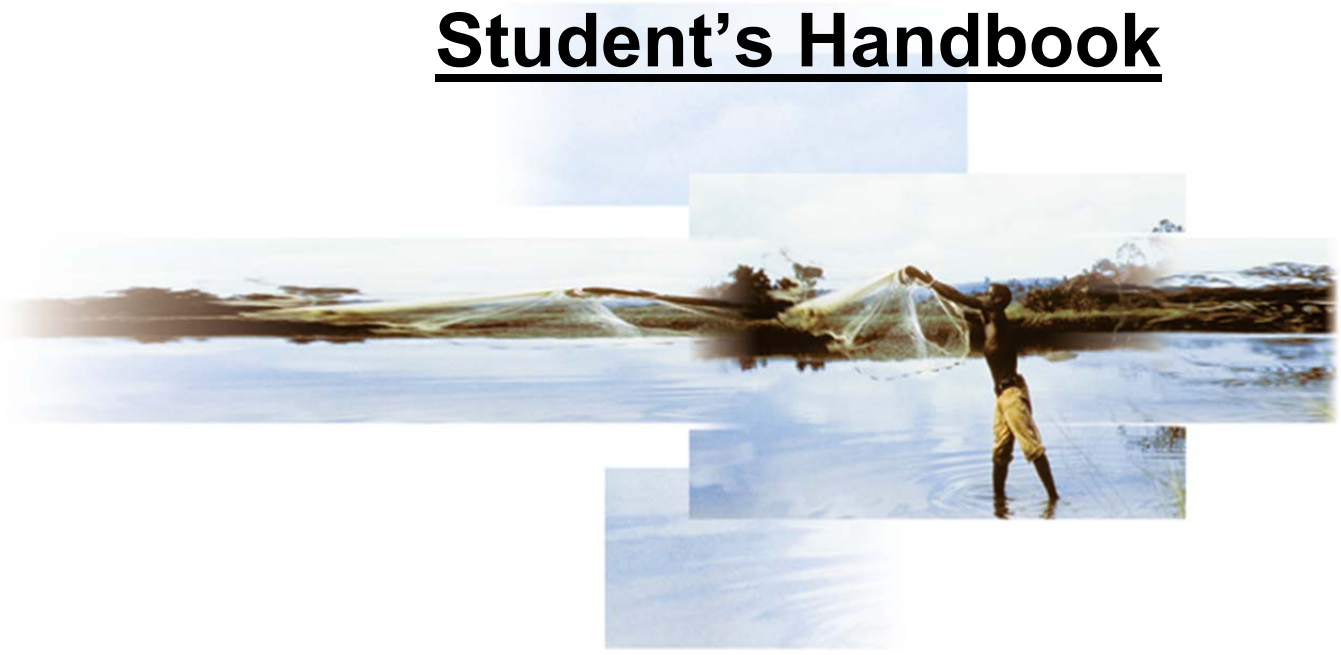
Fachbereich 02
Biologie / Chemie

ISATEC
International Studies in
Aquatic Tropical Ecology

Master of Science Course

International Studies in Aquatic Tropical Ecology

Student's Handbook



Programme Director &
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INTRODUCTION TO THE ISATEC STUDY PROGRAMME

ISATEC is a two-year international Master of Science study programme in tropical aquatic ecology at the University of Bremen (UB). It is conducted in collaboration with the associated Leibniz Center for Tropical Marine Ecology (ZMT). The programme aims at the joint education and specialisation of German and foreign students in the field of tropical aquatic ecology. Students receive a broad knowledge in theoretical and applied ecology, with emphasis on concepts and methodologies for sustainable utilisation and conservation of tropical aquatic ecosystems. Thus, general ecology, as well as fisheries biology, aquaculture sciences, ecological economics, environmental law, and social sciences relevant to coastal planning and management will be one part of this study programme.

As early as 1991 courses related to tropical aquatic ecology were implemented into the biology curriculum at the UB once the ZMT started to operate. In addition two-week block courses ("Diploma courses") were offered to postgraduates and young international scientists, providing ample opportunity to gain experience in the co-teaching of German and foreign students and young scientists. The topics of those courses are now included in the *ISATEC* syllabus and represent integral parts of the programme

Bremen is well suited for the implementation of the MSc-programme thanks to its high scientific standard in aquatic sciences, its modern scientific infrastructure, its international scientific co-operation, and its numerous lecturers experienced in teaching abroad.

PROFILE OF THE MSC-HOLDER

Participants of *ISATEC* are trained to become experts in the field of tropical aquatic ecology and its application to the conflict between utilisation and conservation of aquatic ecosystems. They are qualified to join or conduct multidisciplinary teams working in the investigation and management of tropical coastal zones or freshwater systems as well as to continue university studies (PhD) in areas related to aquatic ecosystem research or integrated coastal zone management. Potential employers are national and international organisations involved in research and nature conservation projects, governmental institutions dedicated to coastal systems and resource management, consulting agencies involved in environmental evaluations, universities, and organisations dedicated to developmental aid and technical cooperation (GTZ, DAAD,

DED, CIM etc.).

