip/Mask, zonale Statistiken, Habitatmodellierung) • Web Processing Services (Einbindung von Funktionen aus R und GRASS GIS in Python-Skripte, webbasierte Ansprachen von Funktionen unter Beachtung von Standards des Open Geospatial Consortiums (OGC))</p>
<b>Recommended reading</b>	<p>KORDUAN, P. &amp; ZEHNER, M. L. (2008): Geoinformation im Internet. Technologien zur Nutzung raumbezogener Informationen im WWW, Wichmann, Heidelberg. KRESSE, W. &amp; FADAIE, K. (2004): ISO Standards for Geographic Information, Springer, Berlin. MITCHELL, T. (2008): Web Mapping Illustrated: Using Open Source GIS Toolkits. O'Reilly, Sebastopol, CA. PENG,</p>

Z.-R. & TSOU, M.-H. (2003): Internet GIS: Distributed Geographic Information Services for the Internet and Wireless Networks, Wiley, Hoboken, NJ. PEREZ, A. S. (2012): OpenLayers Cookbook. Packt Publishing. OBE, R. O. & HSU, L. (2014): PostGIS in Action. Manning Publications. FISCHER-STABEL, P. (2013): Umweltinformationssysteme: Grundlegende

<b>Links</b>		
<b>Language of instruction</b>	German	
<b>Duration (semesters)</b>	1 Semester	
<b>Module frequency</b>	jährlich	
<b>Module capacity</b>	30	
Examination	Prüfungszeiten	Type of examination
<b>Final exam of module</b>	Veranstaltungsende	Ü
<b>Type of course</b>	Exercises	
<b>SWS</b>	4	
<b>Frequency</b>	SuSe or WiSe	
<b>Workload attendance time</b>	56 h	

## lök210 - Practice of Nature Conservation

<b>Module label</b>	Practice of Nature Conservation
<b>Module code</b>	lök210
<b>Credit points</b>	6.0 KP
<b>Workload</b>	180 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> <li>• Master's Programme Sustainability Economics and Management (Master) &gt; Supplementary Modules</li> <li>• Master's Programme Water and Coastal Management (Master) &gt; Science</li> </ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Mose, Ingo (module responsibility)</li> <li>• Mose, Ingo (Module counselling)</li> <li>• Buchwald, Rainer (authorised to take exams)</li> <li>• Dörfler, Inken (authorised to take exams)</li> <li>• Mose, Ingo (authorised to take exams)</li> <li>• Fartmann, Thomas (authorised to take exams)</li> <li>• Janßen, Hans-Joachim, Dipl.-Ing. (authorised to take exams)</li> </ul>
<b>Prerequisites</b>	Completed ecology-oriented Bachelor course
<b>Skills to be acquired in this module</b>	<p>With the successful completion of the module the students will gain a general and advanced knowledge of crucial approaches and instruments of nature conservation in Germany and Europe, especially of the implementation of large protected areas (NSG, biosphere reserve, national park etc.), of maintenance/management projects and measures as well as of approaches to their integration into nature conservation and regional development strategies (via agriculture, tourism etc.) in co-operation with national park administrative authorities and other relevant actors. Additionally, the module gives basic skills in developing ecological connectivity systems (example dragonflies) as well as in developing and implementing approaches to ecological planning inside and outside the nature reserves.</p> <p>Ranking/position of the module within the course of studies: The module focuses on problems, methods, results, and analyses relevant to nature conservation and refers to corresponding issues of modules in Bachelor courses as well as of basic modules in Master courses of Landscape Ecology.</p>
<b>Module contents</b>	<p>a) Seminar "Protected areas and regional development": Survey of the most important types of large protected areas in Europe as well as current concepts of integrating the purposes of conservation with the tasks of regional development especially in peripheral rural areas</p> <p>b) Seminar "Introduction to the German Nature Conservation Law": This course deals with some parts of the Nature Conservation Law of Germany and Lower Saxony and discusses their relevance to the actual Nature Conservation policy in Northwest-Germany.</p> <p><b>this seminar takes place in the winter term</b></p> <p>c) Field course "Habitat connectivity": Theory of ecological connectivity including causes and impacts of fragmentation and isolation in nature-near biotopes; investigation of migration and dispersal behaviour in selected dragonfly species of ditch systems</p> <p>d) Excursion "Protected areas": Presentation of a selected large protected area in Germany or Europe especially considering geographical, floristic, faunistic, historical, agricultural, and nature conservation aspects as well as aspects of landscape and economics</p>
<b>Recommended reading</b>	<p>Amler, K. et al. (1999): Populationsbiologie in der Praxis. Stuttgart.</p> <p>Corbet, Ph. S. (1999): Dragonflies: Behaviour and ecology of Odonata. Chichester.</p> <p>Hammer, T. (ed., 2003): Großschutzgebiete - Instrumente nachhaltiger Entwicklung. München.</p> <p>Jedicke, E. (1990): Biotopverbund. Stuttgart.</p> <p>Jessel, B. &amp; K. Tobias (2002): Ökologisch orientierte Planung. Stuttgart.</p> <p>Köppel, J. et al. (1998): Praxis der Eingriffsregelung. Stuttgart.</p> <p>Mose, I. (ed., 2007): Protected areas and regional development in Europe. Aldershot.</p> <p>Sternberg, K. &amp; R. Buchwald (1999/2000): Die Libellen Baden-Württembergs; 2 volumes. Stuttgart.</p>
<b>Links</b>	<a href="https://www.uni-oldenburg.de/vegetationskunde/">https://www.uni-oldenburg.de/vegetationskunde/</a>
<b>Languages of instruction</b>	German, English
<b>Duration (semesters)</b>	1 Semester
<b>Module frequency</b>	jährlich
<b>Module capacity</b>	35

Examination	Prüfungszeiten	Type of examination		
<b>Final exam of module</b>	Before the end of the module	6 CP = Paper (in the course of a seminar) or excursion report or assignment		
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		1		14
Exercises		1		14
Seminar		2		28
Study trip		3		42
<b>Total module attendance time</b>				<b>98 h</b>

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## lök211 - Practice of Nature Conservation

<b>Module label</b>	Practice of Nature Conservation
<b>Module code</b>	lök211
<b>Credit points</b>	9.0 KP
<b>Workload</b>	270 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li></ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"><li>• Mose, Ingo (module responsibility)</li><li>• Mose, Ingo (Module counselling)</li><li>• Dörfler, Inken (authorised to take exams)</li><li>• Fartmann, Thomas (authorised to take exams)</li><li>• Mose, Ingo (authorised to take exams)</li><li>• Janßen, Hans-Joachim, Dipl.-Ing. (authorised to take exams)</li></ul>
<b>Prerequisites</b>	
<b>Skills to be acquired in this module</b>	

With the successful completion of the module the students will gain a general and advanced knowledge of crucial approaches and instruments of nature conservation in Germany and Europe, especially of the implementation of large protected areas (NSG, biosphere reserve, national park etc.), of maintenance/management projects and measures as well as of approaches to their integration into nature conservation and regional development strategies (via agriculture, tourism etc.) in co-operation with national park administrative authorities and other relevant actors. Additionally, the module gives basic skills in developing ecological connectivity systems (example dragonflies) as well as in developing and implementing approaches to ecological planning inside and outside the nature reserves. Ranking/position of the module within the course of studies: The module focuses on problems, methods, results, and analyses relevant to nature conservation and refers to corresponding issues of modules in Bachelor courses as well as of basic modules in Master courses of Landscape Ecology.

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### Module contents

a) Seminar "Protected areas and regional development": Survey of the most important types of large protected areas in Europe as well as current concepts of integrating the purposes of conservation with the tasks of regional development especially in peripheral rural areas b) Seminar "Introduction to the German Nature Conservation Law": This course deals with some parts of the Nature Conservation Law of Germany and Lower Saxony and discusses their relevance to the actual Nature Conservation policy in Northwest-Germany. \*\*this seminar takes place in the winter term\*\* c) Fieldcourse "Habitat connectivity": Theory of ecological connectivity including causes and impacts of fragmentation and isolation in nature-near biotopes; investigation of migration and dispersal behaviour in selected dragonfly species of ditch systems d) Excursion "Protected areas": Presentation of a selected large protected area in Germany or Europe especially considering geographical, floristic, faunistic, historical, agricultural, and nature conservation aspects as well as aspects of landscape and economics

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### Recommended reading

Amler, K. et al. (1999): Populationsbiologie in der Praxis. Stuttgart. Corbet, Ph. S. (1999): Dragonflies: Behaviour and ecology of Odonata. Chichester. Hammer, T. (ed., 2003): Großschutzgebiete - Instrumente nachhaltiger Entwicklung. München. Jedicke, E. (1990): Biotopverbund. Stuttgart. Jessel, B. & K. Tobias (2002): Ökologisch orientierte Planung. Stuttgart. Köppel, J. et al. (1998): Praxis der Eingriffsregelung. Stuttgart. Mose, I. (ed., 2007): Protected areas and regional development in Europe. Aldershot. Sternberg, K. & R. Buchwald (1999/2000): Die Libellen Baden-Württembergs; 2 volumes. Stuttgart.

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### Links

<https://www.uni-oldenburg.de/vegetationskunde/>



<b>Languages of instruction</b>	German, English
<b>Duration (semesters)</b>	1 Semester
<b>Module frequency</b>	jährlich
<b>Module capacity</b>	35

Examination	Prüfungszeiten	Type of examination
<b>Final exam of module</b>	Before the end of the module	9 CP = graded oral examination (Mose/Buchwald), additionally active participation in both seminars

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		1		14
Exercises		1		14
Seminar		2		28
Study trip		3		42
<b>Total module attendance time</b>				<b>98 h</b>

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## lök215 - Ornithological population estimates

<b>Module label</b>	Ornithological population estimates
<b>Module code</b>	lök215
<b>Credit points</b>	6.0 KP
<b>Workload</b>	180 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li></ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"><li>• Schmaljohann, Heiko (module responsibility)</li><li>• Schmaljohann, Heiko (Module counselling)</li><li>• Schmaljohann, Heiko (authorised to take exams)</li></ul>
<b>Prerequisites</b>	<p>Tierökologische und ökologische Kenntnisse über Bestandsschätzungen bei Vögeln; ornithologische Artenkenntnisse; idealerweise Teilnahme an der Vorlesung „Ökologie und Physiologie der Vögel“ und des Kurses „Wissenschaftliches Forschen in der Feldornithologie“</p>

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### Skills to be acquired in this module

Vermittelte Qualifikation:

Studierende besitzen nach erfolgreichem Besuch des Moduls

- Vertieftes Wissen über Methoden zu Bestandsschätzungen von Vögeln in unterschiedlichen Habitaten.

- Vertieftes Wissen über die Bedeutung der Entdeckungswahrscheinlichkeit auf die Abschätzung von Vogelbeständen.

- Vertieftes Wissen über die tageszeitliche Veränderung verschiedener Verhaltensweisen.

- Vertieftes Wissen über die Auswerteverfahren von Bestandsschätzungen und die Interpretation der entsprechenden Ergebnisse.

- Vertieftes feldornithologisches Wissen zur Bestimmung von Vogelarten

Stellenwert/Verortung Modul im Studiengang:

Mit diesem Modul werden während des Masterstudiums ornithologische Kartierungsmethoden vorgestellt, selbstständig durchgeführt und ausgewertet. Die kritische Auseinandersetzung mit den Schätzungen von Vogelbeständen stellt eine wichtige Grundlage für zukünftige Kartierungsarbeiten und die biologische Interpretation dieser Daten dar. Mit diesem Modul erhalten die Studierenden zudem ein vertieftes Wissen über die Brutökologie von Vögeln und erlangen feldornithologische Kenntnisse zur Artbestimmung von Vögeln.

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### Module contents

Bestandsschätzungen von Vogelbeständen mithilfe der „Distance sampling“ Methode in verschiedenen Habitaten

Wissenschaftliche Auswertung und Interpretation der Daten

Brutökologie der Vogelgemeinschaften in Dünen und Wäldern

Verhaltensökologie von Brutvögeln

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### Recommended reading

Crawley 2012. The R book. Wiley. ISBN: 8601404492532

Buckland, Rexstad, Marques, Oedekoven 2015. Distance Sampling: Methods and Applications, Methods in Statistical Ecology. DOI: 10.1007/978-3-319-19219-2\_14

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Südbeck, Andretzke, Fischer, Gedeon, Schikore, Schröder, Sudfeld 2012. Methodenstandards zur Erfassung der Brutvögel Deutschlands. ISBN 3-00-015261-X

Svensson, Mullarney, Zetterström 2017. Der Kosmos Vogelführer - Alle Arten Europas, Nordafrikas und Vorderasiens. Kosmos. ISBN 9783440156353

**Ein Fernglas wird benötigt!**

**Weitere Literatur wird in den Vorbesprechung bekannt gegeben.**

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<b>Links</b>	
<b>Language of instruction</b>	German
<b>Duration (semesters)</b>	1 Semester
<b>Module frequency</b>	Sommersemester
<b>Module capacity</b>	12
<b>Reference text</b>	

Weitere Verwendbarkeit in:

- M.Sc. Biologie Uni Oldenburg

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Examination	Prüfungszeiten	Type of examination
<b>Final exam of module</b>	Semesterende	2 Prüfungsleistungen: - Hausarbeit (70%) - Referat (30%)  Aktive Teilnahme in Seminar und Übung

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<b>Type of course</b>	Course selection
<b>SWS</b>	4
<b>Frequency</b>	SuSe or WiSe
<b>Workload attendance time</b>	56 h

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## Iök225 - Peatland Ecology

