HUMBOLDT-UNIVERSITÄT ZU BERLIN

LANDWIRTSCHAFTLICH-GÄRTNERISCHE FAKULTÄT

List of Modules - Modulverzeichnis

Master Programme - Masterstudiengang

Fishery Science and Aquaculture

Berlin, June 2011

Contents

1. Specialized Optional Modules (Basics)

2. Specialized Optional Modules (In-depth)

<table>
<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (Basics)
Ecology of Fish</td><td>WPG 1</td><td>Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">The students
- understand importance and impact of fish in the food web of aquatic systems
- learn about differentiation between horizontal and vertical ecological interactions
- understand population dynamics and life history of fish and the connection to ecology and fisheries management
- understand which mechanisms structure fish assemblages</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="3">Methods competence</td></tr>
<tr><td colspan="5">Preconditions: none, recommended: Fish Biology, Ecology, Limnology</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Cre dits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>3</td><td>4</td><td>135</td><td>- feeding strategies
- competition
- population dynamics
- fish assemblages
- life history strategies
- estimation of abundance and biomass of fish</td></tr>
<tr><td>Exercise</td><td>1</td><td>2</td><td>45</td><td></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td colspan="2">Exam</td><td colspan="3">Oral Exam 15 minutes</td></tr>
<tr><td colspan="2">Duration</td><td colspan="3">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="3">☒ WS ☐ SS 4 semester rotation</td></tr>
<tr><td colspan="2">· Teachers</td><td colspan="3">PD Dr. T. Mehner, mehner@igb-berlin.de</td></tr>
</table>

<table>
<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (Basics)
Applied Limnology (Limnology II)</td><td>WPG 2</td><td>Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">The students have acquired knowledge in the field of applied limnology and are able to use their knowledge in practice.</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="3">Methods competence</td></tr>
<tr><td colspan="5">Preconditions: none, recommended: Limnology</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Cre dits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>1</td><td>2</td><td>45</td><td>- laboratory and field studies in applied limnology
- limnological classification by trophic and hydrographic features
- different limnological field and laboratory techniques, limnological investigations of lake ecosystems
- lake classification (UNESCO, OECD, LAWA etc.)
- methods of lake restoration (selected examples)</td></tr>
<tr><td>Exercise</td><td>2</td><td>3</td><td>90</td><td></td></tr>
<tr><td>Field studies</td><td>1</td><td>1</td><td>45</td><td></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td colspan="2">Exam</td><td colspan="3">Oral Exam 30 minutes (100%), precondition: project report 15 pages and presentation 20 minutes</td></tr>
<tr><td colspan="2">Duration</td><td colspan="3">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="3">☐ WS ☒ SS 4 semester rotation</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="3">Prof. Dr. R. Koschel, Dr. P. Kasprzak
rko@igb-berlin.de, stechlin@igb-berlin.de</td></tr>
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<table>
<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (Basics)
Systematics and Evolution of Fish</td><td>WPG 3</td><td>Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">The students
- learn about the factors that have driven the evolution of fishes
- understand the relevant extant taxa and their diversity and biology
- understand the basic mechanisms of speciation in extant fishes</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="3">Methods competence</td></tr>
<tr><td colspan="5">Preconditions: none, recommended: Fish Evolution, Taxa</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Credits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>3</td><td>4</td><td>135</td><td>- Evolution of most important fish taxa and their relationships
- determination of species and attribution to taxonomic categories, knowledge about special features
- Systematics and phylogeny of important taxa
- development of morphological structures in the evolutionary process
- Exercises concerning the determination of living and dead fish (exercises in the Berlin Zoo-Aquarium)</td></tr>
<tr><td>Exercise</td><td>1</td><td>2</td><td>45</td><td></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td colspan="2">Exam</td><td colspan="3">Oral Exam 30 minutes</td></tr>
<tr><td colspan="2">Duration</td><td colspan="3">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="3">☒ WS ☐ SS 4 semester rotation</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="3">Prof. F. Kirschbaum frank.kirschbaum@staff.hu-berlin.de</td></tr>
</table>

