Module Description Master of Science Marine Geosciences 2012

Climate Change I: Fundamentals

Module title and code no	05-MAR-1-C1 Climate Change I: Fundamentals			
Representative/s	Andre Paul, Michael Schulz			
Appendant courses	05-MAR-1-C1-1 05-MAR-1-C1-2	Earth System Modelling The Role of High Latitudes Oceans in Climate Change	Lecture, Exercise Lecture, Exercise	3 SWS 2 SWS
Workload / credit points	9 CP 9 CP (270 h) / 5 SWS 70 h lectures and practicals 150 h reading asigments, homework, self-revision of lectures and additional, complementary material (exercises, textbooks, etc.) 50 h study time for the final exam			
Mandatory / compulsory / elective	Compulsory			
Assignment	Master of Science Marine Geosciences 2012			fulltime class
Duration	1 Semester Winter term / First year of study			
Requirements for participation	Basic computer skills (Windows OS)			
Offered	Yearly WS			
Teaching Language	Teaching language: English			
Learning Outcome	Students obtain a basic understanding of the physics of the climate system with special emphasis on high latitude processes. They become familiar with the mathematical and physical concepts underlying earth-system models and obtain programming and data-anylsis skills (Matlab)			
Content	- Introduction to numerical Earth-System models - Paleoclimatic history of polar regions and their role in global climate evolution			
Exam	Module exam (one mark): oral exam			
Literature	will be announced in the different courses			

Marine Environmental Archives: Methods

Module title and code no	05-MAR-1-C2 Marine Environmental Archives: Methods			
Representative/s	Torsten Bickert, Tilo von Dobeneck			
Appendant courses	05-MAR-1-C2-1 05-MAR-1-C2-2 05-MAR-1-C2-3	Marine Ecosystems as Environmental Indicators Environmental Magnetism Terrigenous Signals	Lecture, Exercise Lecture, Exercise, Seminar Lecture, Seminar	1 SWS 1 SWS 1 SWS

	05-MAR-1-C2-4	Stable Isotopes and Trace Elements in Paleoenvironmental Research	Lecture, Exercise	2 SWS
Workload / credit points	9 CP 180 hours / 9 CP - 15 h presence in Marine ecosystems (1 SWS, 15 weeks) - 30 h presence in Stable isotopes and trace elements (2 SWS, 15 weeks) - 15 h presence in Terrigenous signals (1 SWS, 15 weeks) - 15 h presence in Environmental magnetics (1 SWS, 15 weeks) - 50 h self-study proxy principles and application - 55 h self-study exercises, preparation of case studies			
Mandatory / compulsory / elective	Compulsory			
Assignment	Master of Science Marine Geosciences 2012			fulltime class
Duration	1 Semester Winter term / First year of study			
Requirements for participation	Basic knowledge in marine geology, biogeochemistry, physical oceanography			
Offered	Yearly WS			
Teaching Language	Teaching language: english Further language skills: - Level: C1			
Learning Outcome	- to become familiar with proxy development and application - to gain an understanding of the most important processes in paleoenvironmental change - to be able to apply the methods to case studies of actual research			
Content	This first of two modules on marine paleoenvironmental archives aims at introducing and applying the most important methods to describe the marine environment in the past and to understand the processes of environmental change. Proxy implementation follows the stages of proxy development, validation and application. Proxy research is strongly interdisciplinary. This module, therefore, integrates geochemical, geological, geophysical and paleontological methodology. Stratigraphic methods are very helpful in environmental studies and therefore introduced in an extra course.			
Exam	Module exam (one mark): written exam			
Literature	will be announced in the different courses			

Biogeochemical Processes: Concepts

Module title and code no	05-MAR-1-C3 Biogeochemical Processes: Concepts			
Representative/s	Marcus Elvert, Matthias Zabel			
Appendant courses	05-MAR-1-C3-1	Biogeochemistry I	Lecture, Exercise	5 SWS
Workload / credit points	9 CP 9 CP (270 h) / 5 SWS			