<b>Module label</b>	Peatland Ecology			
<b>Module code</b>	Iök225			
<b>Credit points</b>	6.0 KP			
<b>Workload</b>	180 h			
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>			
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Massmann, Gudrun (module responsibility)</li> <li>• Massmann, Gudrun (Module counselling)</li> <li>• Caspers, Gerfried (authorised to take exams)</li> <li>• Massmann, Gudrun (authorised to take exams)</li> <li>• Peppler-Lisbach, Cord (authorised to take exams)</li> <li>• Maurischat, Philipp, Dr. (authorised to take exams)</li> </ul>			
<b>Prerequisites</b>				
<b>Skills to be acquired in this module</b>	<p>Ziel des Moduls ist es, den Studierenden ökosystemare Zusammenhänge im Moor aus pedologischer, hydrologischer und vegetationskundlicher Sicht zu vermitteln. Zu Beginn des Moduls werden die Grundlagen zur Moorökologie im Seminar vermittelt. In fünf eintägigen Exkursionen werden verschiedene Moore besucht und durch die Einbeziehung von externen Moorfachleuten unter verschiedensten Gesichtspunkten beleuchtet. Studierende besitzen nach erfolgreichem Besuch des Moduls</p> <ul style="list-style-type: none"> <li>• vertiefte theoretische Kenntnisse über das Ökosystem Moor</li> <li>• vertiefte bodenkundlich-hydrologische-vegetationsökologische Kenntnisse</li> <li>• vertiefte Kenntnisse ökosystemarer Prozessabläufe</li> <li>• vertiefte Kenntnisse bezüglich aktueller Forschungsthemen [nop]</li> <li>++ An aktuellen Forschungsfragen orientierte sowie theoriegestützte Vertiefung von Grundlagenwissen sowie Aneignung von Detailwissen in den Einzeldisziplinen der Landschaftsökologie</li> <li>++ Erkennen und analysieren komplexer ökologischer Interdependenzen und Zusammenhänge im Rahmen eines landschaftsökologischen Systemverständnisses</li> <li>++ Einordnung und Reflexion landschaftsökologischer Kenntnisse in inter-(und trans-)disziplinären Zusammenhängen</li> <li>+ Befähigung zum Transfer, d.h. Übertragen, Anpassen und Erweitern von erlerntem Wissen auf neue Problemstellungen und Kompetenz zur Problemlösung</li> <li>++ Erlernen und selbständiges, zielgerichtetes Anwenden von Methoden-kenntnissen in wissenschaftlichen Forschungsarbeiten: Erfassungs-, Mess-, Auswertungs-, Modellierungs-, Bewertungs- und Planungsmethoden</li> <li>++ Befähigung zur (auch englischsprachigen) fachlichen und fachübergreifenden Präsentation und Kommunikation von Arbeitsergebnissen gegenüber unterschiedlichen Adressatengruppen</li> <li>++ Soziale und interkulturelle Kompetenz zur Zusammenarbeit in Teams unterschiedlicher Zusammensetzung</li> <li>++ Verantwortungsvolles Anwenden der erlernten Kompetenzen, Fähigkeiten und Fertigkeiten in verschiedenen Feldern der landschaftsökologischen Berufspraxis [nop]</li> </ul>			
<b>Module contents</b>	<ul style="list-style-type: none"> <li>• Applied Peat Ecology (Ex)</li> <li>• Ecology of Peatlands (S)</li> </ul>			
<b>Recommended reading</b>	Literatur wird je nach Entwicklung des Forschungsfeldes im Rahmen der Vorbereitung zum Seminar bekannt gegeben.			
<b>Links</b>	<a href="https://uol.de/hydrogeologie/">https://uol.de/hydrogeologie/</a>			
<b>Language of instruction</b>	German			
<b>Duration (semesters)</b>	1 Semester			
<b>Module frequency</b>	jährlich			
<b>Module capacity</b>	24			
<b>Examination</b>	<b>Prüfungszeiten</b>	<b>Type of examination</b>		
<b>Final exam of module</b>	<b>Veranstaltungsende</b>	<b>PS</b>		
<b>Type of course</b>	<b>Comment</b>	<b>SWS</b>	<b>Frequency</b>	<b>Workload of compulsory attendance</b>
Seminar		2	SuSe and WiSe	28
Study trip		2	SuSe and WiSe	28
<b>Total module attendance time</b>				56 h

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## lök229 - Soil Ecology and Soil Landscapes

<b>Module label</b>	Soil Ecology and Soil Landscapes
<b>Module code</b>	lök229
<b>Credit points</b>	9.0 KP
<b>Workload</b>	270 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li></ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"><li>• Kalinina, Olga (module responsibility)</li><li>• Kalinina, Olga (Module counselling)</li><li>• Massmann, Gudrun (Module counselling)</li><li>• Kalinina, Olga (authorised to take exams)</li></ul>
<b>Prerequisites</b>	
<b>Skills to be acquired in this module</b>	<p>The objectives of the module:</p> <ul style="list-style-type: none"><li>- to learn the field and laboratory methods of soil investigation in relation to the scientific objectives;</li><li>- to analyse the field and laboratory data and to apply modern statistical methods;</li><li>- to learn the soil evaluation on the basis of field and laboratory data</li><li>- to apply the field and laboratory data for the landscape analyse;</li><li>- to analyse ecological processes in the soil-plant-system;</li><li>- to analyse the ecological interrelation within an landscape;</li><li>- to work on scientific questions on your own;</li><li>- to communicate in team to solve a problem.</li></ul>
<b>Module contents</b>	<p>Field exercises: soil investigation in the context of landscape and soil sampling in relation to a focus of study; humus form as indication a dynamics of the ecosystem</p> <p>Laboratory exercises: Analytical procedures for soil characterization in relation to a focus of study, calculation of laboratory data.</p> <p>Seminar: Analyse the field and laboratory data; apply modern statistical methods; critical discussion of the field and laboratory data, evaluation of landscape and ecosystem using the field and laboratory data.</p>
<b>Recommended reading</b>	<p>Scheffer &amp; Schachtschabel (2018): Lehrbuch der Bodenkunde, Spektrum-Verlag.</p> <p>AD-HOC-AG Bodenkunde (2005): Bodenkundliche Kartieranleitung. Schweizerbart'sche Verlagsbuchhandlung.</p> <p>Schlichting, Blume, Stahr (1995); Bodenkundliches Praktikum, Blackwell.</p> <p>NIBIS Kartenserver</p> <p>see StudIP.</p>
<b>Links</b>	<a href="https://nibis.lbeg.de/cardomap3/#">https://nibis.lbeg.de/cardomap3/#</a>
<b>Language of instruction</b>	German
<b>Duration (semesters)</b>	2 Semester
<b>Module frequency</b>	WiSe and SoSe

**Module capacity**

8 (

2 hrs/w exercise SoSe  
 3 hrs/w exercise WiSe  
 1 hrs/w seminar WiSe

)

**Reference text**

associated with the following modules:

lök120: Geoecological Processes

lök280/lök285: Special Vegetation Ecology

**Type of module**

Wahlpflicht / Elective

**Module level**

MM (Mastermodul / Master module)

**Teaching/Learning method**

2 hrs/w Übung/exercise  
 3 hrs/w Übung/exercise  
 1 hrs/w Seminar/seminar

**Previous knowledge**

Vegetation Ecology, geology, chemistry, ecology, soil science

**Examination**

Prüfungszeiten

Type of examination

**Final exam of module**

Veranstaltungsende

HA

**Type of course**

Comment

SWS

Frequency

Workload of compulsory attendance

Seminar

4

SuSe and WiSe

56

Exercises

2

SuSe and WiSe

28

**Total module attendance time**

84 h

## lök230 - Aquatic Ecology

<b>Module label</b>	Aquatic Ecology
<b>Module code</b>	lök230
<b>Credit points</b>	9.0 KP
<b>Workload</b>	270 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Balke, Thorsten (module responsibility)</li> <li>• Balke, Thorsten (authorised to take exams)</li> <li>• Balke, Thorsten (Module counselling)</li> </ul>
<b>Prerequisites</b>	

### Skills to be acquired in this module

Application of vegetation and landscape ecological fieldmethods in dynamic habitats at land-water interfaces (e.g. coastal and riparian ecosystems). Integration of spatially and temporally explicit data using R and GIS. Interpretation of the collected data regarding restoration potential and European conservation goals.

### Module contents

#### Vegetation ecology and conservation of land-water interfaces: Integrating field, laboratory and GIS methods

This module consists of a blocked 4 day field practical where you will collect spatial data on the vegetation ecology and ecosystem functioning of riparian and coastal habitats in Lower Saxony. Further analysis may be conducted in the laboratory. These data will be processed during regular practical sessions using to produce an assessed final report. Finally, findings will be discussed in a seminar setting for their relevance to ecosystem service provisioning, conservation and restoration of habitats at land-water interfaces in a changing climate. This seminar will cover marshes and coastal meadows, beaches and coastal dunes, lake shores, mangroves or riparian floodplains

### Recommended reading

#### Links

<b>Language of instruction</b>	English
<b>Duration (semesters)</b>	1 Semester
<b>Module frequency</b>	Winter term
<b>Module capacity</b>	16

### Reference text

Geländeübung geblockt, Labor und Datenanalyse Übung wöchentlich

<b>Previous knowledge</b>	ArcGIS/QGIS; R
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Examination	Prüfungszeiten	Type of examination
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### Final exam of module

Before the end of the module 1 assignment; Active participation in seminars and exercises

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture			WiSe	0
Exercises		4	WiSe	56
Seminar		2	WiSe	28
<b>Total module attendance time</b>				<b>84 h</b>

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## bio675 - Molecular Ecology

<b>Module label</b>	Molecular Ecology
<b>Module code</b>	bio675
<b>Credit points</b>	12.0 KP
<b>Workload</b>	360 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"><li>• Master's Programme Biology (Master) &gt; Background Modules</li><li>• Master's Programme Biology (Master) &gt; Background Modules</li><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li></ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"><li>• Nolte, Arne (module responsibility)</li><li>• Gerlach, Gabriele (Module counselling)</li><li>• Nolte, Arne (authorised to take exams)</li><li>• Gerlach, Gabriele (authorised to take exams)</li><li>• Dennermoser, Stefan (authorised to take exams)</li></ul>
<b>Prerequisites</b>	
<b>Skills to be acquired in this module</b>	<p>The field of molecular ecology strives to identify relationships between species genotypes, phenotypes and ecological factors. It addresses questions about how organisms adapt and explains patterns of distribution and biodiversity. During the course, participants will get to know the biological background to design an experiment in the field of molecular ecology. We will discuss the state of the art according to literature. Participants will perform sampling and conduct steps of the analysis. The course will cover field methods (sampling) and lab methods (behavior experiments, genetic analyses, phenotypic analyses) as well as computer based analyses.</p> <ul style="list-style-type: none"><li>++ deepened biological expertise</li><li>++ deepened knowledge of biological working methods</li><li>++ data analysis skills</li><li>+ interdisciplinary thinking</li><li>+ critical and analytical thinking</li><li>+ independent searching and knowledge of scientific literature</li><li>++ ability to perform independent biological research</li><li>++ data presentation and discussion (E) (written and spoken)</li><li>+ statistics &amp; scientific programming</li></ul>
<b>Module contents</b>	<p>Lecture: AN/GG - Molecular ecology background of specific study systems. The lectures will introduce a study system that will be analyzed during the course (study systems may vary from year to year). It is the goal of the lecture to provide students with background information to develop an experimental design of a field study during the practical. Exercise: AN/GG - Mixed course with laboratory and field exercises. Samples will be collected in the field. One goal of the course is to apply modern analyses to understand how organisms are distributed. Another aspect is the application of molecular markers to analyze behavioral experiments.</p>
<b>Recommended reading</b>	will be announced during the course
<b>Links</b>	
<b>Language of instruction</b>	English
<b>Duration (semesters)</b>	1 Semester
<b>Module frequency</b>	summer term
<b>Module capacity</b>	15
<b>Reference text</b>	associated with bio890 Current Topics of Biology (Seminar)
<b>Type of module</b>	Wahlpflicht / Elective



<b>Module level</b>	MM (Mastermodul / Master module)			
<b>Teaching/Learning method</b>	Lecture, Exercise			
<b>Previous knowledge</b>	Reading English literature and presenting seminar topics in English. Basic knowledge of working in a gene laboratory and with a computer.			
Examination	Prüfungszeiten	Type of examination		
<b>Final exam of module</b>	during the module	<b>Portfolio (Presentation, research proposal)</b>		
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SuSe	28
Exercises		6	SuSe	84
<b>Total module attendance time</b>				112 h

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## mar246 - Coastal Hydrogeology and Biogeochemistry

<b>Module label</b>	Coastal Hydrogeology and Biogeochemistry
<b>Module code</b>	mar246
<b>Credit points</b>	6.0 KP
<b>Workload</b>	180 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li><li>• Master's Programme Marine Environmental Sciences (Master) &gt; Mastermodule</li></ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"><li>• Waska, Hannelore (module responsibility)</li><li>• Massmann, Gudrun (Module counselling)</li><li>• Meyer, Rena (Module counselling)</li></ul>
<b>Prerequisites</b>	
<b>Skills to be acquired in this module</b>	

Ziel des Moduls ist die Vermittlung hydrogeologischer und biogeochemischer Kenntnisse von Prozessen in Küstenaquiferen. Dies beinhaltet relevante Themen wie Salzwasserintrusion, Süßwasserlinsen, subterrane Ästuar- und submarine Grundwasseraustritte. Betrachtet werden sowohl hydraulische als auch hydrochemische Prozesse.

### Fachkompetenzen

Die Studierenden:

- Entwickeln ein vertieftes Verständnis über die naturräumlichen Bedingungen an der Küste
- Entwickeln ein vertieftes Verständnis der physikalischen und biochemischen Prozesse in Grundwasserleitern am Land-Meer Übergang (Strömung, Transport von Inhaltsstoffen, biogeochemische Reaktionen)
- Erlangen Kenntnisse über Salzwasserintrusion, Süßwasserlinsen, subterrane Ästuar- und submarine Grundwasseraustritte
- Verstehen die Bedeutung von Prozessen in Küstenaquiferen für die Grundwasserqualität an Land
- Verstehen die Bedeutung von Prozessen in Küstenaquiferen für die Element-Kreisläufe im Küstenmeer, speziell denen von Nährstoffen und Kohlenstoff

### Methodenkompetenzen

Die Studierenden:

- Erwerben Kenntnisse hydrogeologischer und biogeochemischer Methoden im Gelände und Labor
- Entwickeln Fähigkeiten zu selbstreguliertem Lernen
- Vertiefen Fähigkeiten zur Auswertung und Darstellung wissenschaftliche Daten
- Erwerben Wissen über Techniken des interdisziplinären Arbeitens im Team
- Vertiefen Wissen/Erfahrungen über die Kommunikation interdisziplinärer Sachverhalte und Ergebnisse eigener Arbeit.