STUDY CONTENTS OF THE ISATEC PROGRAMME

(I) Fundamentals of aquatic ecology

Essential base for the understanding of ecosystem function: The basic structure of aquatic ecosystems is described and their most important functional groups (primary producers, consumers, decomposers), as well as the chemical and hydrological characteristics of aquatic systems are introduced. Approaches and methods for the modelling of flows of energy and matter are described and modern concepts regarding ecosystem maturity, stability, and resilience are discussed.

Methods and concepts for the investigation of populations and species assemblages: Knowledge of the species composition, trophic structure, and the population dynamics of target species is essential for experts working in tropical ecology and coastal zone management. In lectures and exercises students learn to adequately interpret and process scientific data in the investigation of population dynamics and species community structures using modern analytical methods, including relevant computer software.

Knowledge about tropical aquatic habitats and their living communities: A description of the typical physical and bio-geo-chemical environment of tropical aquatic habitats and their associated species (i.e. mangrove estuaries, mud flats, coral reefs, sandy and rocky beaches, lagoons, riverine and lake systems) will be given.

Knowledge about the utilisation and economic value of aquatic ecosystems and their resources: Detailed information on the economic goods and services of marine and freshwater habitats, which are the resource base for human populations, is provided. The different ways in which tropical ecosystems are utilised and exploited (i.e. recreation in terms of conventional or eco-tourism, fishing, aquaculture, wood processing, mining in coral reefs, extraction of pharmaceutically important substances / species etc.) and possible impacts for the species or communities are discussed.

(II) Fundamentals for the evaluation & management of aquatic resources

Concepts and methods for resource assessment and sustainable yield calculations: Students are introduced to fisheries biology and resource assessment theory. Yield models are constructed and the inclusion of relevant socio-economic variables into fishery models is demonstrated.

Knowledge about aquaculture systems /

rearing techniques and their effects on natural ecosystems: Aquaculture systems for fish, shrimps, molluscs, and other invertebrates as well as algae are described along with the impact of certain culturing techniques on the natural environment.

Understanding of the complex process of decision making in environmental management: Students are introduced to the complex process of decision making in coastal zone management. Steps needed to adequately evaluate management options in terms of their environmental, social and economic implications are explained.

(III) General skills

Ability to study independently and to work and co-operate as a team member: The participants learn how to address and solve complex problems studying in teams as well as alone. Their written and oral proficiency is stimulated by essay writing and oral presentations, which are important elements of the study programme.

Use of modern information sources, such as data banks specific for tropical ecology and coastal zone management: The adequate interpretation of data in different scientific fields (i.e. fisheries biology, ecology, economy, and demography) is essential for experts involved in coastal zone management. The students learn where to locate and access the necessary information resources and how to process the obtained data.

Knowledge of different approaches for ecosystem modelling, the ability for analysis of complex problems and capacity for oral and written communication: The use of modelling is an important tool for ecological investigations and the development of management strategies. Ecosystem, bio-economic or demographic models provide the basis for decision making in environmental management and are important tools of communication between members of a team and non-experts. However, the correct analysis and interpretation of data is only one part that ensures successful management of natural resources. Equally important are skills to present the results in an adequate and convincing manner, both in written and oral presentations. Training this is an essential part of the study programme.

PROGRAMME STRUCTURE

The *ISATEC* programme takes two years (four terms) and includes the submission of a written MSc-thesis. The first two terms are spent at University of Bremen, Germany, where students attend an intense schedule of lectures. The lectures of each of the first two semesters consist of teaching modules composed of thematically linked block courses, usually lasting four weeks. Basic courses are offered in the beginning to ensure that students from different educational backgrounds receive the necessary training be-

fore proceeding with more advanced classes. Hands-on training is provided in a two-week excursion to the biological station of the German Isle of Helgoland. Participation in all modules and courses is obligatory. Credit points are gained by attending the courses and completing all required assignments. Exams on each module are performed in the first and second term. All exams must be passed.

In the third term, students are required to stay at one of the partner institutions of ZMT/University of Bremen in the tropics. There they conduct field studies to obtain the data for their MSc-thesis under the guidance of a foreign supervisor. Before travelling abroad, each student has to elaborate a proposal for the MSc-thesis and data collection in accordance with his/her German supervisor. Upon arrival the student presents this proposal to the scientific auditorium at the partner institution. Under the supervision of the foreign advisor the data for the MSc thesis have to be collected. Before leaving the student has to give an oral final report on the research carried out during the third term.

The fourth term is spent evaluating the field data, writing the MSc-thesis, and preparing and passing the oral thesis defence.