	70 h presence / lecture time (1/3 for each discipline, see above) 150 h homework and self-revision of lectures and additional, complementary material (exercises, textbooks, etc.) 50 h study time for the final exam
Mandatory / compulsory / elective	Compulsory
Assignment	Master of Science Marine Geosciences 2012 fulltime class
Duration	1 Semester Winter term / First year of study
Requirements for participation	Undergraduate expertise in chemistry, geochemistry, and marine geology is required. Additional basic understanding in biology and expertise in scientific calculation is advantageous.
Offered	Yearly WS
Teaching Language	Teaching language: English Further language skills: German
Learning Outcome	After attending this module the student will have expertise in a) the physical and chemical behavior of light stable isotopes under natural environmental conditions, b) the functional relationships of microbially driven processes on earth and methods to study these processes, and c) the utilization of both geo- and biomolecules as sources of information for the study of paleoenvironmental and biogeochemical processes.
Content	The predominant number of transfer processes in the marine realm are driven by biogeochemical reactions and most of them are catalysed by microorganisms. Within the module “Biogeochemical Processes: Concepts” we want to impart the wide range of material cycles, their mechanisms and driving forces in different marine environments, from the sea surface to the ocean crust. Starting with fundamentals in this interdisciplinary field of research, specific courses will lead the students to recently discussed topics in organic geochemistry, inorganic geochemistry, biogeochemistry and geomicrobiology. The understanding of early diagenesis is one of the main prerequisites to answer most of the recent questions of the functioning of the oceanic system. In detail, the physical and chemical behaviour of light stable isotopes (H, B, C, N, O, S) under natural environmental conditions, fractionation processes, microbially catalysed biogeochemical processes and respective research methods (cycles of C, N, P, S, Mn and Fe) will be introduced. The biomarker concept and molecular biomarkers are defined, and techniques to analyze them are described. Additionally, recent applications from a wide variety of marine scientific disciplines, including chemical oceanography, paleoceanography, marine biogeochemistry, and marine microbiology are discussed.
Exam	Module exam (one mark): oral exam
Literature	Canfield, Thamdrup & Kristensen (eds) (2005) Aquatic Geomicrobiology, Acad. Press. Faure (1986) Principles of Isotope Geology. John Wiley & Sons Hoefs (1997) Stable Isotope Geochemistry, Springer. Killops & Killops (2005) Introduction to Organic geochemistry, 2nd edition. Peters, Walters and Moldowan (2005) The biomarker guide, 2nd edition. Schulz & Zabel (eds) (2006) Marine Geochemistry. 2nd ed., Springer. Additionally, specific literature is recommended in each course block.

Marine Resources and Geotechnology I

Module title and code no	05-MAR-1-C4 Marine Resources and Geotechnology I
Representative/s	Gerhard Bohrmann, Achim Kopf
Appendant courses	05-MAR-1-C4-1 Continental Margin Resources — Field Exercise, Exercise, Seminar — 2,5 SWS 05-MAR-1-C4-2 Gas Hydrates: Formation, Detection, Relevance; starts on Monday 14 Oct. 08:15 room Geo 3010 — Lecture, Exercise — 2,5 SWS 05-MAR-1-C4-3 Applied Petroleum Geology; starts on Tuesday Feb. 4, 13:15, room GEO-0340 — Lecture — 1 SWS
Workload / credit points	9 CP 270 h / 9 CP - 35 h presence in Continental margin resources (2.5 SWS, 14 weeks) - 35 h presence in Gas hydrates: formation, detection, relevance (2.5 SWS, 14 weeks) - 200 h homework and self-revision of the given and additional, complementary material (textbooks, regional papers, preparation of oral presentations, etc.)
Mandatory / compulsory / elective	Compulsory
Assignment	Master of Science Marine Geosciences 2012 — fulltime class
Duration	1 Semester Winter term / First year of study
Requirements for participation	Basic knowledge of sedimentary and tectonic processes as well as exploration and under water technology Basic knowledge in Earth history
Offered	Yearly WS
Teaching Language	Teaching language: English Further language skills: - Level: moderate to high
Learning Outcome	The courses in this module provide the student with a basic understanding of ocean margin resources and what technology is used to explore and monitor them, with special attention to hydrocarbon resources and gas hydrate processes. The student will have a comprehensive insight into the physics and chemistry and geobiology of gas hydrate systems, and will further work self-determined on regional marine resources after having been introduced to the basic knowledge of resources in the broadest sense (spanning from MOR ore deposits via sediments and rocks to hydrocarbons, phosphorites and evaporites, mineral deposits in the deep sea, etc.
Content	The field of Marine resources and geotechnology responds to the growing need of a better understanding of geoprocesses along continental margins and on the shelf, especially since these areas undergo heavy use by humans. This includes wind energy, telecommunication, and hydrocarbon industries who explore and exploit these areas and install infrastructure.
Exam	Module exam (combined marks): seminar talk 50 % written exam 50 %