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### Module contents

#### VL Hydrogeologie und Biogeochemie der Küste

Grundwasserleiter, Grundwasserströmung, Transport von Wasserinhaltsstoffen mit dem Grundwasser, Weg des Wassers von der Grundwasserneubildung bis zu submarinen Grundwasseraustritten, Tracermethoden inklusive Datierung, Mischungsberechnungen, Stoffbilanzen, Grundwasserchemismus an der Küste (Hauptinhaltsstoffe, Versalzung, Nährstoffe), hydrochemische Prozesse (z.B. Kationenaustausch, Redoxprozesse, Minerallösung/-fällung), Stoffkreisläufe an der Küste (z.B. C, N, P), gelöstes organisches Material an der Küste (DOM).

#### Ü Hydrogeologie und Biogeochemie der Küste

Hydrogeologische Methoden in Feld und Labor (z.B. Datenloggerauswertung, Geophysik, Wasserprobenahme, Wasseranalytik), biogeochemische Methoden (z.B. optische DOM-Messung, Messung von Radiotracer wie Radium und Radon, Berechnung von Wasseralter und Massenbilanzen).

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### Recommended reading

Knee, K., & Paytan, A. (2011). 4.08 Submarine groundwater discharge: a source of nutrients, metals, and pollutants to the Coastal Ocean. *Treatise Estuar. Coast. Sci.*, 4, 205-234.

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Moore, W. S., & Joye, S. B. (2021). Saltwater intrusion and submarine groundwater discharge: acceleration of biogeochemical reactions in changing coastal aquifers. *Frontiers in Earth Science*, 9, 600710.

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<b>Links</b>		
<b>Language of instruction</b>	German	
<b>Duration (semesters)</b>	1 Semester	
<b>Module frequency</b>	jährlich	
<b>Module capacity</b>	12	
<b>Examination</b>	<b>Prüfungszeiten</b>	<b>Type of examination</b>

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**Final exam of module**

**1 benotete Prüfungsleistung**

Klausur oder mündliche Prüfung oder Präsentation oder Hausarbeit

**Aktive Teilnahme** an der Übung auf Spiekeroog.

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<b>Type of course</b>	Course selection 1VL, 1 Ü oder 1 VL, 1 SE oder 1 SE, 1 Ü
<b>SWS</b>	4
<b>Frequency</b>	SuSe
<b>Workload attendance time</b>	56 h

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## bio770 - Field Methods in Organismal Biology

<b>Module label</b>	Field Methods in Organismal Biology
<b>Module code</b>	bio770
<b>Credit points</b>	15.0 KP
<b>Workload</b>	450 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"><li>• Master's Programme Biology (Master) &gt; Background Modules</li><li>• Master's Programme Biology (Master) &gt; Background Modules</li><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li></ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"><li>• Zotz, Gerhard (module responsibility)</li><li>• Gerlach, Gabriele (Module counselling)</li><li>• Albach, Dirk Carl (Module counselling)</li><li>• von Hagen, Klaus Bernhard (Module counselling)</li><li>• Mouritsen, Henrik (Module counselling)</li><li>• Nolte, Arne (Module counselling)</li><li>• Schmaljohann, Heiko (Module counselling)</li><li>• Zotz, Gerhard (authorised to take exams)</li><li>• Gerlach, Gabriele (authorised to take exams)</li><li>• Albach, Dirk Carl (authorised to take exams)</li><li>• Will, Maria (authorised to take exams)</li><li>• von Hagen, Klaus Bernhard (authorised to take exams)</li><li>• Mouritsen, Henrik (authorised to take exams)</li><li>• Nolte, Arne (authorised to take exams)</li><li>• Khan, Gulzar (authorised to take exams)</li><li>• Schmaljohann, Heiko (authorised to take exams)</li></ul>
<b>Prerequisites</b>	
<b>Skills to be acquired in this module</b>	<p>++ in-depth biological expertise ++ in-depth knowledge of biological working methods ++ data analysis skills + interdisciplinary thinking ++ critical and analytical thinking ++ independent searching and knowledge of scientific literature ++ ability to perform independent biological research + data presentation and discussion (E) (written and spoken) ++ project and time management ++ statistics &amp; scientific programming</p> <p>The module aims at enabling students to apply theoretical knowledge to practical, hypothesis-based field studies within the scope of a seminar. The data derived from the individual projects performed are then to be documented and discussed in the form of a written laboratory course report oriented by a scientific publication and to be written in English. Several teachers cooperate to enable interdisciplinary approaches (e.g. botanical-zoological approaches).</p>
<b>Module contents</b>	<p>S: Biogeographic and ecological classification and characterization of a biome (e.g. Mediterranean region, moist tropics, boreal zone), independent identification and treatment of scientific questions, presentation of scientific results in a "mini symposium" subsequent to the field studies. E: Planning and performing a field study project, data analysis, written report in the form of a scientific publication</p>
<b>Recommended reading</b>	Varies with topic and venue
<b>Links</b>	<a href="http://www.uni-oldenburg.de/fun_eco/">www.uni-oldenburg.de/fun_eco/</a>
<b>Language of instruction</b>	English
<b>Duration (semesters)</b>	1 Semester

<b>Module frequency</b>	annually in summer term
<b>Module capacity</b>	21
<b>Type of module</b>	Wahlpflicht / Elective
<b>Module level</b>	MM (Mastermodul / Master module)
<b>Teaching/Learning method</b>	Seminar, exercise

Examination	Prüfungszeiten	Type of examination
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**Final exam of module**

2 Presentations (30 %) Laboratory course report on project work (70 %)  
PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Exercises		10	SuSe	140
Seminar		2	SuSe	28
Seminar (Pflichtveranstaltung für Erstsemester OHNE bisherige Belehrung)			WiSe	0
<b>Total module attendance time</b>				<b>168 h</b>

## lök250 - Functional Ecology of Plants

<b>Module label</b>	Functional Ecology of Plants			
<b>Module code</b>	lök250			
<b>Credit points</b>	15.0 KP			
<b>Workload</b>	450 h			
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>			
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Zotz, Gerhard (module responsibility)</li> <li>• Zotz, Gerhard (Module counselling)</li> <li>• Zotz, Gerhard (authorised to take exams)</li> <li>• Tay Ying Ling, Jessica (authorised to take exams)</li> <li>• Will, Maria (authorised to take exams)</li> <li>• Badet, Henry Spencer (authorised to take exams)</li> </ul>			
<b>Prerequisites</b>	none			
<b>Skills to be acquired in this module</b>	Lecture: Special subjects of Functional Ecology of Plants are dealt with in detail giving the students a general idea of recent research in the field. Seminar: Giving seminar papers based on own or other people's research allows the improvement of presentation skills. Practical work: Project work including independent planning, performance, analysis, and presentation will familiarize students with the scientific method.			
<b>Module contents</b>	L: "Scaling": Physiological Ecology from individual organ to ecosystem SE: Recent studies in experimental ecology E: Independent research project			
<b>Recommended reading</b>	<p>von Willert, D. J., R. Matyssek and W. Herppich (1995). Experimentelle Pflanzenökologie. Stuttgart, Thieme Verlag</p> <p>Lambers, H., F. S. Chapin III and T. L. Pons (2008). Plant Physiological Ecology. New York, Springer.</p> <p>Schulze, E. D., E. Beck and K. Müller-Hohenstein (2002). Pflanzenökologie. Berlin, Springer.</p> <p>Additional literature will be announced during the module and is contingent on the latest developments in the research field.</p>			
<b>Links</b>	<a href="https://www.uni-oldenburg.de/en/biology/functional-ecology/">https://www.uni-oldenburg.de/en/biology/functional-ecology/</a>			
<b>Language of instruction</b>	English			
<b>Duration (semesters)</b>	1 Semester			
<b>Module frequency</b>	jährlich			
<b>Module capacity</b>	unlimited			
<b>Reference text</b>	<a href="http://www.uni-oldenburg.de/fun_eco/">http://www.uni-oldenburg.de/fun_eco/</a>			
Examination	Prüfungszeiten		Type of examination	
<b>Final exam of module</b>			Two seminar papers (30%) Project report (70%)	
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	--	28
Exercises		10	--	140
Seminar		2	--	28
<b>Total module attendance time</b>				196 h

## lök260 - Restoration of terrestrial Ecosystems

<b>Module label</b>	Restoration of terrestrial Ecosystems			
<b>Module code</b>	lök260			
<b>Credit points</b>	6.0 KP			
<b>Workload</b>	180 h			
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>			
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Balke, Thorsten (module responsibility)</li> <li>• Balke, Thorsten (authorised to take exams)</li> </ul>			
<b>Prerequisites</b>	Basic knowledge in Ecology, Vegetation Science, and Zoology, comparable to the respective Bachelor modules in Environmental Sciences			
<b>Skills to be acquired in this module</b>	<p>The participants will become acquainted with the possibilities and limits of renaturation and restoration projects in terrestrial ecosystems. This implies an extensive knowledge in autecology and population ecology of selected species on the one hand; on the other hand, monitoring by means of hydrological and/or pedological parameters as well as based on the vegetation and selected animal groups is crucial for evaluating such projects. In cooperation with the respective project management, student groups will contribute to the evaluation and advancement of the respective project as well as similar project(s) by performing individual records, analyses and assessments.</p> <p>Ranking/position of the module within the course of studies: The module is closely related to the Master modules "Practice of Nature Conservation", "Special Ecology" and "Ecology of Soil-Water-Plant Systems" and comprises questions of scientific and applied nature conservation.</p>			
<b>Module contents</b>	<p>Theory and Practice of Restoration Ecology (L): The lecture deals with the fundamentals of Restoration Ecology and exemplarily with the biotope systems fen and bog, grassland and heath.</p> <p>Restoration of Terrestrial Ecosystems (LC): The participants collect data contributing to the evaluation of current restoration projects (Hudewald, mesophilic grassland, heath, oligotrophic stagnant waters).</p>			
<b>Recommended reading</b>	<p>Bakker, J.P.: Nature management by grazing and cutting. Dordrecht 1989. Van Andel, J., Bakker, J.P., Snaydon, R.: Disturbance in grasslands. Dordrecht 1987. Zerbe, S. &amp; Wiegand, G. (Hrsg.): Renaturierung von Ökosystemen in Mitteleuropa. Heidelberg 2009. Schopp-Guth, A.: Renaturierung von Moorlandschaften. Bonn 1999. Nick, K.J. et al.: Moorregeneration im Leegmoor/Emsland nach Schwarztorfabbau und Wiedervernässung. Bonn 2001. Wheeler, B.D. et al.: Restoration of temperate wetlands. Baffins Lane u.a. 1995. Perrow, M.R. &amp; Davy, A.J.: Handbook of ecological restoration; 2 volumes. Cambridge 2002.</p> <p>Additional literature will be announced during the course, if necessary.</p>			
<b>Links</b>	<a href="https://www.uni-oldenburg.de/vegetationskunde/">https://www.uni-oldenburg.de/vegetationskunde/</a>			
<b>Language of instruction</b>	English			
<b>Duration (semesters)</b>	1 Semester			
<b>Module frequency</b>	jährlich			
<b>Module capacity</b>	unlimited			
<b>Examination</b>	Prüfungszeiten		Type of examination	
<b>Final exam of module</b>	Before the end of the module		Seminar paper or assignment	
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture and seminar		2	--	28
Exercises		2	--	28
<b>Total module attendance time</b>				56 h

## lök270 - Landscape Management Support Planning

<b>Module label</b>	Landscape Management Support Planning			
<b>Module code</b>	lök270			
<b>Credit points</b>	15.0 KP			
<b>Workload</b>	450 h			
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>			
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• a N., (module responsibility)</li> </ul>			
<b>Prerequisites</b>				
<b>Skills to be acquired in this module</b>	<p>The landscape management support plan aims at compensating for any project-related impacts on the environment. The mitigation and compensation plan is the outcome of a planning process which will be trained in this course. Upon successful completion of the module students will gain:</p> <ul style="list-style-type: none"> <li>• Technical skills in mapping plants and animals in landscapes: Records, sorting of records for preparing mapping keys; field mapping.</li> <li>• Technical skills in landscape management support planning including GIS analysis, evaluation of the compensation of environmental impacts on selected ecosystem compartments, and planning of compensation and mitigation</li> </ul> <p>Ranking/position of the module within the course of studies: This module imparts both action-oriented and theoretical knowledge required for landscape management support planning.</p>			
<b>Module contents</b>	Mapping results obtained in the field study are fed into GIS, compensation and mitigation measures are planned, and finally the impacts are balanced by the compensation measures.			
<b>Recommended reading</b>	Relevant literature will be announced during the preparatory course and is contingent on the latest developments in the research field. Additionally, a script for the exercise will be handed over to the participants.			
<b>Links</b>	<a href="https://www.uni-oldenburg.de/en/landeco/">https://www.uni-oldenburg.de/en/landeco/</a>			
<b>Language of instruction</b>	German			
<b>Duration (semesters)</b>	1 Semester			
<b>Module frequency</b>	jährlich			
<b>Module capacity</b>	unlimited			
<b>Reference text</b>	Medienformen: Geländearbeit, GIS-Arbeit, Präsentation der Inhalte über Beamer, Folie und Tafel, Selbststudium mit dem e-learning System <a href="http://www.GIMOLUS.de">www.GIMOLUS.de</a> ,			
<b>Examination</b>	<b>Prüfungszeiten</b>		<b>Type of examination</b>	
<b>Final exam of module</b>	Before the end of the module		Specialized practical exercise	
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Exercises		10	SuSe	140
Seminar		1	SuSe and WiSe	14
<b>Total module attendance time</b>				154 h