1st term (at UB)

module I: Aquatic ecology (9 CP)

- M1-01 Concepts of aquatic ecology
- M1-02 Tropical coastal ecosystems
- M1-03 Introduction to marine microbiology
- M1-04 Aquatic flora & fauna
- ✍ examinations (graded)

module II: Ressource use & assessment (6 CP)

- M2-01 Introduction to Fisheries biology
- M2-02 Monitoring of marine ecosystems and GIS
- M2-03 Tropical aquaculture and its physiological basics
- M2-04 Tropical fisheries and catching methods
- ✍ examinations (graded)

module III: Fundamentals of scientific work (9 CP)

- M3-01 Introduction to systems analysis
- M3-02 Experimental design & advanced statistics
- M3-03 Scientific writing
- ✍ examinations (graded)

module IV: Semester Study and its Oral Presentation (6 CP)

- ✍ oral presentation (graded)

2nd term (at UB)

module V: The abiotic environment (9 CP)

- M5-01 Fundamentals in physical oceanography
- M5-02 Biogeochemical cycling of elements in the aquatic environment
- M5-03 Aquatic pollution
- M5-04 Coastal geomorphology & coastal processes
- ✍ examinations (graded)

module VI: Computer use & modelling (9 CP)

- M6-01 Population dynamics & stock assessment
- M6-02 Trophic modelling of ecosystems
- M6-03 Modelling spatio-temporal dynamics
- M6-04 Modelling in conservation biology
- ✍ examinations (graded)

module VII: Coastal planning and management (9 CP)

- M7-01 Ecological economics
- M7-02 Participatory techniques & stakeholder analysis
- M7-03 Interdisciplinarity between natural & social sciences
- M7-04 Law of the sea and international environmental marine law
- ✍ examinations (graded)

module IV: Scientific essay (6 CP)

- ✍ scientific essay (graded)

3rd term (at tropical partner institution)

Student Project (27 CP)

- elaboration of thesis proposal
- oral presentation of thesis proposal
- presentation of preliminary results of completed field studies
- ✒ data collection for the MSc thesis

4th term (at UB)

Master thesis & colloquium (30 CP)

- 🕮 MSc thesis seminar
- completion of the MSc thesis – manuscript
- oral defence of the MSc thesis

Supervision of the students

The main contact persons and councillors for the students are the student tutor and the programme coordinator. Programme lecturers mainly function as scientific mentors for the *ISATEC* students. They assist the students to successfully satisfy their study performances and with the preparation for the term abroad and the thesis proposal. Each student is supervised individually during the entire study period. The student tutor provides *guidance in practical and every-day matters*. That includes the search for accomodation, support in bureaucratic matters such as enrollment at the university, registration at the residence office, extending the visa, obtaining a health insurance, etc. Also for advice what to do in Bremen and its surroundings during spare time the tutor can be asked.

Teaching methods

Teaching methods include formal lectures, tutorials, seminars, group projects, computer workshops, laboratory and fieldwork, independent study and field trips. Students are encouraged to ask questions during and after lectures or seminars if anything requires further clarification. Furthermore the sharing and discussion of relevant personal experiences also provides additional useful insights into problem solving.

Learning strategies

Success and failure in the *ISATEC* Programme are strongly linked to the study skills. The following advice might help students to succeed in the course: Work steadily, attend classes regularly, plan your time, review all teaching material quickly, take advantage of working and learning with your colleagues, use the libraries, make use of the institute and its computer facilities. In case of problems contact your tutor or the *ISATEC* coordinator immediately.

Assessment of study performances

Credit points are gained by attending the course and completing all required assignments. Students who cannot attend the classes due to illness (certified by a doctor) may still pass the module. Each module is assessed by an examination in the first and second term. A module examination may consist of a combination of assessment methods e.g. an oral performance and a written exam. The module grades obtained contribute to the final MSc grade. All module exams must be passed. Within a module bad performances in thematic parts can be compensated by good performances in the other parts. The total performance in the module examination has to be at least 50 % to pass the module. Compensation between modules is not possible, but repeat examinations can be performed if a module examination was failed.

In addition, an oral presentation must be presented at the end of the first semester and a scientific essay must be prepared in the second term. Both are graded and the grades obtained for this work contribute to the final MSc grade.

The grading system often differs between universities. In order to make conversions comprehensible, the grading system used in the *ISATEC* Programme is presented in the table below.

Grading system of the *ISATEC* study programme

Perf. [%]	100-95	94.5-90	89.5-85	84.5-80	79.5-75	74.5-70	69.5-65	64.5-60	59.5-55	54.5-50	49.5-0
Grade	**1.0**	**1.3**	**1.7**	**2.0**	**2.3**	**2.7**	**3.0**	**3.3**	**3.7**	**4.0**	**5.0**
	excel-lent	*very good*	*good*			*satisfactory*			*sufficient*		*fail*

Course work assignment & group projects

Written assignments are required in some courses. These are valuable learning aids and provide means for the lecturer to assessing the students‘ understanding of the course content. Course work assignments may take the form of group project work, thus requiring the submission of a report jointly by a team of students. This form of assessment demands teamwork, co-operation and organisation, skills that a MSc student should develop during his/her studies. The work is returned with the examiner’s marks and comments. Penalties for late submission will be specified for each assignment when it is issued and will be strictly adhered to.