Literature	will be provided during the individual classes

Sedimentary Structures and Processes: Shelves and Passive Margins

Module title and code no	05-MAR-1-C5 Sedimentary Structures and Processes: Shelves and Passive Margins			
Representative/s	Rüdiger Henrich, Volkhard Spieß			
Appendant courses	05-MAR-1-C5-1	Sedimentary Structures and Processes: Passive Continental Margins	Lecture, Exercise	2 SWS
	05-MAR-1-C5-3	Seismic and Acoustic Imaging of Sedimentary Structures	Lecture, Exercise	1 SWS
	05-MAR-2-C5-2	Sedimentology and Ecology of Shelves	Lecture, Exercise, Seminar	2 SWS
Workload / credit points	9 CP Amount of work 270 hours / 9 CP - 10 h presence in Seismic and acoustic imaging - 30 h Presence in Sedimentology and Ecology of Shelves - 30 h Presence in Sedimentary structures and processes: passive margins - 70 h Repetition of content of the lectures - 90 h Work time for case study and written report - 40 h Preparation time for the oral exam			
Mandatory / compulsory / elective	Compulsory			
Assignment	Master of Science Marine Geosciences 2012			fulltime class
Duration	1 Semester Winter term / First year of study			
Requirements for participation	Basic sedimentological and geophysical knowledge.			
Offered	Yearly WS			
Teaching Language	Teaching language: english			
Learning Outcome	Advanced training in facies analysis, acoustic imaging and evaluation of conceptional sedimentation models for tropical and nontropical carbonaceous and siliciclastic modern and ancient continental margin systems (shelf and continental slope settings).			
Content	! first dates: Tuesday, Oct. 22, 2 pm s.t. until 4.30 pm Saturday, Oct. 26, 9 am s.t. until 2 pm! A major element of the marine environment are particles derived from biogenic production or terrigenuous sediment input, which accumulate to thick sequences on continental margins and in the deep sea. The processes responsible for the transport of particles, their deposition and the interfaces and structures as a results of environmental changes and tectonics forces are the central focus of this module integrating sedimentological, geophysical and actuo-paleontological results. Training on the application of advanced methods of data interpretation from two- and three-dimensional imaging from echosounder to deep seismic records is included. This is applied on selected case studies from current research. Building up on this knowledge a second course introduces the main features of carbonate and			

	terrigenous sedimentation patterns in tropical and non-tropical shelf environments along latitudinal and bathymetrical traverses. Analysis of sediment dynamics and ecological pattern on shelves provide important links between terrestrial and oceanic responses to global climate forcing. Finally sediment dynamics, in particular slope stability and mass wasting phenoma, are analysed and discussed in terms of sedimentary and evolutionary models for selected modern and ancient case studies. Joint oral exam on module content (60%): Oral exam (20 minutes per candidate, two examiners) covering all topics of all three courses of the module ("Sedimentology and ecology of shelves", "Seismic and acoustic imaging", "Sedimentary structures and processes of passive continental margins") Practical exams (40%): Oral presentation (20%) of a topic on "Seismic and acoustic imaging" Written report (20%) on description and interpretation of a sedimentary core record and seismic information associated to the topics presented in the course "Sedimentary structures and processes of passive continental margins"
Exam	Module exam (combined marks): oral exam 60 % written report 20 % seminar talk 20 %
Literature	

Formation and Evolution of the Ocean Crust

Module title and code no	05-MAR-1-C6 Formation and Evolution of the Ocean Crust			
Representative/s	Wolfgang Bach, Heinrich Villinger			
Appendant courses	05-MAR-1-C6-1	Geophysics of Mid-Ocean Ridges and Abyssal Plains	Lecture	2 SWS
	05-MAR-1-C6-2	Magmatic and Hydrothermal Processes at Mid-Ocean Ridges	Lecture, Exercise	2 SWS
	05-MAR-1-C6-3	Microscopy of Rocks from the Ocean Basins	Exercise	2 SWS
Workload / credit points	9 CP 9CP = 270 hours 90 hours of course work in the three classes (30 hours each) 30 hours for exercises and practicing (05M-MAR-1-C6-2 and -3) 60 hours for home work assignments (05M-MAR-1-C6-2 and -3) 90 hours for home work assignments and computational exercises (05M-MAR-1-C6-1)			
Mandatory / compulsory / elective	Compulsory			
Assignment	Master of Science Marine Geosciences 2012			fulltime class
Duration	1 Semester Winter term / First year of study			
Requirements				