<table>
<tr><td colspan="6">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (Basics)
Physiology of Fish Reproduction</td><td colspan="2">WPG 4</td><td>Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="4">The students
- understand of complex interaction between physiological processes, anatomic structures, and environmental influences on reproduction of fish
- apply basic knowledge in artificial reproduction of fish</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="4">Methods competence</td></tr>
<tr><td colspan="6">Preconditions: none, recommended: Fish Biology, Aquaculture, Limnology, Ecology</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Cre dits</td><td>Workload</td><td colspan="2">Contents</td></tr>
<tr><td>Lecture</td><td>3</td><td>4</td><td>135</td><td colspan="2">- Hormon physiological fundamentals in reproduction of fish,
- Sex differentiation,
- Gonadal development,
- Function of gonads
- Regulation of gonad function
- Spermatogenesis and oogenesis
- Insemination and fecundation
- Types of reproduction in fish
- Controlling of reproduction in aquaculture</td></tr>
<tr><td>Exercise</td><td>1</td><td>2</td><td>45</td><td colspan="2"></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td colspan="2"></td></tr>
<tr><td colspan="2">Exam</td><td colspan="4">Oral Exam 30 minutes</td></tr>
<tr><td colspan="2">Duration</td><td colspan="4">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="4">☐ WS ☒ SS 4 semester rotation</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="4">Prof. Dr. W. Kloas werner.kloas@igb-berlin.de</td></tr>
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<table>
<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (Basics)
Fishery Engineering and Fishing Gear</td><td>WPG 5</td><td>Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">The students
- acquire knowledge about some theoretical technical basics important in this field</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="3">Methods competence</td></tr>
<tr><td colspan="5">Preconditions: none, recommended: Fish Evolution, Taxa</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Cre dits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>2</td><td>4</td><td>90</td><td>- aquacultural process engineering: breeding and storage of fish, water refinement (e.g. oxygenation, waste water treatment)
- mechanisation of working processes: feeding, fish harvesting, grading, scaling and counting
- planning, erection and running of fishery plants
- fishing gears of the inland fishery and their construction,
use of machines and equipment in the inland fishery</td></tr>
<tr><td>Excursion</td><td>1</td><td>1</td><td>45</td><td></td></tr>
<tr><td>Exercise</td><td>1</td><td>1</td><td>45</td><td></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td colspan="2">Exam</td><td colspan="3">Oral Exam 30 minutes</td></tr>
<tr><td colspan="2">Duration</td><td colspan="3">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="3">☒ WS ☐ SS 4 semester rotation</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="3">Dr. F. Rümmler, frank.ruemmler@ifb-potsdam.de</td></tr>
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<table>
<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (Basics)
Management of Fish Communities</td><td>WPG 6</td><td>Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">The students
- differentiate between ecological, environmental and socio-economic impacts on inland fisheries
- understand fisheries management as management of fish, fisheries and environment
- learn methods to estimate fish stocks and fish production in inland waters
- understand alternative management concepts</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="3">Methods competence, management skills, thinking holistically and in systems terms</td></tr>
<tr><td colspan="5">Preconditions: none, recommended: Fish Evolution, Taxa, Limnology, Fish Ecology</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Cre dits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>4</td><td>6</td><td>180</td><td>- coastal and marine fisheries
- fisheries management techniques of special fish species
- fisheries, water quality management, recreation and conservation
- recreational fisheries as part of the inland fisheries
- modern concepts in fisheries management
- socio-economic aspects of fisheries management</td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td colspan="2">Exam</td><td colspan="3">Oral Exam 30 minutes (100%), prerequisite: holding a seminar (30 minutes)</td></tr>
<tr><td colspan="2">Duration</td><td colspan="3">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="3">☒ WS ☐ SS 4 semester rotation</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="3">Prof. Dr. R. Arlinghaus arlinghaus@igb-berlin.de
Dr. H. Winkler helmut.winkler@biologie.uni-rostock.de</td></tr>
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<table>
<tr><td colspan="6">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (Basics)
Methods of Fisheries Science</td><td>WPG 7</td><td colspan="2">Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="4">The students
- Learn methods to solve fisheries issues
- Are prepared to overcome statistical challenges
- Learn to search, analyse and use scientific literature
- Learn to write and present scientific results</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="4">Methods competence, presentation skills, critical thinking</td></tr>
<tr><td colspan="6">Preconditions: none, recommended: Management of Fish Communities</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Cre dits</td><td>Workload</td><td colspan="2">Contents</td></tr>
<tr><td>Lecture</td><td>3</td><td>4</td><td>135</td><td colspan="2">- What is science?
- Examples of good and bad research in fisheries science
- Introduction to applied fisheries statistics
- Methods of fisheries ecology
- Social scientific methods
- Presenting fisheries data and writing for fisheries journals</td></tr>
<tr><td>Exercise</td><td>1</td><td>2</td><td>45</td><td colspan="2"></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td colspan="2"></td></tr>
<tr><td colspan="2">Exam</td><td colspan="4">Research proposal 20 pages (50%) and presentation 15 minutes (50%)</td></tr>
<tr><td colspan="2">Duration</td><td colspan="4">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="4">☒ WS ☐ SS 4 semester rotation</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="4">Prof. Dr. R. Arlinghaus arlinghaus@igb-berlin.de</td></tr>
</table>