Master thesis

The MSc thesis is based on a research project conducted under the supervision of a member of the academic staff of *ISATEC*. Students who have been involved in a research project at their home institution prior to joining *ISATEC* are encouraged to carry out their thesis work within this project. The Master thesis must be written in English. In addition to the submission of the written thesis, each student must give a 30 minutes oral presentation of his/her thesis work, followed by another 30 minutes of questions by and discussion with the examiners at the end of the 4th term.

Forms to be submitted

Students are responsible for collecting the necessary signatures and submit the respective forms in time. The following table gives an overview of the most relevant forms and when they have to be handed in.

Form	Name / Purpose	Time of submission
Form Ex	Examination Registration	*Until 2 days before the date of the exam*
Form 2	Essay Registration	*During the 1st term*
Form 3	Proof of Study Performances	*End of the semester of the respective module*
Form 5	Application for Admission to the MSc Thesis and Abroad Registration	*End of 2nd term, before going abroad*
Form 6a	3rd Term Agreement	*End of 2nd term, before going abroad*
Form 6ad	Diving Agreement	*Before going abroad*
Form 6b	3rd Term Performances	*Take abroad and return signed by foreign supervisor after 3rd term, April 01st at the latest*

LOGISTICS FOR INCOMERS

Searching for a place to live

One of the biggest problems is to find a room at the beginning of the term. Unfortunately, at German institutions of higher education there are no student residences on campus. Students have to find a place to live by themselves which can be an exhausting thing to do. If you want to bring your family with you and are eligible to do so under the law relating to foreigners, we strongly advise you to find a place to live before they join you. How to find a place to live without too much effort is outlined in the following pages. Not only you, but also all new students of the Bremen University are looking for nice places to live. **Therefore we strongly recommend that you start looking for a room before you leave home!** Unfortunately there are only limited rooms in the student housing facilities available and most other places are usually unfurnished. There are, however, several possibilities to obtain very cheap second hand furniture.

Before leaving home: It would be perfect if you arrive and have a room or an apartment awaiting you. To make this dream come true, you can try the following strategies:

- *A room in a student residence*: costs between 190 and 250 Euro per month. Some residences offer accommodation for families, too. Student housing is located within walking distance of the university campus. Apartments may be single or shared by up to eight persons. All rooms and apartments have cooking facilities and bathrooms. All rooms are furnished and include a small kitchen. Students should however note that bed linen, towels, dishware, cooking utensils, etc. are not inclusive. In the vicinity you may find some students' clubs, which promote social interaction with other students and an international flair. These facilities are maintained by the Student Services (Studentenwerk). Once a student's housing application has been processed, the Studentenwerk can arrange accommodation for the duration of the student's studies. Students wishing to apply for accommodation at student residences are required to complete an application form for accommodation, which is available from the Studentenwerk website. Applications have to be filled out and returned directly to the Studentenwerk. You also need to attach a passport photo, your letter of admission and your financial information. Applicants have to indicate their preferences for a particular type of accommodation and location via the application form. Further information about student accommodation and application forms is available through the Studentenwerk: Mrs. Bakker, Studentenwerk Bremen, Wohnungs- &

Wohnheimwesen, Bibliothekstraße 3 (Studentenhaus, 2nd floor), 28359 Bremen. Phones: 0421/2201-10121, -10122, -10123, -10124, fax 0421/2201-21290, email: elke.bakker@stw-bremen.de. Office Hours: Monday 10 am – 1 pm, Wednesday 2 pm – 5.30 pm.

- *Private student residences* also let rooms at reasonable prices. The Studentenwerk can assist you to get in touch with the landlords. Please contact Mrs. Bakker on that subject.

Looking for rooms when you are in Bremen: If you are not successful in finding a room before your arrival in Germany try to reserve a bed at a youth hostel or a motel. You should also inform the *ISATEC* students tutor that you are still looking for an accommodation, she may be able to assist you. The earlier you come before the term starts the better your chances to find a room. We strongly recommend that you schedule your arrival in Germany well before the term begins. By the time lectures starts, most rooms will be let already.

Notice boards: Student Services and AStA (Student's Union) has put up several large notice boards ("Schwarzes Brett") at different locations at campus. There you can search for ads offering accommodation, etc.

- *Newspapers:* Once or twice a week local newspapers advertise available accommodation. You will have an advantage over your competitors if you get hold of a copy as early as possible There are phone numbers to ring potential landlords and make an appointment to have a look at the accommodation. Most landlords will ask you how long you are intending to stay in Germany and what guarantees you can offer for paying the rent (your scholarship e.g.).

  The ABC of advertisements: When you scan through the advertisements you will stumble across a lot of abbreviations, such as "2 Zi.-Whg" = 2 room appartment; "2 ZKDB" = 2 rooms, kitchen, hall, bathroom; "zzgl. NK" = plus extra charges; "ZH" = central heating; "K" = deposit; "NR" = non-smokers; "KN" = kitchenette; "NMM" = net monthly rent (costs for heating, electricity, gas, water, and waste disposal have to be paid additionally); "MZV" = rent in advance; "Prov." = commission; "WG" = shared housing; "WBS erforderlich" = only for those students granted a special permit on social grounds; "kalt" = cold (heating and other costs have to be paid additionally); "Abstand" = you have to buy part of the furnishings.