for participation	
Offered	Yearly WS
Teaching Language	Teaching language: English
Learning Outcome	Ability to evaluate geophysical and petrological observations. Mastering basic principles of model development, using geophysical and petrological data. Developing problem-solving skills in ocean crust formation and evolution processes, using geophysical and petrological principles.
Content	Mantle melting and melt segregation. Magma plumbing systems - seismic imaging and petrological processes. Heat flow and seawater circulation. Variability in crustal architecture in relation to spreading and magma production rates. Causes and consequences of changes in geophysical properties with crustal aging.
Exam	Module exam (combined marks): assignment 50 % assignment 50 %
Literature	Will be made introduced at beginning of courses

Master Conference

Module title and code no	05-MAR-1-MC Master Conference
Representative/s	Simone Kasemann
Appendant courses	05-MAR-1-MC-1 Master Conference Project Exercise 2 SWS 2 SWS
Workload / credit points	3 CP 90 h / 3 CP - 24 h presence, working group arrangements and conference attendance (3 SWS, 14 weeks) - 66 h conference organisation and preparation of personal contribution
Mandatory / compulsory / elective	Mandatory
Assignment	Master of Science Marine Geosciences 2012 fulltime class
Duration	1 Semester Winter term / First year of study
Requirements for participation	
Offered	Yearly WS
Teaching Language	Teaching language:
Learning Outcome	At the end of the module the students will be able to - to coordinate a conference session - to assess the organisational complexity involved in coordinating a session - to present scientific results to a professional audience
Content	The aim of the module is the organization of a geosciences conference over three to four days. The students decide on the scientific focus of the conference and

	prepare the scientific program regarding themes and sessions. Talks will be presented by the students as well as by in-house and external speakers. The students are responsible for the development of the program, time scheduling, speaker invitation and the assignment of activities.
Exam	Exam not marked: contribution to the conference
Literature	Will be assigned during the project

Climate Change II: Models and Data

Module title and code no	05-MAR-2-C7 Climate Change II: Models and Data
Representative/s	Andre Paul, Michael Schulz
Appendant courses	05-MAR-2-C7-1 Abrupt Climate Changes — Lecture, Exercise, Seminar — 2 SWS 05-MAR-2-C7-2 Modelling Past and Future Climate Changes — Lecture, Exercise — 3 SWS
Workload / credit points	6 CP 6 CP (180 h) / 4 SWS 56 h lectures and practicals 80 h homework, self-revision of lectures and additional, complementary material (exercises, textbooks, etc.) 44 h study time for the final exam
Mandatory / compulsory / elective	Compulsory
Assignment	Master of Science Marine Geosciences 2012 — fulltime class
Duration	1 Semester Summer term / First year of study
Requirements for participation	Contents of module Climate Change I: Fundamentals
Offered	Yearly SS
Teaching Language	Teaching language: English
Learning Outcome	The students become familiar with the reconstructed climate variations for selected time intervals of the Cenozoic. They gain an understanding of the dynamics of abrupt climate changes and are enabled to assess the role of natural and anthropogenic climate variations in future climate change.
Content	- Reconstructions and modelling of millennial-scale climate variability during the last glacial cycle - Overview of historical climate variations and predictions of future climate change
Exam	Module exam (one mark): oral exam
Literature	will be announced in the different courses