<table>
<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (Basics)
Aquaculture of Cyprinids</td><td>WPG 8</td><td>Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">The students
- know international status of aquaculture
- understand limnological processes in warm water fish ponds
- know biology of cyprinid species and their nutrition
- know other species in warm water ponds
- learn breeding methods of various cyprinids in aquaculture
- are able to manage and organize an aquaculture enterprise
- learn the marketing of cyprinids
- understand importance and historical development of cyprinid aquaculture
- learn to construct ponds
- understand the pond as habitat</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="3">Methods competence</td></tr>
<tr><td colspan="5">Preconditions: none, recommended: Aquaculture, Limnology, Fish Biology</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Credits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>3</td><td>4</td><td>135</td><td>- international status of aquaculture
- limnological processes in warm water fish ponds
- biology of cyprinid species and their nutrition
- other fish species in warm water fish ponds
- breeding methods of various cyprinids in aquaculture
- aquaculture enterprise
- marketing of cyprinids
- importance and historical development of cyprinid aquaculture
- construction of ponds
- pond as habitat</td></tr>
<tr><td>Exercise</td><td>1</td><td>2</td><td>45</td><td></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td colspan="2">Exam</td><td colspan="3">Oral Exam 30 minutes</td></tr>
<tr><td colspan="2">Duration</td><td colspan="3">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="3">☒ WS ☐ SS 4 semester rotation, lectures fortnightly</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="3">Dr. G. Füllner Gert.Fuellner@smul.sachsen.de</td></tr>
</table>

Master Fishery Science and Aquaculture				
Specialised Optional Module (Basics) **Microbial Diseases (Fish pathology I)**			WPG 9	**Credits: 6**
Objectives	- knowledge of occurrence, spread and control of microbial fish and shellfish diseases in the most important fishery regions in Europe, North America, Asia, and Australia			
Key qualification	Methods competence			
Preconditions: none, recommended: Microbiology, Anatomy, Fish Farming				
Teaching formats	Hours in class	Credits	Workload	Contents
Lecture	3	4	135	- symptoms, etiology, epidemiology, diagnosis, therapy/ prophylaxis of fish diseases caused by viruses, bacteria, protozoan and fungi in aquaculture and ornamental fish - infectology, immune response, stress - organisation of fish health service and EU directives
Exercise	1	2	45	
Total			180	
Exam	Oral Exam 30 minutes			
Duration	☒ 1 Semester ☐ 2 Semester			
Start of module	☒ WS ☐ SS 4 semester rotation			
Teachers	Dr. S. Heidrich stefanheidrich@web.de			

<table>
<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (Basics)
Special and Tropical Aquaculture</td><td>WPG 10</td><td>Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">Students have knowledge about
- developments in world aquaculture
- rearing concepts of different intensities
- tropical freshwater fish candidates
- biology and cultivation of marine fish species, molluscs and crustaceans
- application of biotechnologies in tropical aquaculture
- evaluation and design of possible farm sites
- approaches to improve sustainability and product quality</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="3">Methods competence</td></tr>
<tr><td colspan="5">Preconditions: none, recommended:Aquaculture, Limnology, Fish Biology</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Cre dits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>3</td><td>4</td><td>135</td><td>- Biological and ecological principles
- World aquaculture in numbers
- Aquacullture and aqua-agriculture systems
- Tropical freshwater fish candidates and their performance profiles in relation to production systems
- Preconditions for suitable farm sites
- Biotechnological approaches in tropical aquaculture
- Sustainability issues in tropical aquaculture
- Influencing product quality and quality management
- Functions and application of water reuse systems
- Cultivation of fish, molluscs and crustaceans in brackish and marine waters</td></tr>
<tr><td>Excercise</td><td>1</td><td>2</td><td>45</td><td></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td colspan="2">Exam</td><td colspan="3">Seminar presentation (30 min., 50%) and term paper (10 pages, 50%)</td></tr>
<tr><td colspan="2">Duration</td><td colspan="3">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="3">☒ WS ☐ SS 4 semester rotation</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="3">Dr. Müller-Belecke andreas.mueller-belecke@ifb-potsdam.de</td></tr>
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<table>
<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (Basics)
Aquaculture of Salmonids</td><td>WPG 11</td><td>Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">The students:
- the economic significance of salmonid culture,
- the most important salmonids used in aquaculture,
- the procedures of trout production and breeding,
- the problems concerning ecology and economy,
- occurence, distribution, and significance of salmonids,
- the most important salmon species used in aquaculture</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="3">Methods competence</td></tr>
<tr><td colspan="5">Preconditions: none, recommended: module Fish Biology, Limnology</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Cre dits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>3</td><td>4</td><td>135</td><td>- trouts and their distribution,
- biology and physiology of salmonids,
- methods and technics in trout production,
- breeding of trouts,
- technology of waste water treatment in trout aquaculture,
- market and perspectives of trout production,
- salmon species: natural distribution, development of stocks,
- biology and physiology of salmonids,
- intensive and semi-intensive produktion technology,
- environmental impact of salmon production,
- diseases and their control</td></tr>
<tr><td>Exercise</td><td>1</td><td>2</td><td>45</td><td></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td colspan="2">Exam</td><td colspan="3">Oral Exam 30 minutes</td></tr>
<tr><td colspan="2">Duration</td><td colspan="3">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="3">☒ WS ☐ SS 4 semester rotation</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="3">Dr. H. Wedekind helmut.wedekind@LfL.bayern.de
Prof. Dr. V. Hilge volker.hilge@vti.bund.de</td></tr>
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<table>
<tr><td colspan="6">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (In-depth)
Aquatic Microbial Ecology</td><td>WPV 1</td><td colspan="2">Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="4">Main aims are to understand:
- Structural and functional diversity of microbes in freshwater ecosystems
- the meaning of microbial activities in matter circulation, eutrophication, restoration or acidification
- use of specific methods for analysis of numbers, activities and identification of micro-organisms</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="4">Methods competence</td></tr>
<tr><td colspan="6">Preconditions: none, recommended: Basic microbiological knowledge</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Cre dits</td><td>Workload</td><td colspan="2">Contents</td></tr>
<tr><td>Lecture</td><td>3</td><td>4</td><td>135</td><td colspan="2">- Biology of micro-organisms (structure, macro-molecules, reproduction, phylogeny)
- Microbial ecology in freshwaters (functional diversity, microbes in nutrient’s circuits, biotic and abiotic interactions within microbiota)
- Basic methods from water- and sediment-sampling to molecular-biological techniques</td></tr>
<tr><td>Exercise</td><td>1</td><td>2</td><td>45</td><td colspan="2">Short course in Neuglobsow (3 days)</td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td colspan="2"></td></tr>
<tr><td colspan="2">Exam</td><td colspan="4">Oral Exam 30 minutes, prerequisite: participation in course at Stechlin</td></tr>
<tr><td colspan="2">Duration</td><td colspan="4">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="4">☒ WS ☐ SS 4 semester rotation,</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="4">Dr. P. Casper, pc@igb-berlin.de</td></tr>
</table>