## lök280 - Special Vegetation Ecology

<b>Module label</b>	Special Vegetation Ecology	
<b>Module code</b>	lök280	
<b>Credit points</b>	6.0 KP	
<b>Workload</b>	180 h	
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>	
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Pepler-Lisbach, Cord (module responsibility)</li> <li>• Buchwald, Rainer (authorised to take exams)</li> <li>• Dörfler, Inken (authorised to take exams)</li> <li>• Pepler-Lisbach, Cord (authorised to take exams)</li> </ul>	
<b>Prerequisites</b>		
<b>Skills to be acquired in this module</b>	<p>The module qualifies the participants to extend their knowledge acquired in their ecologically oriented Master studies of Landscape Ecology. This comprises advanced knowledge of the flora and vegetation types in Central Europe as well as the acquisition of additional methods in vegetation ecology</p>	
<b>Module contents</b>	<p>In the summer term, the module (6 CP) includes a one-week field course in a selected Central European natural landscape focussing on floristic, vegetation ecological, phytosociological (syntaxonomical) aspects as well as on aspects of biocoenology and nature conservation.</p>	
<b>Recommended reading</b>	<p>Dierschke, H. (1994): Pflanzensoziologie. Grundlagen und Methoden. UTB Große Reihe; Stuttgart. Ellenberg, H. &amp; Leuschner, C. (2010): Vegetation Mitteleuropas mit den Alpen in ökologischer, dynamischer und historischer Sicht. 6th edition; Stuttgart. Frey, W. &amp; Lösch, R. (2010): Lehrbuch der Geobotanik. 3rd edition, Stuttgart and others. Pott, R. (1995): Die Pflanzengesellschaften Deutschlands. 2nd edition; Stuttgart. Van der Maarel, E. (ed.) (2005): Vegetation Ecology; Malden. Wilmanns, O. (1998): Ökologische Pflanzensoziologie. 6th edition; Heidelberg.</p>	
<b>Links</b>	<p><a href="https://www.uni-oldenburg.de/vegetationskunde/">https://www.uni-oldenburg.de/vegetationskunde/</a></p>	
<b>Language of instruction</b>	German	
<b>Duration (semesters)</b>	1 Semester	
<b>Module frequency</b>	jährlich	
<b>Module capacity</b>	unlimited	
<b>Reference text</b>	<p>The field course in this module is also part of the 9CP module lök285 "Special Vegetation Ecology". Therefore, it is not possible to register for the modules lök280 and lök285 simultaneously.</p>	
<b>Examination</b>	<b>Prüfungszeiten</b>	<b>Type of examination</b>
<b>Final exam of module</b>	Before the end of the module	Assignment
<b>Type of course</b>	Exercises	
<b>SWS</b>	4	

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**Frequency**

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<b>Workload attendance time</b>	56 h
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## lök285 - Special Vegetation Ecology

<b>Module label</b>	Special Vegetation Ecology			
<b>Module code</b>	lök285			
<b>Credit points</b>	9.0 KP			
<b>Workload</b>	270 h			
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>			
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Pepler-Lisbach, Cord (module responsibility)</li> <li>• Buchwald, Rainer (authorised to take exams)</li> <li>• Pepler-Lisbach, Cord (authorised to take exams)</li> </ul>			
<b>Prerequisites</b>	Completed Bachelor studies with ecological orientation			
<b>Skills to be acquired in this module</b>	The module qualifies the participants to extend their knowledge acquired in their ecologically oriented Master studies of Landscape Ecology. This comprises advanced knowledge of the flora and vegetation types in Central Europe as well as the acquisition of additional methods in vegetation ecology.			
<b>Module contents</b>	<p><b>Exercise:</b> In the summer term, the module includes, as a compulsory component (6 CP), a one-week field work in a selected Central European natural landscape focussing on floristic, vegetation ecological, phytosociological (syntaxonomical) aspects as well as on aspects of biocoenology and nature conservation.</p> <p><b>Lecture:</b> Additionally, the lecture "Vegetation Ecology" (3 CP) is offered in the winter term, imparting the fundamentals of development, dynamics, dispersal, site conditions, floristic composition as well as protection of decisive Central European vegetation and biotope types, respectively.</p>			
<b>Recommended reading</b>	<p>Dierschke, H. (1994): Pflanzensoziologie. Grundlagen und Methoden. UTB Große Reihe; Stuttgart.</p> <p>Ellenberg, H. &amp; Leuschner, C. (2010): Vegetation Mitteleuropas mit den Alpen in ökologischer, dynamischer und historischer Sicht. 6th edition; Stuttgart.</p> <p>Frey, W. &amp; Löss, R. (2010): Lehrbuch der Geobotanik. 3rd edition, Stuttgart and others.</p> <p>Pott, R. (1995): Die Pflanzengesellschaften Deutschlands. 2nd edition; Stuttgart.</p> <p>Van der Maarel, E. (ed.) (2005): Vegetation Ecology; Malden.</p> <p>Wilmanns, O. (1998): Ökologische Pflanzensoziologie. 6th edition; Heidelberg.</p>			
<b>Links</b>	<a href="https://www.uni-oldenburg.de/vegetationskunde/">https://www.uni-oldenburg.de/vegetationskunde/</a>			
<b>Language of instruction</b>	German			
<b>Duration (semesters)</b>	2 Semester			
<b>Module frequency</b>	jährlich			
<b>Module capacity</b>	unlimited			
<b>Reference text</b>	The field work is also part of the 6 CP module lök280 "Special Vegetation Ecology". Therefore, it is not possible to register for the modules lök280 and lök285 simultaneously.			
<b>Examination</b>	<b>Prüfungszeiten</b>	<b>Type of examination</b>		
<b>Final exam of module</b>	Before the end of the module	Oral examination or assignment		
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2		28
Exercises		4		56
<b>Total module attendance time</b>				84 h

## lök310 - Group Project: Sustainable Spatial Development

<b>Module label</b>	Group Project: Sustainable Spatial Development	
<b>Module code</b>	lök310	
<b>Credit points</b>	9.0 KP	
<b>Workload</b>	270 h	
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>	
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Mose, Ingo (module responsibility)</li> <li>• Mose, Ingo (Module counselling)</li> <li>• Schaal, Peter (Module counselling)</li> <li>• Mose, Ingo (authorised to take exams)</li> <li>• Schaal, Peter (authorised to take exams)</li> </ul>	
<b>Prerequisites</b>	Participation in the module Environmental Planning	
<b>Skills to be acquired in this module</b>	Upon successful completion of the module the students will have gained various skills in the independent use and application of planning methods to develop appropriate solutions to selected problems in spatial planning and regional development, additionally experiences will be gained in organizing group work and the successful integration of individual tasks in a wider project context	
<b>Module contents</b>	Review of theoretical knowledge in spatial and environmental planning based on a specific planning task reflecting or integrating practical requirements.	
<b>Recommended reading</b>	Literature will be announced during the lectures.	
<b>Links</b>		
<b>Language of instruction</b>	German	
<b>Duration (semesters)</b>	1 Semester	
<b>Module frequency</b>	jährlich	
<b>Module capacity</b>	unlimited	
<b>Examination</b>	<b>Prüfungszeiten</b>	<b>Type of examination</b>
<b>Final exam of module</b>	Before the end of the module	Special exercise (70%) und presentation (30%)
<b>Type of course</b>	Seminar and exercise	
<b>SWS</b>	6	
<b>Frequency</b>	SuSe	
<b>Workload attendance time</b>	84 h	

## lök320 - Sustainable Spatial Development in Europe

<b>Module label</b>	Sustainable Spatial Development in Europe
<b>Module code</b>	lök320
<b>Credit points</b>	6.0 KP
<b>Workload</b>	180 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> <li>• Master's Programme Sustainability Economics and Management (Master) &gt; Supplementary Modules</li> <li>• Master's Programme Water and Coastal Management (Master) &gt; Planning</li> </ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Mose, Ingo (module responsibility)</li> <li>• Mose, Ingo (Module counselling)</li> <li>• Mose, Ingo (authorised to take exams)</li> <li>• Klenke, Thomas (authorised to take exams)</li> <li>• Kramer, Nadine (authorised to take exams)</li> <li>• Schaal, Peter (authorised to take exams)</li> </ul>
<b>Prerequisites</b>	Good command of English
<b>Skills to be acquired in this module</b>	Presentation and critical reflection of crucial demands of a sustainable spatial development in selected fields of activities especially considering rural development. Comparison of suitable case studies in a European context. Knowledge into central control instruments of structural, regional, and agricultural policy on a national as well as on a European level. Considering specific demands of spatial development in the context of political and social processes of Europeanization.
<b>Module contents</b>	<p>SE/EX Multifunctionality and rural development (3 CP)  V Topical issues of agriculture and nutrition (1.5 CP)  SE/EX Sustainable tourism (3 CP)  SE/EX Renewable energy planning (3 CP)  V Colloquium on sustainable spatial development (1.5 CP)  SE Special subject job market: Job market and inequality in Europe (3 CP) – This course  (1.07.211 / FK I) takes place in the summer semester.</p> <p>Multifunctionality and rural development  Survey of the multifunctionality of rural areas, especially the importance of agriculture and forestry, tourism and recreational activities, habitation, and protection of nature as well as the demands on spatial planning and regional development involved under the conditions of sustainability. Illustration by means of selected examples in a European context.</p> <p>Agriculture and agricultural policy  Survey of EU agricultural policy programmes and their strategic-instrumental implementation as well as of selected topics of current developments in agriculture presented by various guest lecturers.</p> <p>Sustainable tourism  Presentation of various concepts of sustainable tourism and its realization from the viewpoint of offer and demand. Illustration by means of selected examples in a European context.</p> <p>Renewable energy planning  Survey of different forms of renewable energy and related demands on spatial development seen from a mainly planning and actor-orientated point of view. Illustration by means of selected examples in a European context.</p> <p>Colloquium on sustainable spatial development  Survey of up-to-date theoretical approaches, concepts, instruments as well as practical fields of activities in sustainable spatial development in a national and European context.</p> <p>Special subject job market: Job market and inequality  This course (1.07.211 / FK I) takes place in the summer semester.  Three one-day excursions with varying emphasis will be performed in the vicinity of Oldenburg as an integral part of the module seminars.</p>
<b>Recommended reading</b>	<p>Akademie für Raumforschung und Landesplanung (Hrsg.): Handwörterbuch der Raumordnung. Hannover 2017.</p> <p>Cloke, P.; Marsden, T.; Mooney, P.H. (eds.): Handbook of rural studies. London 2006.</p> <p>Ermann, U. et al.: Agro-Food Studies. Eine Einführung. Köln 2018</p> <p>Fischer, A.: Sustainable Tourism. Bern 2014.</p>

Grabski-Kieron, U.; Mose, I.; Reichert-Schick, A.; Steinführer, A. (eds.): European rural peripheries revalued. Governance, actors, impacts. Münster 2016.  
 Küster, H.: Die Entdeckung der Landschaft. Einführung in eine neue Wissenschaft. München 2012.  
 Lossau, J.; Freytag, T.; Lippuner, R. (Hrsg.): Schlüsselbegriffe der Kultur- und Sozialgeographie. Stuttgart 2014  
 Schmied, D. (ed.): Winning and losing. The changing geography of Europe's rural areas.

Additional literature will be announced in the seminars.

<b>Links</b>	<a href="https://www.uni-oldenburg.de/en/geo/">https://www.uni-oldenburg.de/en/geo/</a>			
<b>Languages of instruction</b>	German, English			
<b>Duration (semesters)</b>	1 Semester			
<b>Module frequency</b>	jährlich			
<b>Module capacity</b>	unlimited			
Examination	Prüfungszeiten		Type of examination	
<b>Final exam of module</b>	Before the end of the module		6 CP = Report or assignment	
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	--	28
Seminar		3	--	42
Study trip		1	--	14
<b>Total module attendance time</b>				<b>84 h</b>

## lök321 - Sustainable Spatial Development in Europe

<b>Module label</b>	Sustainable Spatial Development in Europe
<b>Module code</b>	lök321
<b>Credit points</b>	9.0 KP
<b>Workload</b>	270 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Mose, Ingo (module responsibility)</li> <li>• Mose, Ingo (Module counselling)</li> <li>• Klenke, Thomas (authorised to take exams)</li> <li>• Kramer, Nadine (authorised to take exams)</li> <li>• Mose, Ingo (authorised to take exams)</li> <li>• Schaal, Peter (authorised to take exams)</li> </ul>
<b>Prerequisites</b>	Good command of English
<b>Skills to be acquired in this module</b>	Presentation and critical reflection of crucial demands of a sustainable spatial development in selected fields of activities especially considering rural development. Comparison of suitable case studies in a European context. Knowledge into central control instruments of structural, regional, and agricultural policy on a national as well as on a European level. Considering specific demands of spatial development in the context of political and social processes of Europeanization.
<b>Module contents</b>	<p>SE/EX Multifunctionality and rural development (3 CP)  V Topical issues of agriculture and agricultural policy (1.5 CP)  SE/EX Sustainable tourism (3 CP)  SE/EX Renewable energy planning (3 CP)  V Colloquium on sustainable spatial development (1.5 CP)  SE Special subject job market: Job market and inequality in Europe (3 CP) – This course (1.07.211 / FK I) takes place in the summer semester.</p> <p><b>Multifunctionality and rural development</b>  Survey of the multifunctionality of rural areas, especially the importance of agriculture and forestry, tourism and recreational activities, habitation, and protection of nature as well as the demands on spatial planning and regional development involved under the conditions of sustainability. Illustration by means of selected examples in a European context.</p> <p><b>Agriculture and agricultural policy</b>  Survey of EU agricultural policy programmes and their strategic-instrumental implementation as well as of selected topics of current developments in agriculture presented by various guest lecturers.</p> <p><b>Sustainable tourism</b>  Presentation of various concepts of sustainable tourism and its realization from the viewpoint of offer and demand. Illustration by means of selected examples in a European context.</p> <p><b>Renewable energy planning</b>  Survey of different forms of renewable energy and related demands on spatial development seen from a mainly planning and actor-orientated point of view. Illustration by means of selected examples in a European context.</p> <p><b>Colloquium on sustainable spatial development</b>  Survey of up-to-date theoretical approaches, concepts, instruments as well as practical fields of activities in sustainable spatial development in a national and European context.</p> <p><b>Special subject job market: Job market and inequality</b>  This course (1.07.211 / FK I) takes place in the summer semester. Three one-day excursions with varying emphasis will be performed in the vicinity of Oldenburg as an integral part of the module seminars.</p>
<b>Recommended reading</b>	<p>Cloke, P.; Marsden, T.; Mooney, P.H. (eds.): Handbook of rural studies. London 2006.</p> <p>Schmied, D. (ed.): Winning and losing. The changing geography of Europe's rural areas.</p> <p>Additional literature will be announced in the seminars.</p>
<b>Links</b>	<a href="https://www.uni-oldenburg.de/en/geo/">https://www.uni-oldenburg.de/en/geo/</a>
<b>Languages of instruction</b>	German, English
<b>Duration (semesters)</b>	1 Semester