Arrival & first destination:

We recommend you do not to arrive during the weekend as all public administration offices and, from Saturday afternoon onwards, many shops, too, are closed. The International Office at the University of Bremen opens from 9 am to 12 am and will help

you to arrange your first days in Germany.

Students from abroad are advised to arrive at the latest one week before the programme starts. The week of arrival will be occupied with house hunting, registration at the foreigner's registration office, organising a health insurance policy (if not previously done), opening a bank account, and University enrollment. For help please contact the ISATEC students tutor.

Enroling at the university

In order to get registered at the University of Bremen you have to go the administrative building's ground floor (VWG) to the registration office for international students (opening hours: Monday, Tuesday, Thursday 9:00 am - 12:00 pm (at noon) and Wednesday 2:00 pm - 4:00 pm). You have to appear in person. You need to bring a certificate confirming statutory health insurance cover in Germany or proof that you are exempt from compulsory insurance because your home insurance cover is recognised in Germany (see below), the letter of admission to the *ISATEC* programme, your passport, and several passport photographs. You will be given an invoice form which you use to pay the obligatory semester contribution of about 280 Euro per term. The University of Bremen does not charge tuition fees, but this financial contribution, which has to be paid every term, is used to maintain student's activities and for organisational services. It also includes a semester ticket that allows you unlimited use of public transport within the City of Bremen and its surroundings for the duration of one term. The money has to be transferred before you can be issued your student card and the public transport pass. Please note that you have to register at the university for every new term!

Registration renewal

Registration at the University of Bremen is only valid for one term. For each subsequent semester you have to renew your registration by paying the semester fee. At the registration office you can hand in the registration renewal form (will be send to you in advance via mail) and a health insurance certificate for the next term. Please note: the closing dates for renewing registration usually fall within the previous term. Registrations deadlines are August 15th for the following winter terms and February 15th for the summer terms. If you fail to renew your registration in time you cannot continue your studies!

Health insurance

Germany has an excellent health service. The health service is governmentally subsidised and about 75 million people (i.e. almost 90% of the population) are insured via a statutory or a private health insurance scheme. The statutory health insurance scheme covers the costs of treatment by a doctor or dentist, medication, hospital treatment, and many other palliative and preventive measures. Everyone insured in statutory health insurance has to pay a basic charge on medication and other items if he/she is not exempt from this additional charge. You can

be exempted from these additional payments if your monthly income is below a certain level but you have to apply for this exemption when you sign your health insurance contract. This sometimes applies to students; your health insurance company will advise you. In addition, there are certain costs which are not covered in full, such as charges for dentures, orthodontic work, and spectacles where you merely receive a part-subsidy.

Private health insurance prices as well as benefits vary greatly. Since medical treatment in Germany is expensive we recommend that you chose a scheme covering more than just the basic minimum.

Students are eligible to statutory health insurance at the lowest monthly rate. Per term (6 months) you will have to pay around 600 Euros. This regulation does not apply to students who have spent more than 14 semesters studying and students who are older than 30 years of age. The largest statutory insurance company is the "Allgemeine Ortskrankenkasse (AOK)". Offices of the AOK and the "Techniker Krankenkasse" are situated in the main glass hall of the University of Bremen (2nd floor). You have to go to the health insurance's office, bring your passport and student card and sign the insurance contract. The ISATEC students tutor can provide help if necessary.

Students older than 30 years must organise their own private health insurance. The International Office will advise you which organisation is most advantageous for you and in case, for your family members as well.

Some countries' health insurance schemes are recognised in Germany. You have to go to an insurance office in the main glass hall, bring your insurance documents and fill out the paper work. The German insurance will then issue you a document which proves that your home insurance is valid in Germany. This document is essential for your enrollment. Your insurance company at home and the International Office will advise you in the run-up to your stay. Please note that you need proof of health insurance coverage in order to register at the University. Usually, the health insurance company will issue you a certificate, the institution stamps it and returns it to the company. However, if the insurance company requires a certificate from the institution of higher education in order to register with them, just get informal confirmation from your institution that you fulfill the requirements for studying in Germany.

Opening a bank account

In order to open a bank account you need to bring a valid passport. Non-EU citizens additionally need a valid visa for their stay in Germany. If you present your student card ("Immatrikulationsbescheinigung"= proof of enrolment) at the bank, your account will be free of charge. If you are unable to give proof of enrollment when you open your account, you can change this later on. If you

do not register as a student at the bank they will charge a basic fee every month plus fees for every transaction. Allow for 2-4 weeks before you receive an ATM card that enables you to use the automatic teller machines. Drawing cash at ATM machines of your bank is free of charge, whilst you have to pay for using those of other banks.