Master Fishery Science and Aquaculture				
Specialised Optional Module (In-depth) **Ecology and Systematics of Plankton and Benthos**			WPV 2	**Credits: 6**
Objectives	The students - get general ideas about the diversity and systematics of invertebrates in lakes and rivers - gain insight in the ecology of selected species and taxa - get an overview about the food webs in different habitats - learn adaptive strategies of the organisms in their habitat - take note about the interactions between invertebrates and Fish and their importance as fish food - understand the significance of fish feeding on the structure of different communities			
Key qualification	Methods competence			
Preconditions: none, recommended: modules Limnology, Biology, Ecology				
Teaching formats	Hours in class	Credits	Workload	Contents
Lecture	2	4	90	- systematics and ecology of zooplankton and zoobenthos, developmental cycles, ecological physiology, significant environmental factors, habitats - ecology of feeding, food webs, flow of energy, biology of productivity - adaptational strategies in different habitats - predator-prey-relationships - top-down and bottom-up regulation of communities - water pollution, self-purification, assessment of ecological integrity
Seminar	1	1	45	
Practical training	1	1	45	
Total			180	
Exam	Oral Exam 30 minutes 100%, precondition: presentation 15 minutes			
Duration	☒ 1 Semester ☐ 2 Semester			
Start of module	☐ WS ☒ SS			
Teachers	Prof. Dr. N. Walz walz@igb-berlin.de Dr. M. Pusch pusch@igb-berlin.de			

<table>
<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (In-depth)
Phycology</td><td>WPV 3</td><td>Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">Students
- understand the phylogenetical diversity and the ecological role of algae in inland waters
- they are able to differentiate the main groups of algae, to identify selected representants under the microscope and to document the necessary diacritical characteristics
- they are able to use sampling and preparation techniques according to special demands of the different algal groups</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="3">Methods competence</td></tr>
<tr><td colspan="5">Preconditions: none, recommended: modules Limnology, Biology, Ecology</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Cre dits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>2</td><td>4</td><td>90</td><td>Biology of the main cyanobacteria and algal groups of inland waters:
- Cyanophyta (Blue-green alga, Cyanobacteria)
- Chrysophyta (Golden Algae)
- Bacillariophyta (Diatoms)
- Xanthophyta (Yellow-green Algae)
- Cryptophyta (Cryptophytes)
- Dinophyta (Dinoflagellates)
- Euglenophyta (Euglenids)
- Chlorophyta (Green Algae)</td></tr>
<tr><td>Excursion</td><td>1</td><td>1</td><td>45</td><td></td></tr>
<tr><td>Practical training</td><td>1</td><td>1</td><td>45</td><td></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td colspan="2">Exam</td><td colspan="3">Written Exam 30 minutes 100%, precondition: participation practical training</td></tr>
<tr><td colspan="2">Duration</td><td colspan="3">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="3">☐ WS ☒ SS block course 4 semester rotation</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="3">PD Dr. L. Krienitz krie@igb-berlin.de</td></tr>
</table>