Marine Environmental Archives: Project

Module title and code no	05-MAR-2-C8 Marine Environmental Archives: Project

Representative/s	Torsten Bickert, Tilo von Dobeneck
Appendant courses	05-MAR-2-C8-1 Marine Environmental Archives Project — Project Exercise 4 SWS 05-MAR-2-C8-2 Stratigraphic Methods — Lecture, Exercise 1 SWS
Workload / credit points	6 CP 120 hours / 6 CP - 15 h presence in Stratigraphic methods (1 SWS, 15 weeks) - 60 h presence in marine environmental archives project (4 SWS, 15 weeks) - 45 h self-study related to literature study, report writing
Mandatory / compulsory / elective	Compulsory
Assignment	Master of Science Marine Geosciences 2012 — fulltime class
Duration	1 Semester Summer term / First year of study
Requirements for participation	Contents of module Marine Environmental Archives I
Offered	Yearly SS
Teaching Language	Teaching language: english Level: C1
Learning Outcome	- To become familiar with proxy development and application - To gain an understanding of the most important processes in paleoenvironmental change - To be able to apply the methods to case studies of actual research
Content	This second module on marine environmental archives aims at applying the gained knowledge on analyzing and understanding marine archives to an actual topic in paleoenvironmental research within a student project.
Exam	Module exam (one mark): project exercise report
Literature	will be assigned during the project

Biogeochemical Processes: Projects

Module title and code no	05-MAR-2-C9 Biogeochemical Processes: Projects
Representative/s	Marcus Elvert, Matthias Zabel
Appendant courses	05-MAR-2-C9-1 Biogeochemistry II — Project Exercise 5 SWS
Workload / credit points	6 CP 6 CP (180 h) / 5 SWS 60 h for supplementary lectures, exercises, and 1 day field work 70 h for home and lab work 50 h for the documentaion of the project / writing the report
Mandatory / compulsory / elective	Compulsory
Assignment	Master of Science Marine Geosciences 2012 — fulltime

	class
Duration	1 Semester Summer term / First year of study
Requirements for participation	Contents of topics and research themes provided in "Biogeochemistry I" (05M-MAR-1-C3-1).
Offered	Yearly SS
Teaching Language	Teaching language: English Further language skills: German
Learning Outcome	After successful participation students will be familiar with fundamental lab methods in organic and inorganic geochemistry, which are essential for geochemical work in marine sciences. Students will be able to objective-oriented and problem-based work independently as well as in a team. They will be able to describe open questions in our research field and provide conceptions of the ocean as a geochemical system.
Content	Based on theoretical foundations given in module “Biogeochemistry I”, we focus on practical applications in our lab facillities. After a one-day field exercise for biogeochemical sampling of marine sediments, each student will work on small, interdisciplinary projects, which will be designed according to recent, typical research questions in the fields of marine organic and inorganic geochemistry and biogeochemistry. Additionally, specific topics from the previous module are expanded by special lectures and exercises. For example, principles of geochemical modeling are trained and applied.
Exam	Module exam (one mark): written report
Literature	Canfield, Thamdrup & Kristensen (eds) (2005) Aquatic Geomicrobiology, Academic Press. Boudreau & Joergensen (eds) (2001) The benthic boundary layer. Oxford Press. Grob & Barry (2004) Modern Practice of Gas Chromatography, John Wiley & Sons Inc, 1045 pages. Ardrey (2003) Liquid Chromatography - Mass Spectrometry, John Wiley and Sons Ltd, 296 pages. Broekaert (2001) Analytical Atomic Spectrometry with Flames and Plasmas, Wiley-VCH, 364 pages. Schulz & Zabel (eds) (2006) Marine Geochemistry. 2nd ed., Springer Verlag.

Marine Resources and Geotechnology II

Module title and code no	05-MAR-2-C10 Marine Resources and Geotechnology II		
Representative/s	Gerhard Bohrmann, Achim Kopf		
Appendant courses	05-MAR-2-C10-1	Advanced Methods in Marine Geophysical Exploration	Lecture, Exercise2,5 SWS
	05-MAR-2-C10-2	Marine Geotechnology	Lecture, Exercise,2,5 SWS Seminar
Workload / credit points	6 CP 180 SWS / 6 CP - 30 h presence in Advanced methods in marine geophysical exploration (2.5 SWS, 12 weeks) - 30 h presence in Marine geotechnology (2.5 SWS, 12 weeks) - 120 h homework and self-revision of the given and additional, complementary material (textbooks, regional papers, preparation of oral presentations, etc.)		