The Residents' Registration Office

During the first few days after arrival you have to register at the Residents' Registration Office. In order to do this you need a permanent residence. You will find a bureau of the Residents' Registration Office dedicated especially to students directly at the University. The address is: *bremen_service universität* (bsu), Klagenfurter Straße (Zentralbereich) 28359 Bremen University. Office hours Tuesday: 9 am - 1 pm, Wednesday: 10 am - 1 pm and 2 pm - 4 pm Thursday: 9 am - 1 pm. At registration you have to present your passport and visa and fill in a registration form. The forms are available both from the municipal authorities and from local stationery shops. The final section has to be completed by your landlord (possibly the owner of the guesthouse or the person in charge of administration for student residences). Every time you change your place of residence you have to inform the Office within the first two weeks.

The Foreigner Registration Authority

This is your next port of call if you intend to stay in Germany for more than 3 months. It should not be confused with the International Office at the University! In order to register here you need: your passport and possibly your visa, the Confirmation of Registration from the Residents' Registration Office, the notification of admission from your institution of higher education, proof of financial resources or the scholarship award letter, possibly a passport photograph. Your visa (usually granted for 3 months) has the status of a temporary residence permit. Before these 3 months have elapsed you will have to extend the visa for 12 months. If your initial visa is valid for the whole time you only have to report to the authority at the beginning of your stay and will be spared extension procedures.

Most Foreigners' Registration Authorities no longer require you to undergo a medical examination. If you move to a different town you will have to cancel your registration with the one Foreigners' Registration Authority and re-register with the new one. If you move within the same place or town you only have to update your resident's registration.

A piece of advice: dealing with the German authorities is not always easy (as it is with bureaucracy in many countries…). If civil servants send you from one place to another or are unfriendly, do not despair. Stay calm and polite and ask the person for his or her name and that of their boss. Make a point of writing down this information. You are entitled to it and unfriendly officials will fear a complaint and be more co-operative. And going to the next person presumably in

charge you may say “Herr/Frau ... sent me to you” so you won’t be blamed for ending up in a wrong office.

Important moving information

If you are moving from one room or apartment to another at any time during your stay in Germany, please make sure that you register your change of address with at least the following offices: The Resident’s Registration Office, the University, your health insurance agency, your bank, the DAAD if you have a scholarship, and the *ISATEC* team. You can, in addition, order the post office to redirect your mail from the old to the new address for a limited time period by filling out a specific form (“Nachsendeantrag”) available at any post office or on their webpage.

THE PLACE YOU WILL STUDY

The state and city of Bremen

The Free Hanseatic City of Bremen (HB) is in fact two cities, forming one federal state of the Federal Republic of Germany. This is quite unusual since the two cities of Bremen and Bremerhaven are separated by 65 km of Lower Saxon (Niedersachsen) territory.

The state of Bremen covers an area of 400 square kilometres and is the smallest of the 16 German counties. The total population of the state of Bremen is around 700.000, and there are around 600.000 people living in and around Bremen City. This makes Bremen the tenth largest town in Germany. Bremerhaven is smaller, with only over 100.000 inhabitants. Bremen became a member of the Hanse, the once powerful trading league of cities, in 1358 and this trading tradition still continues. The state of Bremen is an international seaport and trading centre near the North Sea and the second most important county in respect to international trade in the Federal Republic of Germany. More than 15.000 seagoing vessels of all nations call at the ports of Bremen and Bremerhaven every year.

Study facilities

Language classes: The University of Bremen (UB) today is becoming internationalised with its number of foreign students increasing every year. For this reason, foreign languages have become an integral component of studies at UB. The Modern Language Centre “Fremdsprachenzentrum” (FZHB) in cooperation with the Goethe Institute Bremen, offers some language courses free of charge. A preliminary test at the beginning of the semester is made to assess the appropriate level at which students should enter language programmes. The Modern Language Centre offers courses in German, English, French, Spanish, Portuguese, and many

other languages. Further information is available from Fremdsprachenzentrum, Bibliothekstr. 1, 28359 Bremen, phone: ++49 - 421 – 21861960, fax: ++49 - 421 – 2187563, email: fzhb@uni-bremen.de.

Access to computer facilities and internet service are provided directly via the Computer Network Centre "Zentrum für Netze" (ZfN) located on campus. After your registration at the University of Bremen you will automatically receive a university account activation code in your semester documents. The account includes an e-mail address and access to computer and online facilities. Zentrum für Netze der Universität Bremen, building SFG, 2nd floor, Enrique-Schmidt-Str. 7; 28359 Bremen. Phone: ++49 - 421 - 218 - 61305, fax: ++49 - 421 - 218-9861306, email: zfn-verwaltung@uni-bremen.de.

The university library has a large collection of current journals, an extensive microfiche collection with reference and bibliographical sources, and CD-ROM databanks containing bibliographical and specific information relevant to coursework. Journals can be consulted free of charge. In addition, the library also offers the students a number of well equipped workspaces containing PC workstations and printing devices. The library has internet access via which students may access the electronic library services such as e-books, etc. Searches for both internal and external (commercial) databanks are also possible.