<table>
<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (In-depth)
Tropical Fish Communities</td><td>WPV 4</td><td>Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">The students learn about
- ecology and zoogeography of tropical freshwater fish
- systematics of primary and secondary fishes
- characteristics of tropical fish communities
- periodicity of life cycles in the tropics
- overviews about aquaculture systems in the tropics and subtropics
- resources for tropical and subtropical aquaculture
- sustainability of tropical and subtropical aquaculture systems
- socioeconomy of tropical and subtropical aquaculture</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="3">Methods competence</td></tr>
<tr><td colspan="5">Preconditions: none, recommended: modules Limnology, Biology, Ecology</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Credits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>2</td><td>4</td><td>90</td><td>- ecology and zoogeographic of tropical fish species
- systematic of primary and secondary tropical fish species
- characteristics of tropical fish communities
- periodicity of life cycles in the tropics
- overview about aquaculture systems in the tropics and subtropics
- resources for tropical and subtropical aquaculture
- sustainability of tropical and subtropical aquaculture systems
- - socioeconomy of tropical and subtropical aquaculture</td></tr>
<tr><td>Seminar</td><td>2</td><td>2</td><td>90</td><td></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td colspan="2">Exam</td><td colspan="3">Oral Exam 30 minutes</td></tr>
<tr><td colspan="2">Duration</td><td colspan="3">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="3">☒ WS ☐ SS 4 semester rotation</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="3">Prof. Dr. F. Kirschbaum frank.kirschbaum@staff.hu-berlin.de
Dr. A. Müller-Belecke andreas.mueller-belecke@ifb-potsdam.de</td></tr>
</table>

Master Fishery Science and Aquaculture				
Specialised Optional Module (In-depth) **Water Chemistry**			WPV 5	**Credits: 6**
Objectives	- Understanding of problems of diffuse input of pollutants in freshwater and concepts of renaturation and reducing the input - Understanding of chemical balance processes, mostly biological or chemical influenced and their mathematical description (acid-, base-, fallout-, redox-, and complexing balance) - Insight in circulation of substances in aquatic systems - Knowledge in analytical methods (theoretical basic and practical work) for quantitative determination of water substances (nutrients, humic substances, different organic and anorganic pollutants, metals)			
Key qualification	Analytic abilities			
Preconditions: none, recommended: modules Limnology, Chemistry, Ecology				
Teaching formats	Hours in class	Credits	Workload	Contents
Lecture	2	2	90	- Geogene and anthropogene diffuse input of substances in surface freshwater and their effects, - Renaturation concepts, - Fundamentals of chemical balance in aquatic systems (acid-, base-, fallout-, redox-, and complexing balance), - Circulation of substances in aquatic systems in chemical point of view - Theoretical fundamentals in chemical analysis (Photometry, AAS, GC, Ionchromatography etc.)
Pract. Train.	1	2	45	
Seminar	1	2	45	
Total			180	
Exam	Oral Exam 30 minutes			
Duration	☒ 1 Semester ☐ 2 Semester			
Start of module	☒ WS ☐ SS 4 semester rotation			
Teachers	Dr. J. Gelbrecht gelbrecht@igb-berlin.de			

Master Fishery Science and Aquaculture				
Specialised Optional Module (In-depth) **Fish Behaviour and Evolution**			WPV 6	**Credits: 6**
Objectives	The students: - Understand fish behaviour as substantial component of animal's life - Learn that behavioural patterns are adaptive traits in fitness maximization - Learn which processes may impact on evolution in fish - Understand the interdependencies between fish ecology, behaviour and evolution			
Key qualification	Methods competence			
Preconditions: none, recommended: Fish Ecology, Fish Systematics				
Teaching formats	Hours in class	Credits	Workload	Contents
Interactive Learning in Peer Groups	3	4	135	Contents: - Reproductive behaviour - Feeding behaviour - Social behaviour - Speciation in Fish
Seminar	1	2	45	
Total			180	
Exam	3 assessments during lecture 1/3 each			
Duration	☒ 1 Semester ☐ 2 Semester			
Start of module	☒ WS ☐ SS 4 semester rotation			
Teachers	Dr. T. Mehner mehner@igb-berlin.de			

<table>
<tr><td colspan="6">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialized Optional Module (In-depth)
Experimental Fish Biology</td><td colspan="2">WPV 7</td><td>Studienpunkte: 6</td></tr>
<tr><td colspan="2">Objectives:</td><td colspan="4">- Understand basic principles of fish husbandry
- Learn experimental design, data collection and analysis
- Get an understanding of basic fish biology and behaviour</td></tr>
<tr><td colspan="2">Key qualifications</td><td colspan="4">Methods competence, complex thinking</td></tr>
<tr><td colspan="6">Preconditions: none</td></tr>
<tr><td>Teaching Formats</td><td>Hours in Class</td><td>cre dits</td><td>Workload (h)</td><td colspan="2">Contents</td></tr>
<tr><td>Block lecture</td><td>3</td><td>4,5</td><td>120</td><td colspan="2">- experimental procedures in fish biology
- experimental design and execution
- basic data processing and analysis</td></tr>
<tr><td>Exercise</td><td>1</td><td>1,5</td><td>60</td><td colspan="2"></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td colspan="2"></td></tr>
<tr><td colspan="2">Exam</td><td colspan="4">Oral exam, 20 minutes</td></tr>
<tr><td colspan="2">Duration</td><td colspan="4">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of Module</td><td colspan="4">☒ WS ☐ SS</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="4">Prof. Dr. Jens Krause, j.krause@igb-berlin.de</td></tr>
</table>