Mandatory / compulsory / elective	Compulsory
Assignment	Master of Science Marine Geosciences 2012 fulltime class
Duration	1 Semester Summer term / First year of study
Requirements for participation	Contents of module Marine resources and geotechnology I
Offered	Yearly SS
Teaching Language	Teaching language: English Further language skills: - Level: moderate to high
Learning Outcome	- to obtain a good overview on advanced geophysical methods - to understand soil physics and its application to seafloor infrastructure - to be introduced to state-of-the-art technology in offshore science
Content	Seminar talk (plus written handout), practical exercises
Exam	Module exam (combined marks): seminar talk 50 % processing of tasks 50 %
Literature	to be provided in the individual classes

Sedimentary Structures and Processes: Active Margins

Module title and code no	05-MAR-2-C11 Sedimentary Structures and Processes: Active Margins		
Representative/s	Katrin Huhn, Achim Kopf		
Appendant courses	05-MAR-1-C11-2	Sedimentary Structures and Processes Active Continental Margins	Lecture, Exercise, Seminar 3 SWS
	05-MAR-2-C11-1	Modelling of Sedimentation Processes and Tectonics	Lecture, Exercise 2 SWS
Workload / credit points	6 CP 6 CP (180 h) / 5 SWS - 36 h Presence in Sedimentary Structures and Processes - 24 h Presence in Modelling of Sedimentation Processes and Tectonics - 50 h Self-revision of lectures and additional, complementary material - 40 h Preparation of the seminar talk - 30 h Preparation of modelling tasks		
Mandatory / compulsory / elective	Compulsory		
Assignment	Master of Science Marine Geosciences 2012 fulltime class		
Duration	1 Semester Summer term / First year of study		
Requirements for	Basic geophysical, sedimentological, geotechnical, and geodynamic knowledge;		

participation	contents of module Sedimentary Structures and Processes: Shelves and Passive Margins
Offered	Yearly SS
Teaching Language	Teaching language:
Learning Outcome	Students will broaden and deepen their understanding of mass transfer processes at convergent margins from i.a. a geophysical, sedimentological, and geotechnical point of view. Furthermore, students will be able to incorparate geoscientific data into numerical models to simulate different geodynamic scenarios, geological situations and sediment transport processes.
Content	Based on fundamental geoscientific knowledge on subduction zones, we now focus on the interplay between tectonic, seismic activity and mass transport processes at active convergent margins. This module combines two main objectives: (1) to gain a deeper insight into mass transfer processes and their manifestations at active convergent margins and (2) to introduce numerical simulation techniques and to have the ability to develop numerical models for various mass transfer scenarios at continental margins.
Exam	Advance performance: - Written exam (60%) - Oral presentation of model (40%)
Literature	will be announced in the different courses

Convergent Margin and Intra-Plate Processes

Module title and code no	05-MAR-2-C12 Convergent Margin and Intra-Plate Processes			
Representative/s	Wolfgang Bach, Heinrich Villinger			
Appendant courses	05-MAR-2-C12-1	Geochemical Tracers in Petrogenetic and Geodynamic Studies	Lecture, Exercise	2 SWS
	05-MAR-2-C12-2	Geophysics of Active and Passive Continental Margins	Lecture	2 SWS
	05-MAR-2-C12-3	Mass and Energy Transfers coupled to Plate Tectonics	Seminar	1 SWS
Workload / credit points	6 CP 6CP = 180 hours 60 hours of course work in two classes (05M-MAR-2-C12-1 & 05M-MAR-2-C12-2) 30 hours for home work assignments in class 05M-MAR-2-C12-1 60 hours for home work assignments in class 05M-MAR-2-C12-2 8 hours for participation in a joint seminar (05M-MAR-2-C12-3) 22 hours for preparation of a seminar talk (05M-MAR-2-C12-3)			
Mandatory / compulsory / elective	Compulsory			
Assignment	Master of Science Marine Geosciences 2012			fulltime class
Duration	1 Semester Summer term / First year of study			
Requirements for participation				
Offered	Yearly SS			

Teaching Language	Teaching language: English
Learning Outcome	Accomplishing an advanced understanding of intra-plate and convergent margin processes, including seafloor subsidence, mantle plume dynamics, plate flexure, and subduction zone magmatic and geophysical processes. Ability to assess mass transfers between principle Earth reservoirs.
Content	Geodynamics, focusing on the origin and consequences of mantle plumes and plate subduction. Using rock compositions as a guide to geodynamic cycling. Using geophysical methods in assessing plate cooling and subduction.
Exam	Module exam (combined marks): assignment 50 % assignment 50 %
Literature	