In order to borrow books, it is necessary to register at the library after being enrolled at the university. To apply for a library card please consult the Enquiry Desk on the ground floor. The library also acts as a link to the resources of other libraries by means of an interlibrary loan service. Advice and additional information are available at the Enquiry Desk. Tours of the library are arranged regularly throughout the year and you will have an introduction to the library at the beginning of the study programm.

The ZMT also offers a small but specialised library of books and journals about tropical marine ecology and coastal aquatic management. In addition, the affiliated marine institutes also have accessible libraries that complement the library facilities available at the university.

MONEY AND FINANCES

Financial requirements

Many foreign students coming to Germany do not have scholarships. They have to present proof that they can finance the entire period of their stay in Germany (so-called proof of financial resources) to a German foreign embassy and to the Foreigners' Registration Authority.

You will have to cover a variety of expenses during the first few days: a deposit on ac-

commodation, the first instalment of the rent, health insurance, semester fee, enrollment etc. Thus, we recommend you to reserve at least 1000 EURO for these initial expenses. You are allowed to import as much foreign currency into Germany as you wish, but you may have to announce it at the customs authorities and you should check on currency regulations in your own country. At present you need about 800 Euros per month to lead a modest life:

- Accommodation: 300 Euros per month on average. Deposit: one to two months' rent (returned on expiry of the duration of rent - if there is no cause for complaint).
- Medical insurance: approximately 100 Euros per month.
- Lunch at the University: 3 Euros on average.
- The amount required for other costs (food, books, stationery, travel, clothes, sport/leisure etc.) vary from person to person, but are unlikely to be less than 200 Euros per month.
- Tuition fees: *ISATEC* is free of tuition fees. Students at Bremen University are however required to pay the obligatory semester contribution of approximately 280 Euros (DAAD scholarship holders pay a reduced amount). The cost of the semester ticket is included in this fee.
- An additional budget of approximately 50 Euros per month should be calculated to cover costs of excursions, books and other necessary study materials or xerox copies. A two-week excursion is part of the first term. Students have to contribute part of the expenses (up to 200 Euro).

Cash & currency

The smallest unit of German currency is the "Cent" (Ct.). 100 "Cents" are 1 "Euro" There are 8 different coins: 1 Cent, 2 Cent, 5 Cent, 10 Cent, 20 Cent, 50 Cent, 1 Euro, and 2 Euro. Similarly, there are 7 different notes: 5 Euro, 10 Euro, 20 Euro, 50 Euro, 100 Euro, 200 Euro, and 500 Euro. The reverse side of each coin will show individual designs relating to the respective Member State. However, they are valid in all 18 countries of the "Euro Zone", regardless of their national sides. In large stores, restaurants and hotels you can usually use credit cards, but not always in smaller guesthouses and shops.

Banks & money transfer

All banks, even private ones, are subject to state control. The major banks are the Commerzbank, the Deutsche Bank, and the Dresdner Bank, as well as the Sparkasse Bremen, and the Postbank. Opening times differ from one bank to another but are usually weekdays from 9 am to 6 pm. Some banks close during lunchtime from 12 pm to 2.30 pm.

In Germany, in contrast to many other countries, it is rather unusual to send cheques to people via mail (e.g. the rent to your landlord). There are various ways of conducting monetary transactions: A *transfer form* enables you to move money from your account to another. *Standing order*: you empower the

bank to transfer a set sum (such as the rent) regularly and automatically on an agreed date (e.g. the first of the month), which is recommendable for paying your rent. *Direct debit*: this is a practical method of payment if you have recurring sums that vary in size (such as the telephone bill). A direct debit given to the recipient empowers him to deduct the respective amounts from your account. You don't have to worry about abuse: you can always cancel the authorisation and stop the direct debit. *EC cards*: with Euro cheques you have been able to pay anywhere in Europe in the currency of the country. However, their use has been replaced by the use of charge cards (Euro cheque cards or credit cards). If you setup a bank giro account, your bank usually provides you with an EC card (the card may show the EC logo which once stood for *Euro Cheque*, but now indicates the *Electronic Cash* system). The PIN-number issued with this card enables you to draw money at cash points or pay directly via your card. In case of loss the card can be blocked by a phone call 24 hours a day. The EC card should not be confused with the Eurocard, which is a globally valid credit card. *Overdraft facilities/credit cards*: overdraft facilities allow you to overdraw your account to a certain agreed limit. However, interest on overdrafts can be steep. If you need a credit card your bank will advise you on that subject. *Home banking*: many banks now offer their clients the opportunity to carry out their personal monetary transactions via their own computer. Ask the bank for advice but bear in mind that your personal data is protected much better if you got to the bank in person. There have been a number of security breaches with online-banking recently. Also, many home banking web sites are available in German only.