<table>
<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (In-depth)
European, World Sea and Inland Fisheries-Aims, Efficiency, Conflicts and Legal Regulation</td><td>WPV 8</td><td>Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3"></td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="3">Methods competence</td></tr>
<tr><td colspan="5">Preconditions: none, recommended: module Fish Biology, Economy</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Cre dits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>4</td><td>6</td><td>180</td><td>- Historical development of the different kinds of fisheries and tendencies;
- Spectrum of fishing methods and their social-economic background;
- Global catches and overfishing situation;
- Development of fisheries and aquaculture in third worlds countries;
- Global demand for fish food and its flux to markets, trade agreements;
- National and international regulations for promotion and control of fisheries;
- The different research and surveillance organizations in fisheries;
- Structure, work and issues of the international and supranational organizations concerned in conservation of the aquatic environment.</td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td colspan="2">Exam</td><td colspan="3">Oral Exam 30 minutes</td></tr>
<tr><td colspan="2">Duration</td><td colspan="3">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="3">☐ WS ☒ SS 4 semester rotation</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="3">Dr. U. Grosch</td></tr>
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<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (In-depth)
Protection of Endangered Species</td><td>WPV 9</td><td>Credits: 6</td></tr>
<tr><td>Objectives</td><td colspan="4">Students acquire knowledge about
- applied aspects of fish ecology and fisheries
- environmental assessment methods
- fish based environmental assessments
- habitat restoration
- environmental assessment of waters</td></tr>
<tr><td>Key qualification</td><td colspan="4">Methods competence</td></tr>
<tr><td colspan="5">Preconditions: none, recommended: modules Fish Biology, Limnology, Ecology</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Credits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>3</td><td>4</td><td>135</td><td>- Extinction risks, hazards and threats of freshwater fish
- introduction to threatened species, habitat requirements, environmental preferences, ecological guilds, ecology of endangered species risk categories, stock assessment, assessments of environmental impacts, conservation threats, methodologies, sampling design, data handling & analyses
- habitats, habitat assessment, type-specific fish communities & assemblages, trait-mediated habitat use, life cycle histories
- fish migrations, biodiversity concepts, conservation concepts
- evaluation of freshwaters, fish-based assessment of environmental impacts
- mitigation measures, revitalisation, restoration, decolonization, stock enhancement</td></tr>
<tr><td>Exercise</td><td>1</td><td>2</td><td>45</td><td></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td>Exam</td><td colspan="4">Oral Exam 30 minutes</td></tr>
<tr><td>Duration</td><td colspan="4">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td>Start of module</td><td colspan="4">☐ WS ☒ SS 4 semester rotation</td></tr>
<tr><td>Teachers</td><td colspan="4">Dr. C. Wolter wolter@igb-berlin.de</td></tr>
</table>

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<tr><td colspan="6">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (In-depth)
Recreational Fisheries</td><td>WPV 10</td><td colspan="2">Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="4">Students learn
- role of recreational fishing in global fisheries
- human dimensions theories to understand angler behaviour
- economic methods to value recreational fisheries
- biological approaches in recreational fisheries science</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="4">Methods competence, inter-disciplinary thinking</td></tr>
<tr><td colspan="6">Preconditions: none, recommended: module Fisheries Management</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Cre dits</td><td>Workload</td><td colspan="2">Contents</td></tr>
<tr><td>Lecture</td><td>3</td><td>4</td><td>135</td><td colspan="2">- importance of the recreational fisheries
- management of the recreational fisheries
- methods of the recreational fisheries
- present state and trends in the recreational fisheries
- nature and animal protection
- social-economic aspects of recreational fisheries
- cultivation of angling waters
- usual methods of recreational fisheries</td></tr>
<tr><td>Pract. Train.</td><td>1</td><td>2</td><td>45</td><td colspan="2"></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td colspan="2"></td></tr>
<tr><td colspan="2">Exam</td><td colspan="4">Oral exam 30 minutes (100%), prerequisite: holding a seminar (30 minutes)</td></tr>
<tr><td colspan="2">Duration</td><td colspan="4">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="4">☐ WS ☒ SS 4 semester rotation</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="4">Prof. Dr. R. Arlinghaus arlinghaus@igb-berlin.de</td></tr>
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Master Fishery Science and Aquaculture				
Specialised Optional Module (In-depth) **Fish and Fisheries Sampling Techniques**			WPV 11	**Credits: 6**
Objectives	Students: - Learn to plan fishing operations - Learn to apply fisheries techniques - Learn to consider statistics in sampling - Learn to gather and store field data			
Key qualification	Methods competence, teamwork, scientific writing, field work, critical analysis skills			
Preconditions: none, recommended: modules Fish Communities Management, Recreational Fisheries				
Teaching formats	Hours in class	Credits	Workload	Contents
Seminar	2	3	90	- Plan and conduct field sampling - Fish sampling and processing techniques - Creel surveys - Sample processing and analysis
Pract. Train.	2	3	90	
Total			180	
Exam	Field research paper (30 pages) in teamwork as prerequisite for presentation of results (30 minutes, 100%)			
Duration	☒ 1 Semester ☐ 2 Semester			
Start of module	☐ WS ☒ SS 4 semester rotation			
Teachers	Prof. Dr. R. Arlinghaus arlinghaus@igb-berlin.de Dr. C. Wolter wolter@igb-berlin.de			