<b>Module frequency</b>	jährlich			
<b>Module capacity</b>	unlimited			
Examination	Prüfungszeiten	Type of examination		
<b>Final exam of module</b>	Before the end of the module	9 CP = Report or assignment or oral examination (extended version)		
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2		28
Seminar		6		84
Study trip		2		28
<b>Total module attendance time</b>				140 h



## Iök345 - Advanced Limnology

<b>Module label</b>	Advanced Limnology			
<b>Module code</b>	Iök345			
<b>Credit points</b>	6.0 KP			
<b>Workload</b>	180 h			
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>			
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Kiel, Ellen (module responsibility)</li> <li>• Kiel, Ellen (Module counselling)</li> <li>• Kiel, Ellen (authorised to take exams)</li> </ul>			
<b>Prerequisites</b>	Basic knowledge of taxonomy + determination of mainly invertebrates, basic skills in faunistic field methods, L Animal Ecology			
<b>Skills to be acquired in this module</b>	<p><b>Special Aquatic Ecology</b> The module imparts general and special knowledge of the ecology of typical floodplain water systems with special emphasis on floodplain dynamics and the resulting processes related to those water systems. Floodplain development and (faunistic) biodiversity are further main topics comprising e.g. the explanation of ecological conditions and colonisation processes and referring to questions of nature protection, examining the habitat preference of selected species and describing the population development of typical floodplain species.</p> <p><b>E Special Aquatic Ecology</b> Familiarization with the course of a planning process on the basis of an exemplary project in Northwest Germany; independent development of a concept of methods for assessing the faunistic actual state and subsequent realization in the field; scientific documentation and ecologically relevant assessment of the situation in the project area using selected indicator groups (scientific determination of selected taxa); preparation of final expert opinions on the project</p>			
<b>Module contents</b>	<p><b>L Special Aquatic Ecology</b> Ecology of typical floodplain water systems (mainly oxbow lakes bodies and temporary water bodies); description of the decisive processes in floodplain and water system dynamics as well as the expressivity of the (faunistic) biodiversity; description of the ecological conditions and colonisation processes relevant to questions of nature protection, aspects of biodiversity as well as habitat preference and population development of typical floodplain species.</p> <p><b>E Special Aquatic Ecology</b> Description of legal and planning procedures based on a case study; development and realization of a concept of methods for assessing the faunistic current status; scientific documentation (determination of taxa), analysis (determination and classification of species-related characteristics of the taxa relevant to the planning) and ecologically relevant assessment of the situation in the project area; final expert opinion on the project</p>			
<b>Recommended reading</b>	See announcements in StudIP			
<b>Links</b>	<a href="https://www.uni-oldenburg.de/en/biology/aquatic-ecology-and-nature-conservation/">https://www.uni-oldenburg.de/en/biology/aquatic-ecology-and-nature-conservation/</a>			
<b>Languages of instruction</b>	German, English			
<b>Duration (semesters)</b>	1 Semester			
<b>Module frequency</b>	jährlich			
<b>Module capacity</b>	unlimited			
<b>Reference text</b>	The courses of this module are integrated into Iök350 "Special Animal Ecology" (9 CP). Students graduating in Special Animal Ecology cannot graduate in Special Aquatic Ecology.			
<b>Examination</b>	<b>Prüfungszeiten</b>	<b>Type of examination</b>		
<b>Final exam of module</b>	Before the end of the module.	Special exercise or Assignment		
<b>Type of course</b>	<b>Comment</b>	<b>SWS</b>	<b>Frequency</b>	<b>Workload of compulsory attendance</b>
Lecture		1		14
Exercises		3		42
<b>Total module attendance time</b>				56 h

## Iök350 - Advanced Animal Ecology

<b>Module label</b>	Advanced Animal Ecology
<b>Module code</b>	Iök350
<b>Credit points</b>	9.0 KP
<b>Workload</b>	270 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Kiel, Ellen (module responsibility)</li> <li>• Kiel, Ellen (authorised to take exams)</li> <li>• Kiel, Ellen (Module counselling)</li> </ul>
<b>Prerequisites</b>	Basic knowledge of taxonomy + determination of mainly vertebrates, basic skills in faunistic field methods, L Animal Ecology
<b>Skills to be acquired in this module</b>	<p><b>L Special Aquatic Ecology</b> The module imparts general and special knowledge of the ecology of typical floodplain water systems with special emphasis on floodplain dynamics and the resulting processes related to those water systems. Floodplain development and (faunistic) biodiversity are further main topics comprising e.g. the explanation of ecological conditions and colonisation processes and referring to questions of nature protection, examining the habitat preference of selected species and describing the population development of typical floodplain species.</p> <p><b>E Special Aquatic Ecology</b> Familiarization with the course of a planning process on the basis of an exemplary project in North-west Germany; independent development of a concept of methods for assessing the faunistic actual state and subsequent realization in the field; scientific documentation and ecologically relevant assessment of the situation in the project area using selected indicator groups (scientific determination of selected taxa); preparation of final expert opinions on the project</p> <p><b>L Applied Animal Ecology</b> Qualification for preparing a professional zoecological contribution within the scope of an expert opinion; familiarization with the most important faunistic indicator groups for scientific objectives relevant to a project</p>
<b>Module contents</b>	<p><b>L Special Aquatic Ecology</b> Ecology of typical floodplain water systems (mainly old water bodies and temporary water bodies); description of the decisive processes in floodplain and water system dynamics as well as the expressivity of the (faunistic) biodiversity; description of the ecological conditions and colonisation processes relevant to questions of nature protection, aspects of biodiversity as well as habitat preference and population development of typical floodplain species.</p> <p><b>E Special Aquatic Ecology</b> Description of legal and planning procedures based on a case study; development and realization of a concept of methods for assessing the faunistic current status; scientific documentation (determination of taxa), analysis (determination and classification of species-related characteristics of the taxa relevant to the planning) and ecologically relevant assessment of the situation in the project area; final expert opinion on the project</p> <p><b>L Applied Animal Ecology</b> Importance of professional zoecological contributions within the scope of ecologically relevant planning; legal and qualified arguments; regulations for the conservation of species under national and international law; faunistic indication: complex of problems related to vicarious species, well-founded selection of indicator groups Principles of developing a concept of sampling and of performing field work; description of standard methods of sampling and analysis, essential aspects of a professional zoecological contribution for an expert opinion on a project; detailed description of the most important faunistic indicator groups for scientific objectives relevant to a project</p>
<b>Recommended reading</b>	See announcements in StudIP
<b>Links</b>	
<b>Languages of instruction</b>	German, English
<b>Duration (semesters)</b>	1 Semester
<b>Module frequency</b>	jährlich
<b>Module capacity</b>	unlimited

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**Reference text**

Special Animal Ecology (9 CP) integrates the courses of the module Special Aquatic Ecology (6 CP). Students graduating in Special Animal Ecology cannot graduate in Special Aquatic Ecology.

Examination	Prüfungszeiten	Type of examination		
<b>Final exam of module</b>	Before the end of the module	Special exercise or Assignment		
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3		42
Exercises		3		42
<b>Total module attendance time</b>				<b>84 h</b>

## lök360 - Special Abiotic Factors (Soil/Water)

<b>Module label</b>	Special Abiotic Factors (Soil/Water)
<b>Module code</b>	lök360
<b>Credit points</b>	6.0 KP
<b>Workload</b>	180 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Greskowiak, Janek (module responsibility)</li> <li>• Greskowiak, Janek (Module counselling)</li> <li>• Kalinina, Olga (Module counselling)</li> <li>• Massmann, Gudrun (Module counselling)</li> <li>• Greskowiak, Janek (authorised to take exams)</li> <li>• Kalinina, Olga (authorised to take exams)</li> <li>• Massmann, Gudrun (authorised to take exams)</li> <li>• Maurischat, Philipp (authorised to take exams)</li> </ul>
<b>Prerequisites</b>	Basic knowledge of Soil Science, Hydrogeology and Hydrochemistry
<b>Skills to be acquired in this module</b>	<p>E: Applied modelling of water and solute transport in groundwater: Impartment of knowledge into quantitative hydrogeology (hydraulics and advection-dispersion). Qualification to develop simple groundwater flow and transport models.</p> <p>E: Hydrochemical modelling of water-rock interactions using PHREEQC: Impartment of knowledge into quantitative hydrogeochemistry and skills in hydrogeochemical modelling.</p> <p>L: Major Soils of the World and excursion to the World Soil Museum in Wageningen (The Netherlands): Impartment of knowledge into distribution, properties and classification of soils of the world. Qualification to apply the World Reference Base for Soil Resources (WRB) and to identify the soils of the world.</p> <p>E: Special soil science field and laboratory exercises: Impartment of knowledge into specific field and laboratory methods. Qualification to select and apply specific field and laboratory methods as well as to analyse and interpret results.</p>
<b>Module contents</b>	<p>E: Applied modelling of water and solute transport in groundwater: Performance of a sandbox experiment. Numerical modelling of groundwater flow and solute transport using PMWIN (<a href="http://www.simcore.com">http://www.simcore.com</a>): Model setup, parameterization and numerical solution of the groundwater flow and advection-dispersion equations.</p> <p>E: Hydrochemical modelling of water-rock interactions using PHREEQC: Modelling of hydrogeochemical processes (speciation reactions and mineral reactions, pyrite oxidation, oxidation of organic matter, redox reactions, ion exchange, equilibrium reactions and reaction kinetics) using the software PHREEQC (<a href="http://wwwbrr.cr.usgs.gov/projects/GWC_coupled/phreeqc/">http://wwwbrr.cr.usgs.gov/projects/GWC_coupled/phreeqc/</a>)</p> <p>L: Major Soils of the World and excursion to the World Soil Museum in Wageningen (The Netherlands): Application of the international soil classification system "WRB", step-wise familiarization with soils and their properties as well as with the related landscapes and catenas (from polar to tropical soils), study of varnished profiles of globally distributed soils.</p> <p>E: Special soil science field and laboratory exercises: Selection of current scientific objectives, construction of a sampling and investigation design, performance of field studies (preferably abroad) and laboratory analysis, analysis and interpretation of results.</p>
<b>Recommended reading</b>	<p>-Appelo, C.A.J. &amp; Postma, D. (2005): Geochemistry, groundwater and pollution.- 2nd edition, A.A. Balkema.</p> <p>-Kinzelbach, W. und Rausch, R. (1995): Grundwassermodellierung - Eine Einführung mit Übungen, Gebrüder Borntraeger Berlin.</p> <ul style="list-style-type: none"> <li>• Zech, W. &amp; Hintermaier-Erhard, G. (2002): Böden der Welt. Spektrum Akademischer Verlag, Heidelberg, Berlin.</li> <li>• IUSS Working Group WRB. 2014. World Reference Base for Soil Resources 2014.</li> </ul> <p>International soil classification system for naming soils and creating legends for soil maps.</p>

World Soil Resources Reports No. 106. FAO, Rom; [www.fao.org/3/a-i3794e.pdf](http://www.fao.org/3/a-i3794e.pdf)  
 -see also announcements in StudIP

<b>Links</b>				
<b>Languages of instruction</b>		German, English		
<b>Duration (semesters)</b>		1 Semester		
<b>Module frequency</b>		jährlich		
<b>Module capacity</b>		15		
<b>Reference text</b>		The module can be taken as a 6 CP or a 9 CP module. For the 6 CP module, 2 of the 4 courses offered must be attended, for the 9 CP module, 3 of the 4 courses		
<b>Examination</b>		<b>Prüfungszeiten</b>	<b>Type of examination</b>	
<b>Final exam of module</b>		Before the end of the module	Oral examination or assignment	
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		1	--	14
Exercises		3	--	42
<b>Total module attendance time</b>				56 h

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## lök365 - Special Abiotic Factors (Soil/Water)

<b>Module label</b>	Special Abiotic Factors (Soil/Water)
<b>Module code</b>	lök365
<b>Credit points</b>	9.0 KP
<b>Workload</b>	270 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li></ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"><li>• Greskowiak, Janek (module responsibility)</li><li>• Greskowiak, Janek (Module counselling)</li><li>• Kalinina, Olga (Module counselling)</li><li>• Massmann, Gudrun (Module counselling)</li><li>• Greskowiak, Janek (authorised to take exams)</li><li>• Kalinina, Olga (authorised to take exams)</li><li>• Massmann, Gudrun (authorised to take exams)</li><li>• Maurischat, Philipp (authorised to take exams)</li></ul>
<b>Prerequisites</b>	Basic knowledge of Soil Science, Hydrogeology and Hydrochemistry
<b>Skills to be acquired in this module</b>	<p>E: Applied modelling of water water and solute transport in groundwater: Performance of a sandbox experiment. Numerical modelling of groundwater flow and solute transport using PMWIN (<a href="http://www.simcore.com">http://www.simcore.com</a>): Model setup, parameterization and numerical solution of the groundwater flow and advection-dispersion equations.</p> <p>E: Hydrochemical modelling of water-rock interactions using PHREEQC: Modelling of hydrogeochemical processes (speciation reactions and mineral reactions, pyrite oxidation, oxidation of organic matter, redox reactions, ion exchange, equilibrium reactions and reaction kinetics) using the software PHREEQC (<a href="http://wwwbrr.cr.usgs.gov/projects/GWC_coupled/phreeqc/">http://wwwbrr.cr.usgs.gov/projects/GWC_coupled/phreeqc/</a>)</p> <p>L: Major Soils of the World and excursion to the World Soil Museum in Wageningen (The Netherlands): Impartment of knowledge into distribution, properties and classification of soils of the world. Qualification to apply the World Reference Base for Soil Resources (WRB) and to identify the soils of the world.</p> <p>E: Special soil science field and laboratory exercises: Impartment of knowledge into specific field and laboratory methods. Qualification to select and apply specific field and laboratory methods as well as to analyse and interpret results.</p>
<b>Module contents</b>	<p>E: Applied modelling of water and substance transfer in ground water: Performance of a box corer experiment. Numerical modelling of groundwater currents and substance transfer using PMWIN (<a href="http://www.simcore.com">http://www.simcore.com</a>): Model setup, parameterization and numerical solution of groundwater current and advection dispersion equations.</p> <p>E: Hydrochemical modelling of water-rock interactions using PHREEQC: Modelling of hydrogeochemical processes (speciation reactions and mineral reactions, pyrite oxidation, oxidation of organic substances, redox reactions, ion exchange, balance reactions and reaction kinetics) using the software PHREEQC (<a href="http://wwwbrr.cr.usgs.gov/projects/GWC_coupled/phreeqc/">http://wwwbrr.cr.usgs.gov/projects/GWC_coupled/phreeqc/</a>)</p> <p>L: Major Soils of the World and excursion to the World Soil Museum in Wageningen (The Netherlands): Application of the international soil classification system "WRB", step-wise familiarization with soils and their properties as well as with the related landscapes and catenas (from polar to tropical soils), study of varnished profiles of globally distributed soils.</p> <p>E: Special soil science field and laboratory exercises: Selection of current scientific objectives, construction of a sampling and investigation design, performance of field studies (preferably abroad) and laboratory analysis, analysis and interpretation of results.</p>
<b>Recommended reading</b>	<p>-Appelo, C.A.J. &amp; Postma, D. (2005): Geochemistry, groundwater and pollution.- 2nd edition, A.A. Balkema.</p> <p>-Kinzelbach, W. und Rausch, R. (1995): Grundwassermodellierung - Eine Einführung mit Übungen, Gebrüder Borntraeger Berlin.</p> <ul style="list-style-type: none"><li>• Zech, W. &amp; Hintermaier-Erhard, G. (2002): Böden der Welt. Spektrum Akademischer Verlag, Heidelberg, Berlin.</li><li>• IUSS Working Group WRB. 2014. World Reference Base for Soil</li></ul>

Resources 2014.