Marine Field and Lab Practice

Module title and code no	05-MAR-2-E Marine Field and Lab Practice			
Representative/s	Rüdiger Henrich			
Appendant courses	05-MAR-2-E-1a	Climate modes and events of the Phanerozoic	Field Exercise, Exercise, Seminar	3 SWS
	05-MAR-2-E-1b	Mass wasting along continental margins - Field trip to the Berchtesgaden/Salzburg and Lechtal Alps	Field Exercise	3 SWS
	05-MAR-2-E-1c	Coastal dynamics	Field Exercise, Exercise, Seminar	3 SWS
	05-MAR-2-E-1e	Miocene extentional basins (Sorbas, SE Spain) 1. Meeting 07.05.2014, 1pm, Room 0340	Field Exercise	8 SWS
	05-MAR-2-E-1f	Advanced marine geophysical survey project	Field Exercise, Exercise, Seminar	6 SWS
	05-MAR-2-E-1g	The Troodos Ophiolite, Cyprus	Field Exercise	5 SWS
	05-MAR-2-E-1h	Application of numerical simulation techniques	Project Exercise	3 SWS
	05-MAR-2-E-1i	Sediment Acoustics Training Cruise with RV Polarstern	Field Exercise	5 SWS
	6 SWS			
Workload / credit points	12 CP Total 360 hours / 12 CP The candidates will select several courses from a spectrum exemplified below.			
Mandatory / compulsory / elective	Mandatory			
Assignment	Master of Science Marine Geosciences 2012			fulltime class
Duration	1 Semester Summer term / First year of study			
Requirements for participation	Basic (paleo-) oceanographical, sedimentological and geophysical knowledge.			
Offered	Yearly			

	SS
Teaching Language	Teaching language: english Level: advanced
Learning Outcome	Advanced training in the field and in offshore marine settings how to analyse and interpret marine environmental archives and paleoceanographic and paleoclimatic records, also including applied geotechnical and exploration aspects. Courses comprise combined lectures and excursions as well as integrated field campaigns and educational cruises.
Content	A broad spectrum and open spectrum of field - and offshore marine courses is offered. Integrated analysis includes sedimentology , paleoceanography, paleoecology, paleoclimatology and geophysics of the study areas including applied and exploration aspects.
Exam	Module exam (combined marks): field trip report 50 % field trip report 50 %
Literature	

Geoscientific Project

Module title and code no	05-MAR-3-P Geoscientific Project
Representative/s	Tilo von Dobeneck
Appendant courses	05-MAR-3-P-1 Geoscientific Project Project Exercise 12 SWS 12 SWS
Workload / credit points	15 CP 15 CP = 450 hours / 9-11 weeks 2 weeks conception and preparation, 4-6 weeks project work 4 weeks finalization, documentation and presentation
Mandatory / compulsory / elective	Mandatory
Assignment	Master of Science Marine Geosciences 2012 fulltime class
Duration	1 Semester Winter term / Second year of study
Requirements for participation	Project-specific knowledge and skills
Offered	Yearly WS
Teaching Language	Teaching language:
Learning Outcome	The project exercise is set out to develop and train practical skills of both professional and general character. It enables the students to realize own conceptions, to acquire additional fields of competence and to establish contacts, which may improve their chances on the job market. The project fosters personal initiative and „learning by doing“, but equally represents a supervised, output-oriented practical project, which is to be documented in a written report and presented in a public report colloquium.

Content	The 'Geoscientific Project' can be a marine survey, a field or mapping project, a technical development, a school or media project, or a personal contribution to a commercial or international geoscientific venture. It may be devised and realized in a fully self-contained approach or be integrated as contribution to an ongoing research or commercial project. The responsibility to initiate one's project and find a suitable advisor is entirely on the side of the students. Both individual and team projects are possible; in case of field projects, the latter often have logistic and operational advantages. For team projects, a well-defined task-sharing should be established from the beginning. Contribution and performance of every team partner must be demonstrated and evaluated separately at the end. The geoscientific project should not anticipate the mostly lab-oriented and analytical master thesis project. Not the scientific progress is in the foreground, but a conclusive idea, practical value, wise planning, and a telling and interesting documentation of results and - last not least - the broadening of the own horizon. The temporal frame of each project exercise should not greatly exceed or fall below 9-11 weeks (450 hours / 15 CP) for reasons of comparability and recognition. The period from September to November within the 3rd semester is kept free for this purpose. The practical part of the project exercise can also be realized earlier at demand. In late November of the 3rd semester, a project report must be submitted and an oral colloquium presentation given in the presence of fellow students and project advisors.
Exam	Module exam (combined marks): project exercise report 50 % seminar paper 50 %
Literature	case-dependent