Master Fishery Science and Aquaculture				
Specialised Optional Module (In-depth) **Aquaculture of Additional Species**			WPV 12	**Credits: 6**
Objectives	- Students are capable to describe and assess the different production techniques. - They know about the value of species for the different markets.			
Key qualification	Methods competence			
Preconditions: none, recommended: knowledge in husbandry techniques for fish production				
Teaching formats	Hours in class	Credits	Workload	Contents
Lecture	3	4	135	Controlled reproduction and rearing of economically important fish species of Europe and related aspects, incl. selected species of other regions of the world.
Excursion	1	2	45	
Total			180	
Exam	Oral Exam 30 minutes (100%), prerequisites: presentation 10 minutes, participation in excursion			
Duration	☒ 1 Semester ☐ 2 Semester			
Start of module	☐ WS ☒ SS 4 semester rotation			
Teachers	Prof. Dr. V. Hilge volker.hilge@vti.bund.de J. Gessner sturgeon@igb-berlin.de			

Master Fishery Science and Aquaculture				
Specialised Optional Module (In-depth) **Fish Nutrition**			**Grad:** WPV 13	**Studienpunkte: 6**
Lern- und Qualifikationsziele:	The students learn about - Key aspects of nutrient requirement and metabolism of fish - In-depth knowledge of nutritive values of fish feed and ingredients - Principles of diet formulation and feeding strategies - Current issues and challenges in fish nutrition - Critical evaluation of the scientific literature relating to fish feeding and nutrition			
Schlüsselqualifikationen	Methods competence			
Voraussetzungen für die Teilnahme am Modul: none				
Lehr- und Lernformen	Präsenz-SWS	SP	Workload (h) incl. Vor-/Nachbereitung	Themen, Inhalte
Lecture	2	4	90	- Macronutrients, micronutrients, anti-nutrients and feed additives - Factors influencing feeding and nutrient requirements of fish - Concepts of nutrient utilization and partitioning in fish - Methods to evaluate fish feed ingredients and their limitations - Feed formulation and processing - Feeding practices, nutritional management and waste reduction - Emerging areas of interest in fish nutrition and feeding
Seminar	2	2	90	
Gesamt-h			180	
Modulabschlussprüfung	Seminar presentation (100%), preconditions: participation in class discussion and term paper (10 pages)			
Dauer des Moduls	☒ 1 Semester ☐ 2 Semester			
Beginn des Moduls	☐ WS ☒ SS			
Lehrende	Prof. Dr. K. Hua khua@agrar.hu-berlin.de			