International soil classification system for naming soils and creating legends for soil maps.  
World Soil Resources Reports No. 106. FAO, Rom; [www.fao.org/3/a-i3794e.pdf](http://www.fao.org/3/a-i3794e.pdf)  
-see also announcements in StudIP.

<b>Links</b>				
<b>Languages of instruction</b>		German, English		
<b>Duration (semesters)</b>		1 Semester		
<b>Module frequency</b>		jährlich		
<b>Module capacity</b>		15		
<b>Reference text</b>		The module can be taken as a 6 CP or a 9 CP module. For the 6 CP module, 2 of the 4 courses offered must be attended, for the 9 CP module, 3 of the 4 courses.		
Examination		Prüfungszeiten		Type of examination
<b>Final exam of module</b>		Before the end of the module		Oral examination or housework
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		1.5	--	21
Exercises		4.5	--	63
<b>Total module attendance time</b>				<b>84 h</b>

## lök370 - Ornithology in theoretical Concepts

<b>Module label</b>	Ornithology in theoretical Concepts	
<b>Module code</b>	lök370	
<b>Credit points</b>	6.0 KP	
<b>Workload</b>	180 h	
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>	
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Liedvogel, Miriam (module responsibility)</li> <li>• Liedvogel, Miriam (Module counselling)</li> <li>• Köppl, Christine (authorised to take exams)</li> <li>• Bouwhuis, Sandra (authorised to take exams)</li> <li>• Langemann, Ulrike (authorised to take exams)</li> <li>• Liedvogel, Miriam (authorised to take exams)</li> <li>• Mouritsen, Henrik (authorised to take exams)</li> <li>• Schmaljohann, Heiko (authorised to take exams)</li> </ul>	
<b>Prerequisites</b>		
<b>Skills to be acquired in this module</b>	<p>The module imparts advanced knowledge on different aspects of ornithology. The students acquire:</p> <ul style="list-style-type: none"> <li>• An extended knowledge of morphological and physiological fundamentals and the resulting ecological and behaviour-biological consequences in birds</li> <li>• Knowledge, presentation and discussion of relevant English literature from various fields of ornithology</li> </ul>	
<b>Module contents</b>	<p>Lecture "Ecology and Physiology of Birds": This lecture consolidates special aspects of systematics, morphology, physiology, migration, orientation, population biology, communication and behavioural ecology in birds.</p>	
<b>Recommended reading</b>	<p>Bairlein F (1996) Ökologie der Vögel. G. Fischer, Stuttgart. Bennett PM, Owens IPF (2002) Evolutionary Ecology of birds: Life histories, mating systems, and extinction. Oxford Berthold P (1996) Control of bird migration. Chapman &amp; Hall, London. Brooke M, Birkhead T (1991) The Cambridge Encyclopedia of Ornithology. Cambridge UP, Cambridge. Carey C (1996) Avian energetics and nutritional ecology. Chapman &amp; Hall, New York. Catchpole CK, Slater PJB (1995) Bird song. Cambridge UP, Cambridge. Danchin E, Giraldeau L-A, Cézilly F (2008) Behavioural Ecology. Oxford Farner DS, King JR (eds., 1971-1993) Avian Biology. Vol. I-IX. Academic Press, New York. Furness RW, Monaghan P (1987) Seabird Ecology. Blackie, Glasgow. Gill FB (1990) Ornithology. Freeman, New York. Newton I (2008) The Migration Ecology of Birds. Academic Press, Amsterdam. Podulka S, Rohrbaugh RW, Bonney R (2004) Handbook of Bird Biology. Cornell Lab of Ornithology, Ithaca. Scanes CG (2015) Sturkie's Avian Physiology, 6th edition. Academic Press Scott G (2010) Essential Ornithology. Oxford University Press, Oxford</p>	
<b>Links</b>		
<b>Language of instruction</b>	English	
<b>Duration (semesters)</b>	1 Semester	
<b>Module frequency</b>	jährlich	
<b>Module capacity</b>	30	
Examination	Prüfungszeiten	Type of examination
<b>Final exam of module</b>	Written exam in the last week of the term	Written examintaion
<b>Type of course</b>	Lecture	
<b>SWS</b>	4	
<b>Frequency</b>	WiSe	
<b>Workload attendance time</b>	56 h	



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## lök375 - Ornithology in Practice

<b>Module label</b>	Ornithology in Practice
<b>Module code</b>	lök375
<b>Credit points</b>	6.0 KP
<b>Workload</b>	180 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li></ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"><li>• Liedvogel, Miriam (module responsibility)</li><li>• Liedvogel, Miriam (Module counselling)</li><li>• Liedvogel, Miriam (authorised to take exams)</li><li>• Bouwhuis, Sandra (authorised to take exams)</li><li>• Langemann, Ulrike (authorised to take exams)</li><li>• Schmaljohann, Heiko (authorised to take exams)</li><li>• Vedder, Oscar Herman (authorised to take exams)</li></ul>
<b>Prerequisites</b>	
<b>Skills to be acquired in this module</b>	

- ++ broad and in depths biological expertise
- ++ in depths knowledge of biological working methods
- ++ data analysis skills
- + interdisciplinary thinking
- + critical and analytical thinking
- ++ independent searching and knowledge of scientific literature
- ++ data presentation and discussion in German and English (written and spoken)
- + teamwork
- + project and time management
- + statistics and scientific programming

The aim of the module is to consolidate various aspects of ornithology as well as to impart up to date methods applied in ornithological research.

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### Module contents

The module comprises four required elective courses (6 CP each), one of which needs to be chosen.

*Required elective course 1:* Laboratory course and seminar "Ecology of Colonial Seabirds" (6 CP) The Institute of Avian Research safeguards a long-term individual-based study on common terns: colonially breeding, migratory, piscivorous seabirds. Students spend a week at the colony (located at the Banter See in Wilhelmshaven) to ask a scientific question (e.g. about foraging behaviour, coloniality or courtship behaviour) and collect data to answer it, then spend a week analysing the data statistically, writing a short report in Biology Letters format and presenting their results to their peers. Students receive one mark for the report and one for the presentation and the final mark for the course will be the average of these two marks.

*Required elective course 2:* Laboratory course and seminar "Communication in Birds" (6 CP). Original recordings from bird songs will be used to generate new data sets for the practical. From these recordings we will prepare spectrograms and analyze the waveforms and frequency spectra. Techniques and statistical method that allow to classify song types from individuals or from populations will be introduced and applied. For example, cluster analysis and discriminant analysis are statistical methods to assess the dissimilarity between "objects" or

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song type characteristics. The theoretical background for the practical is provided by the seminar using a standard text book on bird song (Catchpole & Slater 2008).

*Required elective course 3:* Laboratory course and seminar "Japanese Quail" (6 CP). Observations and investigations of behaviour in relation to reproductive activity of male and female Japanese quail, at the Institute of Avian Research. Students will learn about theory regarding pace of life and exploration behaviour and develop predictions for inter-individual differences in exploration behaviour in relation to sex and reproductive activity. These predictions will be tested with standardized behavioural observations and measurements of food intake in the quail. The data will be analysed and discussed in the broader context of life-history theory.

*Required elective course 4:* Laboratory course and seminar "Scientific research in field ornithology, incl. identification of birds" (6 CP) This course has three teaching objectives. Firstly, to impart knowledge of the local bird community. This is conveyed through practical courses, work on bird specimens, and lectures. Secondly, learning and getting to know some standard methods of field ornithology, e.g. breeding survey, waterbird counts, radio telemetry, mist netting. Both teaching objectives form the basis for the third teaching objective. In this, the students independently conduct a scientific ornithological study. The data are analysed in the course under supervision. The results are summarised in a two-page scientific publication. At the end of the course, a kind of scientific conference takes place, in which all scientific projects are presented and discussed. The final grade is made up of the grades for the presentations and the scientific publication.

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## Recommended reading

### *Required elective course 1:*

Becker PH, Frank D, Südman SR (1993) Temporal and spatial pattern of common tern (*Sterna Hirundo*) foraging in the Wadden Sea. *Oecologia* 93: 389-393.

González-Solis J, Sokolov E, Becker PH (2001) Courtship feedings, copulations and paternity in common terns *Sterna hirundo*. *Animal Behaviour* 61: 1125-1132

### *Required elective course 2:*

Catchpole CK & Slater PJB (2008), "Bird Song, Biological themes and variations", Cambridge University Press, 2nd Edition

### *Required elective course 3:*

Reale, D., Garant, D., Humphries, M.M., Bergeron, P., Careau, V., Montiglio, P.O. (2010) Personality and the emergence of the pace-of-life syndrome concept at the population level. *Phil. Trans. R. Soc. B*, 365, 4051–4063.

### *Required elective course 4:*

Bibby, Burgess, Hill (1995) *Methoden der Feldornithologie*

Jonsson (1999) *Die Vögel Europas und des Mittelmeerraumes*

Südbeck, Andretzke, Fischer, Gedeon, Schiko-re, Schröder, Sudfeld (2012) *Methodenstandards zur Erfassung der Brutvögel Deutschlands*

Sutherland, Newton, Green (2004) *Bird Ecology and Conservation: A Handbook of Techniques*

Svensson, Mullarney, Zetterström (2011) *Der Kosmos Vogelführer: Alle Arten Europas, Nord-afrikas und Vorderasiens*

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**Links**

<b>Languages of instruction</b>	German, English	
<b>Duration (semesters)</b>	1 Semester	
<b>Module frequency</b>	jährlich	
<b>Module capacity</b>	12	
<b>Examination</b>	Prüfungszeiten	Type of examination
<b>Final exam of module</b>		PT
<b>Type of course</b>	Exercises	
<b>SWS</b>	4	
<b>Frequency</b>	SuSe	
<b>Workload attendance time</b>	56 h	

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## lök390 - Experimental designs in ecological field studies

<b>Module label</b>	Experimental designs in ecological field studies
<b>Module code</b>	lök390
<b>Credit points</b>	6.0 KP
<b>Workload</b>	180 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• a N., (module responsibility)</li> </ul>
<b>Prerequisites</b>	<ul style="list-style-type: none"> <li>• Basic courses of Ecology (1st and 2nd semesters LÖK)</li> <li>• Skills in determining aquatic organisms, e.g. via Bachelor modules               <ul style="list-style-type: none"> <li>o Knowledge of forms</li> <li>o Running water ecology</li> <li>o Aquatic habitats</li> <li>o Master course in the module "Aquatic Ecology"</li> <li>o Comparable courses at other universities</li> </ul> </li> </ul>
<b>Skills to be acquired in this module</b>	<ul style="list-style-type: none"> <li>- Qualification to independently plan field experiments suitable for answering current ecological questions (individuals, populations, communities)</li> <li>- Methodological competence/independence in performing field experiments</li> <li>- Qualification to independently analyse the experiments in the laboratory guided by hypotheses and using adequate methods, materials and statistical methods</li> <li>- Competence in presenting results on a scientific level (scientific report presenting and discussing the method; scientific publication; both in English)</li> <li>- Impartment of manifold methodological skills in the field of aquatic ecology, experimental field research (autecological, population-ecological and synecological research approaches)</li> <li>- Impartment of extended expertise in planning experiments in general and their analysis in the field of animal ecology (application and linking of acquired skills; generalisable knowledge)</li> <li>- Practical experience in analysing field experiments in general (comprising laboratory phases, access to literature and databases, preparation of scientific publications)</li> <li>- Preparation of Master and Ph.D. theses requiring skills in experimental field research</li> </ul>
<b>Module contents</b>	<p>1st course phase (theoretical preparation and planning)</p> <ul style="list-style-type: none"> <li>- Picking up current ecological research topics related to aquatic habitats, e.g. in streams and ditches (the respective system is selected prior to the start of the course and should change)</li> <li>- Specification of questions and frame conditions by the course lecturer concerning current research questions in the fields of autecology, population ecology, and synecology</li> <li>- Instructions for literature research and the respective analysis by students</li> <li>- Summary and presentation of the current standard of knowledge (structured brief reviews presented to the course participants by students and commented by the lecturer as well as preparation of a synopsis as part of the term paper or the oral examination (see below))</li> <li>- Concrete formulation of questions and working hypotheses based on literature research</li> </ul> <p>2nd course phase (practical preparation and planning; laboratory and field work)</p> <ul style="list-style-type: none"> <li>- Preparatory inspection of the investigation area accompanied by the lecturer</li> <li>- Independent development of a concept of methods (advised by the lecturer)</li> <li>- Presentation of the planned experiment and of the analysis (treatment of samples, data processing etc.)</li> <li>- Independent practical preparation of experiments (calibrate equipment, prepare solutions, prepare trapping jars, determine aquatic data etc.), analysis steps (e.g. prepare laboratory equipment), and logistics (transportation, entry permissions etc.)</li> <li>- Description of methods for all working steps in writing</li> <li>- Independent realization of planning (advised by lecturer)</li> <li>- Report on all procedures including reflection</li> </ul> <p>3rd course phase (further development and application of acquired knowledge; theoretical phase)</p> <ul style="list-style-type: none"> <li>- Common discussion about the possibilities of and limits to applying the procedure to concrete questions concerning other habitats, other animal associations etc.</li> </ul>
<b>Recommended reading</b>	<p>Hauer, F. Richard &amp; Lamberti, Gary A. (2007): Methods in Stream Ecology (Elsevier Inc.)</p> <p>Methods in Ecology and Evolution (British Ecological Society):</p>

<http://www.methodsinecologyandevolution.org/view/0/index.html>  
TIEE: <http://www.esa.org/tiee/misc/about.html>

Additional scientific publications and materials with examples of relevant research work will be made available via StudIP as an E-reserve of reference literature prior to the start of the course.