Geoscientific Research Seminar

Module title and code no	05-MAR-3-S Geoscientific Research Seminar
Representative/s	Kai-Uwe Hinrichs, Simone Kasemann
Appendant courses	05-MAR-3-S-1 Geoscientific Research Seminar Seminar 12 SWS 12 SWS
Workload / credit points	15 CP 450 h / 15 CP 30 h presence in the Seminar 120 h preparation of two seminar presentations 300 h development of defendable proposal for MSc thesis
Mandatory / compulsory / elective	Mandatory
Assignment	Master of Science Marine Geosciences 2012 fulltime class
Duration	1 Semester Winter term / Second year of study
Requirements for participation	Participation in 1st-year courses and geoscientific project
Offered	Yearly WS

Teaching Language	Teaching language: English Level: C1
Learning Outcome	Students will have acquired knowledge to develop and defend a thesis proposal. They will have a deep understanding of the methods, state-of-the-art, and literature relevant to their thesis project.
Content	The Geoscience Research Seminar introduces the students to the processes involved in planning, developing and presenting research proposals. The seminar topics are selected in collaboration with the prospective thesis advisors, while a large extent of independence is expected in the development and presentation of detailed and comprehensive research concepts by the students. Students will develop a concept for their thesis project on current topics in marine geosciences. When entering the course, students are expected to have identified their broad research them and potential advisors. In addition, techniques of scientific inquiry (e.g., literature and data bank surveys, scientific rigor) and sound scientific conduct will be communicated and discussed. In two stages, students will prepare short seminar presentations on the following subjects: (1) Scientific rationale for the proposed study and state-of-the-art of the chosen subject of study. (2) Research questions, hypotheses, methodological approach, work plan. Prospective thesis advisors are expected to contribute during this stage of the seminar. Finally, the concept will be presented and defended in front of a thesis proposal defense committee, consisting of the lecturers and thesis advisors. Students working on related subjects and/or with similar methods are encouraged to form teams with their peers.
Exam	Module exam (combined marks): seminar talk 20 % seminar talk 40 % written report 40 %
Literature	Will be provided by the supervisors of the master theses

Master Thesis

Module title and code no	05-MAR-4-M Master Thesis
Representative/s	
Appendant courses	05-MCM-4-M-1 Master Thesis Thesis 22 SWS we 22 we SWS
Workload / credit points	30 CP about 900 h / 30 CP Equivalent to 22 weeks full time engagement
Mandatory / compulsory / elective	Mandatory
Assignment	Master of Science Marine Geosciences 2012 fulltime class
Duration	1 Semester Summer term / Second year of study
Requirements	Knowledge from previous studies

for participation	
Offered	Yearly SS
Teaching Language	Teaching language: English Level: C1
Learning Outcome	Students are able to develop a topic for their master thesis by attending to contemporary marine geoscientific issues. They have shown how to prepare and realize an independent scientific project including literature research, data preparation and interpretation, optional modelling and simulations, and finally the performance of the written essay. Students show the ability to present and defend their results.
Content	After the second semester, students are encouraged to start developing ideas for their master thesis, usually in close cooperation with one of the research groups at the Department of Geosciences or the cooperating Research Centers. During the research seminar in the third semester, the topic of the thesis work will be defined clearly. The forth semester is dedicated to thesis work. Supervised by a lecturer each student will perform an independent scientific study and prepare a written essay. Students will have a time period of 22 weeks for the realisation of their thesis work. Such thesis work may be a field study, a laboratory experiment or a project outside the university, e.g. in collaboration with industry. Students will deliver a copy of their thesis to the main examiner (usually the supervisor) and one co-examiner; three copies have to be submitted to the examining office. Examiners have a period of four weeks for their evaluation and grading of the thesis. In a final colloquium, the student has to present and defend his or her thesis. The duration of the colloquium will be 45 to 60 minutes. For successful completion of the Master thesis and the colloquium students earn 30 CP. A failed Master thesis may be repeated once only.
Exam	Module exam (combined marks): master thesis 75 % colloquium 25 %
Literature	