<table>
<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (In-depth)
Reproduction of Ornamental Fishes</td><td>WPV 14</td><td>Credits: 6</td></tr>
<tr><td>Objectives</td><td colspan="4">- practical experience in ornamental fish reproduction and necessary feed reproduction,
- knowledge concerning the diversity of reproductive strategies of ornamental fish,
- knowledge in manipulation of exogenous parameters in achieving cyclical reproduction in fish,
- construction of aquaria and filters,
- management of and responsibility in team work</td></tr>
<tr><td>Key qualification</td><td colspan="4">Methods competence</td></tr>
<tr><td colspan="5">Preconditions: none, recommended: modules Fish Biology, Limnology, Aquaculture</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Credits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>2</td><td>4</td><td>90</td><td>- breeding fish, mainly tropical fish and in addition, if there is a student’s interest, breeding crayfish and shrimp.
- practical experience with different fish species, showing various features concerning reproductive biology (e.g. continuous cyclical reproduction, fractional and total spawners etc.)
- different techniques, essential for the breeding success
- modification of pH and conductivity
- different filter techniques
- breeding of food organisms (paramecia, nematodes, Drosophila etc.)</td></tr>
<tr><td>Exercise</td><td>2</td><td>2</td><td>90</td><td></td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td>Exam</td><td colspan="4">Oral Exam 30 minutes</td></tr>
<tr><td>Duration</td><td colspan="4">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td>Start of module</td><td colspan="4">☐ WS ☒ SS 4 semester rotation</td></tr>
<tr><td>Teachers</td><td colspan="4">Prof. Dr. F. Kirschbaum frank.kirschbaum@staff.hu-berlin.de</td></tr>
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<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (In-depth)
Metazoan Fish Parasites (Fish pathology II)</td><td>WPV 15</td><td>Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">- Overview on metazoan fish parasites, their morphology, life cycles, ecology, pathogenicity, and immunology
- Techniques in diagnosis and dissection, differentiation of fish parasites by appropriate examination methods
- Possibilities of prophylaxis and therapy of parasitic fish diseases</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="3">Methods competence</td></tr>
<tr><td colspan="5">Preconditions: none, recommended: modules Fish Biology, Limnology</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Credits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>3</td><td>4</td><td>135</td><td>Biology of metazoan fish parasites:
- Myxosporea
- Monogenea
- Digenea
- Cestoda
- Nematoda
- Acanthocephala
- Crustacea
- Hirudinea
- Bivalvia
Basics in fish immunology</td></tr>
<tr><td>Practical training</td><td>1</td><td>2</td><td>45</td><td>Dissection of fish, microscopy</td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td colspan="2">Exam</td><td colspan="3">Written Exam 90 minutes</td></tr>
<tr><td colspan="2">Duration</td><td colspan="3">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="3">☐ WS ☒ SS 4 semester rotation</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="3">Dr. K. Knopf klaus.knopf@igb-berlin.de</td></tr>
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<tr><td colspan="5">Master Fishery Science and Aquaculture</td></tr>
<tr><td colspan="3">Specialised Optional Module (In-depth)
Genetics and Breeding of Fish</td><td>WPV 16</td><td>Credits: 6</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">- Knowledge in molecular genetic fundamentals and processes,
- Knowledge in inheritance of quantitative and qualitative traits,
- Knowledge in methods for genetic improvement of cultured fish,
- Knowledge in methods for genetic characterization of fish populations and their application in conservation genetics and aquaculture management</td></tr>
<tr><td colspan="2">Key qualification</td><td colspan="3">Methods competence</td></tr>
<tr><td colspan="5">Preconditions: none, recommended: modules Fish Biology, Aquaculture</td></tr>
<tr><td>Teaching formats</td><td>Hours in class</td><td>Credits</td><td>Workload</td><td>Contents</td></tr>
<tr><td>Lecture</td><td>4</td><td>6</td><td>180</td><td>- Molecular genetic fundamentals and processes,
- Fish karyotypes,
- Mechanisms of genetic sex determination in fish,
- Genetics of qualitative and quantitative traits,
- Genetic improvement of fish species by classical breeding as well as biotechnological techniques and gene transfer
- Genetic characterisation of fish populations</td></tr>
<tr><td>Total</td><td></td><td></td><td>180</td><td></td></tr>
<tr><td colspan="2">Exam</td><td colspan="3">Oral Exam 30 minutes</td></tr>
<tr><td colspan="2">Duration</td><td colspan="3">☒ 1 Semester ☐ 2 Semester</td></tr>
<tr><td colspan="2">Start of module</td><td colspan="3">☐ WS ☒ SS 4 semester rotation</td></tr>
<tr><td colspan="2">Teachers</td><td colspan="3">Dr. K. Kohlmann kohlmann@igb-berlin.de
Dr. A. Müller-Belecke andreas.mueller-belecke@ifb-potsdam.de</td></tr>
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Master Fishery Science and Aquaculture				
Specialised Optional Module (In-depth) **Environmental Stress of Fish**			WPV 17	**Credits: 6**
Objectives	- Knowledge on impact of natural and anthorpogenic stressors on aquatic ecosystem, especially in fish, - Knowledge in law of hereditiy of quantitativ and qualitative features, - Testing methods in ecotoxicology - Skills in management of environmental fish diseases, prevention and systematic disease control respectively			
Key qualification	Methods competence			
Preconditions: none, recommended: modules Fish Biology, Limnology, Aquaculture, Ecology				
Teaching formats	Hours in class	Credits	Workload	Contents
Lecture	3	4	135	- Fundamentals and testing methods of ecotoxicology, - Stress induced physiology in fish, - Environmental impact on fish caused by anthropgenic and natural stressors, - Possibilities of diagnosis, prophylaxis and therapy of environmental fish diseases
Exercise	1	2	45	
Total			180	
Exam	Oral Exam 30 minutes			
Duration	☒ 1 Semester ☐ 2 Semester			
Start of module	☐ WS ☒ SS 4 semester rotation			
Teachers	Prof. Dr. W. Kloas werner.kloas@igb-berlin.de Dr. T. Meinelt meinelt@igb-berlin.de			