<b>Links</b>	<a href="https://www.uni-oldenburg.de/en/biology/aquatic-ecology-and-nature-conservation/">https://www.uni-oldenburg.de/en/biology/aquatic-ecology-and-nature-conservation/</a>
<b>Language of instruction</b>	English
<b>Duration (semesters)</b>	2 Semester
<b>Module frequency</b>	jährlich
<b>Module capacity</b>	unlimited
<b>Reference text</b>	Independent literature research on specific questions and methods by students.

Examination	Prüfungszeiten	Type of examination
<b>Final exam of module</b>	as agreed	Oral examination or housework 1) oral or written presentation of the method design 2) documentation of experimental procedure, data analysis and data processing 3) oral or written subject-specific analysis of the planning in respect of the relevant questions and elaborated hypotheses 4) interdisciplinary analysis of the experiments (oral or in writing)

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		1		14
Exercises		3		42
<b>Total module attendance time</b>				<b>56 h</b>

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## mar456 - Coastal Holocene

Module label	Coastal Holocene
Module code	mar456
Credit points	6.0 KP
Workload	180 h
Applicability of the module	<ul style="list-style-type: none"><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li><li>• Master's Programme Marine Environmental Sciences (Master) &gt; Mastermodule</li></ul>
Responsible persons	<ul style="list-style-type: none"><li>• Freund, Holger (module responsibility)</li></ul>
Prerequisites	
Skills to be acquired in this module	

Die Studierenden verstehen die geologischen, sedimentologischen und landschaftsprägenden Transport- und Ablagerungsprozesse im nordwestdeutschen Tiefland (fluviatiler, äolischer, mariner und glazialer Transport) sowie die Verknüpfung dieser Prozesse mit den wichtigsten Vegetationstypen (Wälder, Moore, Trockenlebensräume, Küstenlebensräume) dieser Region.

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### Module contents

#### **VL Nordwestdeutsches Küstenholozän – Geologie, Vegetation und Biostratigraphie**

Die Vorlesung vermittelt Kenntnisse der Materialaufbereitung und –umlagerung auf der Erdoberfläche, geomorphologischer Formungsprozesse und der Landschaftsdynamik am Beispiel der nordwestdeutschen Tiefebene. Behandelt werden kalt- und warmzeitliche Ablagerungszyklen und deren Ursachen, Meeresspiegelfluktuationen und die daran gekoppelte Vegetationsdynamik. Die wichtigsten Vegetationsformen Nordwestdeutschlands werden exemplarisch vorgestellt (Wälder, Moore, Trockenlebensräume und Küstenvegetation).

#### **PR/Ü Biologische Methoden der Faziesansprache von Küstenablagerungen – Pollen- und Diatomeenanalyse**

In der Übung werden Kenntnisse der Palynologie (Pollen- und Sporenkunde) und der Diatomologie praktisch vermittelt. Einsatzmöglichkeiten dieser Methoden werden an Fallbeispielen erläutert. Die Studierenden lernen die wichtigsten Pollen –und Sporentypen sowie die wichtigsten benthischen Diatomeen der Nordsee kennen. Anhand von Bohrkernen erarbeiten die Studierenden wie sich mit Hilfe von Mikrofossilien paläoökologische Fragestellungen beantworten bzw. die Rekonstruktion von Landschafts- und/oder Ökosystemveränderungen durchgeführt werden können. In einem Forschungsbericht dokumentieren die Studierenden ihre Ergebnisse der Bohrkernanalyse.

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### Recommended reading

- Bahlburg, H. & Breitzkreuz, C. (2008): Grundlagen der Geologie. Spektrum
- Ehlers, J. (2011): Das Eiszeitalter. Spektrum
- Lang, G. (1994): Quartäre Vegetationsgeschichte Europas. Fischer
- Moore, P.D., Webb, J.A. & Collinson, M.E. (1991): Pollen Analysis. Oxford
- Pott, R. (1996): Biotoptypen: Schützenswerte Lebensräume Deutschlands und angrenzender Regionen. Ulmer
- Schäfer, A. (2005): Klastische Sedimente – Fazies- und Sedimentstratigraphie. Elsevier
- Weitere Literatur wird in den Veranstaltungen angegeben.

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### Links

Language of instruction	German
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<b>Duration (semesters)</b>	1 Semester
<b>Module frequency</b>	jährlich
<b>Module capacity</b>	20 (

20 Personen im Praktikum Fazieskunde, Verfahren siehe Stud.IP

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Examination	Prüfungszeiten	Type of examination
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**Final exam of module**

Abgabe des Berichts bis Ende des Semesters

**1 benotete Prüfungsleistung**

Bericht zum Praktikum Fazieskunde oder Protokoll

**Aktive Teilnahme**

Aktive Teilnahme umfasst z.B. die regelmäßige Abgabe von Übungen, Anfertigung von Lösungen zu Übungsaufgaben, die Protokollierung der jeweils durchgeführten Versuche bzw. der praktischen Arbeiten, die Diskussion von Seminarbeiträgen oder Darstellungen von Aufgaben bzw. Inhalten in der Lehrveranstaltung in Form von Kurzberichten oder Kurzreferat. Die Festlegung hierzu erfolgt durch den Lehrenden zu Beginn des Semesters bzw. zu Beginn der Veranstaltung.

Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SuSe	28
Exercise or practical training		2	SuSe	28
<b>Total module attendance time</b>				<b>56 h</b>

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## mar458 - Aquatic Ecology

<b>Module label</b>	Aquatic Ecology
<b>Module code</b>	mar458
<b>Credit points</b>	6.0 KP
<b>Workload</b>	180 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"><li>• Master's Programme Environmental Modelling (Master) &gt; Mastermodule</li><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li><li>• Master's Programme Marine Environmental Sciences (Master) &gt; Mastermodule</li></ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"><li>• Brinkhoff, Thorsten Henning (module responsibility)</li><li>• Garcia, Sarahi Lorena (Module counselling)</li></ul>
<b>Prerequisites</b>	
<b>Skills to be acquired in this module</b>	

Studierende können nach erfolgreichem Besuch der Veranstaltungen die Bedeutung von Schwebstoffen für die Ökologie und Biogeochemie und die Gefährdung von Gewässern einschätzen und beurteilen, da sie sich vertieftes Wissen über folgende Gebiete angeeignet haben:

### **VL Grundlagen des Gewässerschutzes:**

Störungen und Gefährdung natürlicher Gewässer, Eutrophierung, Phosphor- und Stickstoffbelastung natürlicher Gewässer, Saprobienysteme, Gewässerversauerung, hygienische Belastung, Trinkwasseraufbereitung, Abwasserklärung, hormonell wirksame Substanzen

### **VL Biologische Bedeutung von Schwebstoffen**

Herkunft, Klassifizierung und Verteilung in Gewässern, Analytik, Transport und Sedimentation, Aggregation und Aggregatbildungsmechanismen, Fallbeispiele von Aggregationsereignissen, mikrobielle Besiedlung, mikrobielle Stoffumsatzaktivität, Strukturanalyse von aggregatassoziierten Bakteriengemeinschaften.

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## **Module contents**

### **VL Grundlagen des Gewässerschutzes**

Allgemeine Grundlagen zum Verständnis von Gewässern (Seen, Flüsse, Grundwasser, Ästuar, Küstenmeere) für deren Gefährdungspotenzial.

Eutrophierung und Sanierung von Gewässern, Bedeutung von Phosphor- und Stickstoffverbindungen für die Nährstoffbelastung von Gewässern, chemische und biologische Charakterisierung und Klassifizierung von Gewässern, Ursachen und Folgen der Gewässerversauerung, hygienische Belastung, Trinkwasserversorgung und -aufbereitung, mechanische, biologische und chemische Abwasserklärung, hormonell wirksame Substanzen

### **VL Biologische Bedeutung von Schwebstoffen**

Herkunft, Klassifizierung und Verteilung von Schwebstoffen in Gewässern, Analytik der Zusammensetzung von Schwebstoffen, Transport und Sedimentation von Schwebstoffen, Aggregation von Primärpartikeln und Aggregatbildungsmechanismen, Fallbeispiele von Aggregationsereignissen, mikrobielle Besiedlung von und mikrobielle Stoffumsatzaktivität auf Schwebstoffen, Strukturanalyse von Schwebstoff-assoziierten Bakteriengemeinschaften.

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## **Recommended reading**

### **VL Grundlagen des Gewässerschutzes**

Skript vorhanden, wird auf Stud.IP hochgeladen.

Dokulil, M., Hamm, A., Kohl, J.G. Ökologie und Schutz von Seen. Facultas Universitätsverlag, Wien 2001.  
Fent K., Ökotoxikologie, Thieme Verlag, Stuttgart 1998.



Frimmel, F.H., Wasser und Gewässer, ein Handbuch, Spektrum Verlag, Heidelberg 1999.  
 Gunkel, G., Bioindikation in aquatischen Ökosystemen, Gustav Fischer Verlag, Jena 1994.  
 Gunkel, G., Renaturierung kleiner Fließgewässer, Gustav Fischer Verlag, Jena 1996.  
 Lozan, J.L. et al., Warnsignale aus der Nordsee, Paul Parey Verlag, Hamburg 1990.  
 Lozan, J.L. et al., Warnsignale aus der Ostsee, Paul Parey Verlag, Hamburg 1996.  
 Mudrack, K., Kunst, S., Biologie der Abwasserreinigung, Gustav Fischer Verlag 1991.  
 Rohmann, U., Sontheimer, H., Nitrat im Grundwasser, Engler-Bunte-Institut, Universität Karlsruhe 1985.  
 Schulze, E., Hygienisch-mikrobiologische Wasseruntersuchungen, Gustav Fischer Verlag, Jena 1996.  
 Schwoerbel, J., Einführung in die Limnologie, Gustav Fischer Verlag, 8. Auflage, Jena 1999.

**VL Biologische Bedeutung von Schwebstoffen**

Skript vorhanden, wird auf Stud.IP hochgeladen.

Weitere Literatur wird zu Beginn der VL bereitgestellt.

<b>Links</b>		
<b>Languages of instruction</b>	German, English	
<b>Duration (semesters)</b>	2 Semester	
<b>Module frequency</b>	jährlich	
<b>Module capacity</b>	unlimited	
<b>Examination</b>	Prüfungszeiten	Type of examination
<b>Final exam of module</b>	Nach Ende der Vorlesungszeit	<p><b>1 benotete Prüfungsleistung</b></p> <p>mündliche Prüfung oder 1 Klausur mit folgenden Optionen:</p> <ol style="list-style-type: none"> <li>1. 100% der Fragen aus einer der beiden VL</li> <li>2. 50% der Fragen aus je einer der beiden VL (2 Teilklausuren)</li> </ol> <p>(Bestanden bei Erreichen von 50% der Notenpunkte insgesamt oder aus je einer der beiden Teilklausuren)</p>
<b>Type of course</b>	Lecture	
<b>SWS</b>	4	
<b>Frequency</b>	SuSe and WiSe	
<b>Workload attendance time</b>	56 h	

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## bio703 - Basic Concepts in Plant Sciences

<b>Module label</b>	Basic Concepts in Plant Sciences
<b>Module code</b>	bio703
<b>Credit points</b>	12.0 KP
<b>Workload</b>	360 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"><li>• Master's Programme Biology (Master) &gt; Background Modules</li><li>• Master's Programme Biology (Master) &gt; Background Modules</li><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li></ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"><li>• Zotz, Gerhard (module responsibility)</li><li>• Albach, Dirk Carl (Module counselling)</li><li>• von Hagen, Klaus Bernhard (Module counselling)</li><li>• Zotz, Gerhard (authorised to take exams)</li><li>• Albach, Dirk Carl (authorised to take exams)</li><li>• von Hagen, Klaus Bernhard (authorised to take exams)</li><li>• Will, Maria (authorised to take exams)</li></ul>
<b>Prerequisites</b>	
<b>Skills to be acquired in this module</b>	<p>Communicating in-depth knowledge in ecology, phylogeny, evolution and genetics of plants. Practicing an approach to scientific questions that considers different scales and methodologies Communicating theoretical concepts of ecology, evolution and genetics of plants.</p> <ul style="list-style-type: none"><li>++ in-depth biological expertise</li><li>+ in-depth knowledge of biological working methods</li><li>+ data analysis skills</li><li>+ interdisciplinary thinking</li><li>++ critical and analytical thinking</li><li>++ independent searching and knowledge of scientific literature</li><li>+ ability to perform independent biological research</li><li>++ data presentation and discussion in English (written and spoken)</li><li>+ teamwork</li><li>++ ethics and professional behaviour</li></ul>
<b>Module contents</b>	<p>V: Biodiversity of plants (2 SWS) V: Resource acquisition and use by plants (1 SWS) V: Gene expression in plants (1 SWS) S: Phylogeny of plants (2 SWS) S: Interactions of plants with environmental parameters (2SWS)</p>
<b>Recommended reading</b>	<p>Bresinsky et al. Strasburger's Plant Sciences. 2013 Springer, available as ebook. Oliveira, R.S. 2019. Plant Physiological Ecology. New York: Springer, available as ebook</p>
<b>Links</b>	
<b>Language of instruction</b>	English
<b>Duration (semesters)</b>	1 Semester
<b>Module frequency</b>	annually, winter term
<b>Module capacity</b>	12
<b>Reference text</b>	<p>associated with bio765 (Current Methods in Plant Science) (recommended)</p>
<b>Type of module</b>	Wahlpflicht / Elective
<b>Module level</b>	MM (Mastermodul / Master module)
<b>Teaching/Learning method</b>	Lecture, seminar
<b>Previous knowledge</b>	Ecology, flora, genetics

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Examination

Prüfungszeiten

Type of examination

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**Final exam of module**

1 Portfolio

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Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		4	WiSe	56
Seminar		4	WiSe	56
<b>Total module attendance time</b>				<b>112 h</b>

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## bio765 - Current Methods in Plant Sciences - Ecology, Phylogeny and Molecular Biology

<b>Module label</b>	Current Methods in Plant Sciences - Ecology, Phylogeny and Molecular Biology
<b>Module code</b>	bio765
<b>Credit points</b>	12.0 KP
<b>Workload</b>	360 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"><li>• Master's Programme Biology (Master) &gt; Background Modules</li><li>• Master's Programme Biology (Master) &gt; Background Modules</li><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li></ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"><li>• Albach, Dirk Carl (module responsibility)</li><li>• Zotz, Gerhard (Module counselling)</li><li>• Will, Maria (Module counselling)</li><li>• Khan, Gulzar (Module counselling)</li><li>• von Hagen, Klaus Bernhard (Module counselling)</li><li>• Zotz, Gerhard (authorised to take exams)</li><li>• Will, Maria (authorised to take exams)</li><li>• Albach, Dirk Carl (authorised to take exams)</li><li>• Khan, Gulzar (authorised to take exams)</li><li>• von Hagen, Klaus Bernhard (authorised to take exams)</li></ul>
<b>Prerequisites</b>	
<b>Skills to be acquired in this module</b>	<p>Acquaintance and practicing ecological, phylogenetic and molecular methods Communication of scale- and method-overarching thinking and project planning Knowledge of current methods and questions in plant science Capacity for teamwork, project- and time management</p> <p>++ in-depth biological expertise ++ in-depth knowledge of biological working methods ++ data analysis skills ++ interdisciplinary thinking + critical and analytical thinking + independent searching and knowledge of scientific literature + ability to perform independent biological research + data presentation and discussion (written and spoken) + teamwork + statistics &amp; scientific programming</p>
<b>Module contents</b>	<p>Current Methods in Plant Science. Subject to annual change. The specific topics for the coming semester will be presented at the module introduction during the orientation week, please check the community-Forum: 5.02.InfoB Informationen MSc Biology for the schedule: <a href="https://elearning.uni-oldenburg.de/dispatch.php/course/details?sem_id=d35edd08df0fb5c6a8ae3a81ea738b88&amp;again=yes">https://elearning.uni-oldenburg.de/dispatch.php/course/details?sem_id=d35edd08df0fb5c6a8ae3a81ea738b88&amp;again=yes</a></p>
<b>Recommended reading</b>	
<b>Links</b>	
<b>Language of instruction</b>	English
<b>Duration (semesters)</b>	1 Semester
<b>Module frequency</b>	annually, winter term
<b>Module capacity</b>	12
<b>Reference text</b>	associated with bio703 (Basic Concepts in Plant Sciences) (recommended)
<b>Type of module</b>	Wahlpflicht / Elective
<b>Module level</b>	MM (Mastermodul / Master module)
<b>Teaching/Learning method</b>	Exercise

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**Previous knowledge**

Ecology, flora, genetics

Examination

Prüfungszeiten

Type of examination

**Final exam of module**

**1 portfolio (1 poster, 1  
short report, 1 report)**

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**Type of course**

Exercises

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**SWS**

8

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**Frequency**

WiSe

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**Workload attendance time**

112 h

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## lök900 - Landscape Ecology Internal Research Module

<b>Module label</b>	Landscape Ecology Internal Research Module
<b>Module code</b>	lök900
<b>Credit points</b>	15.0 KP
<b>Workload</b>	450 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li></ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"><li>• Schmaljohann, Heiko (module responsibility)</li><li>• Schmaljohann, Heiko (Module counselling)</li><li>• der Landschaftsoekologie, Lehrende (authorised to take exams)</li></ul>
<b>Prerequisites</b>	

### Skills to be acquired in this module

- ++ deepened expertise in landscape ecology
- ++ deepened knowledge of working methods in the field of landscape ecology
- ++ data analysis skills
- ++ critical and analytical thinking
- ++ independent searching and knowledge of scientific literature
- ++ ability to perform independent landscape ecology research
- ++ data presentation and discussion in German or English (written and spoken)
- + teamwork
- ++ project and time management
- ++ statistics & scientific programming
- ++ experience of working in a new scientific environment

Students perform individual research projects to learn:

- planning and organization of a research project in a group outside of the University of Oldenburg
- formulating a scientific hypothesis
- planning, performing and analyzing experiments or correlative studies
- working with scientific literature on the specific context of the project
- oral presentation and discussion of backgrounds and results in the lab seminar
- writing a scientific report in publication format
  
- or presenting a scientific poster

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### Module contents

Students are introduced to independent research in a specific area of landscape ecology by a working group of the regular IBU Biology faculty at the University of Oldenburg.

Course work should cover all parts of a scientific project, i.e. developing hypotheses, data collection, data analysis and the presentation of the results. Irrespective of the particular venue (universities, research institutes) the student has to report to a professor in Oldenburg in form of a written scientific report (or scientific poster) and an oral presentation, both in English or German.

Note:

- all Professors and fulltime lecturers in Landscape Ecology at the IBU can act as supervisor, students should contact appropriate supervisors individually and in time (e.g. 2-3 months in advance)

<b>Recommended reading</b>				
<b>Links</b>				
<b>Language of instruction</b>		German		
<b>Duration (semesters)</b>		1 Semester		
<b>Module frequency</b>		WiSe und SoSe		
<b>Module capacity</b>		unlimited		
<b>Reference text</b>		- Alle Professor/Innen und im Schwerpunkt Landschaftsökologie hauptamtlich Lehrende des IBU können als Betreuer/Innen fungieren, die Studierenden müssen die entsprechenden Betreuer*Innen individuell und frühzeitig (z.B. 2-3 Monate im Voraus) kontaktieren.		
Examination		Prüfungszeiten	Type of examination	
<b>Final exam of module</b>		scientific report (scientific manuscript) or scientific poster and an oral presentation		
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Project-orientated module		10	SuSe or WiSe	140
Seminar (+ evtl. Vorlesung)		1	SuSe or WiSe	14
<b>Total module attendance time</b>				154 h

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## lök810 - Landscape Ecology External Research Project

<b>Module label</b>	Landscape Ecology External Research Project
<b>Module code</b>	lök810
<b>Credit points</b>	15.0 KP
<b>Workload</b>	450 h
<b>Applicability of the module</b>	<ul style="list-style-type: none"><li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li></ul>
<b>Responsible persons</b>	<ul style="list-style-type: none"><li>• Schmaljohann, Heiko (module responsibility)</li><li>• Schmaljohann, Heiko (Module counselling)</li><li>• der Landschaftsoekologie, Lehrende (authorised to take exams)</li></ul>
<b>Prerequisites</b>	
<b>Skills to be acquired in this module</b>	<p>++ deepened expertise in landscape ecology</p> <p>++ deepened knowledge of working methods in the field of landscape ecology</p> <p>++ data analysis skills</p> <p>++ critical and analytical thinking</p> <p>++ independent searching and knowledge of scientific literature</p> <p>++ ability to perform independent landscape ecology research</p> <p>++ data presentation and discussion in German or English (written and spoken)</p> <p>+ teamwork</p> <p>++ project and time management</p> <p>++ statistics &amp; scientific programming</p> <p>++ experience of working in a new scientific environment</p> <p>Students perform individual research projects to learn:</p> <ul style="list-style-type: none"><li>• planning and organization of a research project in a group outside of the University of Oldenburg</li><li>• formulating a scientific hypothesis</li><li>• planning, performing and analyzing experiments or correlative studies</li><li>• working with scientific literature on the specific context of the project</li><li>• oral presentation and discussion of backgrounds and results in the lab seminar</li><li>• writing a scientific report in publication format</li><li>• or presenting a scientific poster</li></ul>
<b>Module contents</b>	<p>Students are introduced to independent research in a specific area of landscape ecology by a working group of the regular IBU Biology faculty at the University of Oldenburg.</p> <p>Course work should cover all parts of a scientific project, i.e. developing hypotheses, data collection, data analysis and the presentation of the results. Irrespective of the particular venue (universities, research institutes) the student has to report to a professor in Oldenburg in form of a written scientific report (or scientific poster) and an oral presentation, both in English or German.</p> <p>Note:</p> <ul style="list-style-type: none"><li>• all Professors and fulltime lecturers in Landscape Ecology at the IBU can act as supervisor, students should contact appropriate supervisors individually and</li></ul>



in time (e.g. 2-3 months in advance)

<b>Recommended reading</b>	
<b>Links</b>	
<b>Languages of instruction</b>	German, English
<b>Duration (semesters)</b>	1 Semester
<b>Module frequency</b>	WiSe und SoSe
<b>Module capacity</b>	unlimited
<b>Reference text</b>	<p>- Alle Professor*Innen und hauptamtlich im Schwerpunkt Landschaftsökologie des IBU Lehrenden können als lokale Betreuer*In fungieren, die Studierenden müssen die entsprechenden Betreuer*In individuell und frühzeitig (z.B. 2-3 Monate im Voraus) kontaktieren.</p> <p>- Vor Projektbeginn müssen externe und lokale Betreuer*Innen das Formular für die Lernvereinbarung ausfüllen.</p> <p>- Der*die externe*r Betreuer*In an der Gasteinrichtung wird gebeten, eine kurze schriftliche Bewertung abzugeben, die endgültige Benotung erfolgt durch den*die Betreuer*In aus der Landschaftsökologie der Universität Oldenburg.</p>

Examination	Prüfungszeiten	Type of examination		
<b>Final exam of module</b>		scientific report (scientific manuscript) or scientific poster and an oral presentation		
Type of course	Comment	SWS	Frequency	Workload of compulsory attendance
Project-orientated module		10	SuSe or WiSe	140
Seminar		1	SuSe or WiSe	14
<b>Total module attendance time</b>				154 h

## bio890 - Current Topics in Biology

<b>Module label</b>	Current Topics in Biology	
<b>Module code</b>	bio890	
<b>Credit points</b>	3.0 KP	
<b>Workload</b>	90 h	
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>• Master's Programme Biology (Master) &gt; Skills Modules</li> <li>• Master's Programme Biology (Master) &gt; Skills Modules</li> <li>• Master's Programme Landscape Ecology (Master) &gt; Wahlpflichtmodule</li> </ul>	
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>• Gerlach, Gabriele (module responsibility)</li> <li>• Gerlach, Gabriele (authorised to take exams)</li> <li>• Laakmann, Silke (authorised to take exams)</li> <li>• Beutelmann, Rainer (authorised to take exams)</li> <li>• Bartölke, Rabea (authorised to take exams)</li> <li>• Fleischmann, Pauline (authorised to take exams)</li> </ul>	
<b>Prerequisites</b>		
<b>Skills to be acquired in this module</b>	<p>+ biological knowledge            + biologically relevant, natural / mathematical scientific basic knowledge            ++ interdisciplinary knowledge and thinking            ++ abstract, logical, and analytical thinking            ++ expanded knowledge in a specific biological field            ++ presentation of results and factual discussion, both written and spoken            ++ (scientific) communication skills</p> <p>To develop skills in the critical analysis and interpretation of results and themes in diverse areas of modern biology, including (but not limited to) evolutionary biology, population genetics, biodiversity, ecology, genomics, ornithology, and neurobiology.</p>	
<b>Module contents</b>	<p>Discussion and interpretations of one or more themes in modern biology. The themes and exact content will be provided by the instructor(s) at the beginning of the course. The module bio890 may be taken more than once as long as the content covered in the seminars differ substantially.</p>	
<b>Recommended reading</b>	<p>Varies with chosen topic (will be provided by the instructor(s) at the beginning of the course)</p>	
<b>Links</b>		
<b>Language of instruction</b>	English	
<b>Duration (semesters)</b>	1 Semester	
<b>Module frequency</b>	Summer and winter term	
<b>Module capacity</b>	unlimited	
<b>Type of module</b>	Wahlmodul / Opportunity	
<b>Module level</b>	MM (Mastermodul / Master module)	
<b>Teaching/Learning method</b>	Seminar	
<b>Previous knowledge</b>	Participation in one or more basic modules of the Master Biology	
Examination	Prüfungszeiten	Type of examination
<b>Final exam of module</b>	open	Final exam of module: 1 Portfolio. Components vary in the seminars. They are specified in Stud.IP in the respective seminar.

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<b>Type of course</b>	Seminar
<b>SWS</b>	2
<b>Frequency</b>	SuSe and WiSe
<b>Workload attendance time</b>	28 h

# Abschlussmodul

## mam - Master's Degree Module

<b>Module label</b>	Master's Degree Module		
<b>Module code</b>	mam		
<b>Credit points</b>	30.0 KP		
<b>Workload</b>	900 h		
<b>Applicability of the module</b>	<ul style="list-style-type: none"> <li>Master's Programme Landscape Ecology (Master) &gt; Abschlussmodul</li> </ul>		
<b>Responsible persons</b>	<ul style="list-style-type: none"> <li>der Landschaftsoekologie, Lehrende (authorised to take exams)</li> </ul>		
<b>Prerequisites</b>			
<b>Skills to be acquired in this module</b>	Successful completion of the Master module demonstrates that students are able to work on a problem in the field of Landscape Ecology within a fixed period applying scientific methods.		
<b>Module contents</b>	E: Preparing the Master thesis SE: Active participation in the seminar of the research group, in which the Master thesis is written.		
<b>Recommended reading</b>	Supervisors may supply an initial reading list with important literature. The students are expected to find and use further literature as needed.		
<b>Links</b>			
<b>Languages of instruction</b>			
<b>Duration (semesters)</b>	1 Semester		
<b>Module frequency</b>	semiannual		
<b>Module capacity</b>	unlimited		
<b>Examination</b>	<b>Prüfungszeiten</b>	<b>Type of examination</b>	
<b>Final exam of module</b>		Master's Thesis (80%) Oral examination (20%)	
<b>Type of course</b>	Seminar		
<b>SWS</b>	2		
<b>Frequency</b>			
<b>Workload attendance time</b>	28 h		