MEDICAL TREATMENT AND EMERGENCIES

Doctors: Apart from general medical practitioners there are a huge number of specialised doctors (eye specialists, dermatologists etc.). Usually you will have to make an appointment. If you are in acute pain and you have to be treated immediately or, at least, on the same day and you can go to a doctor without an appointment or on short notice. You will find names and addresses of doctors, listed according to field of specialisation, in the telephone directory or on the internet. You have the right to choose your own doctor. However, you should ask for recommendations. If you do not want to ask local people for advice you can turn to AStA or the International Office. If you have a private insurance and are not in acute pain we recommend contacting your insurance company before undergoing major treatments and check how much you have to contribute to the bills.

Hospitals: In Germany there are public, non-profit (denominational), and private hospitals. If you are sent to hospital, the health

insurance scheme will cover the costs, although you will usually have to pay a contribution. For the exact costs please inquire at the hospital in question.

Emergency services & emergency calls: If you need urgent medical treatment at night or at the weekend you can either go to the outpatients' department at a hospital or ring the doctor on call. You will find the addresses of these doctors in the daily newspaper or the internet under the heading "Ärztlicher Notdienst". You can also ring any doctor's number; the answering machine will tell you the number of the doctor currently on call.

Emergency call: **112** is the free-call number to ring in order to get an ambulance, the fire brigade, the police or any other assistance in a real emergency. Do not dial this number for fun or trivial reasons. If you make an emergency call, state clearly what happened and where it happened and stay on line for further instructions.

FIND YOUR WAY THROUGH EVERY DAY

Eating habits in Germany

The classic German breakfast is hearty and comprised of bread, cheese, cold meats, jam, and coffee or tea. Traditionally, the main hot meal in Germany is lunch, eaten between 12 and 1 pm. Before starting to eat people wish each other "Guten Appetit". As the name in German suggests, the evening meal or "Abendbrot" is essentially composed, once again, of bread and butter with cold meats and cheese. Traditionally it is served earlier than in many other countries, around 6 pm. However, these traditional habits are no longer observed by everyone. Lots of Germans eat different things for breakfast or nothing at all, only have a snack at lunchtime, or eat a hot meal sometime in the evening.

Groceries shopping

Germans do not eat and buy only sausage. Of course, cabbage, potatoes, dumplings, and pounds of meat do exist but also much, much more. The choice of food in Germany is so vast that you (and indeed many Germans, too) can avoid traditional German fare, sausages and meat altogether. Nearly all supermarkets regularly stock mozzarella, mangos, melons, etc. In Turkish, Korean, Italian, and other speciality shops in larger towns you can get everything you can possibly imagine. Restaurants and speciality shops in Germany are comparatively expensive. Discount shops are considerably cheaper but the choice is smaller, the shops simpler. Highly recommendable are the popular weekly farmer's markets where you can buy fresh regional products. You should take a bag or basket with you, as your purchases will usually be filled into your bag loose or

wrapped up in paper which nearly always tears before you get home.

Shops are usually open between 8 am and 8/10 pm on workdays and from 8 am until 6 pm on Saturdays. Some supermarkets stay open until 10 pm on weekdays and Saturdays. The majority of shops are closed on Sundays except for those selling flowers, bread, cakes which are allowed to open for a few hours to ensure that everyone can have a piece of fresh cream cake for Sunday tea. What would Northern Germany be without its “Kiosk”? Here, or at the next gas station, you will find items such as drinks, magazines, chocolate, and other necessities of life till midnight, including Sundays.

Eating out

Many Germans like eating solid foods, but not exclusively. In the cities you can find restaurants from nearly all the countries in the world. Whether Persian, Thai, Russian, Mexican, or Korean - the choice of restaurants in Germany is vast. Students are particularly fond of Italian, Greek, and Turkish restaurants as they are often comparatively reasonably priced. Others prefer fast food at take-aways or delivery services delivering pizzas, Chinese, and Mexican dishes.

Tipping: the prices cited actually include 19 % value added tax and a service charge. Nevertheless, it is customary to leave a tip in restaurants, cafés, and other places where your bill is brought to your table. The rule of thumb is: if a bill is under 5 Euros you round the sum up to the next full Euro; if it is over 5 Euros you allow about 10 % for a tip - of course only if the service was friendly and the food tasty. Nobody expects large tips from students because they are known to be notoriously short of money.

Mail & telephone

Post offices: You can recognise a post-office or letterbox via the yellow sign with a black post-horn. Within Europe you currently pay 0.60 Euros for a standard letter up to 20 grams and 0.45 Euros for a postcard. You can find out what other letters and parcels cost by asking at the post office or reading the brochures available there. The postal code (“Postleitzahl” = ZIP code) of even the smallest German village can be found in the Directory of Postal Codes.

*Telephones - public call boxes***:** You can ring any number you like in Germany and nearly every number abroad from any telephone box. There are only very few countries for which you have to ring the exchange first under 0010 and ask to be connected. In most public telephone boxes it is also possible to receive a call; there should be a sign with the number and a bell. Costs for calls within Germany and abroad vary according to distance and time of day. Payphones have become fairly rare; most public call boxes are card-phones. However, even they are rare today, as everyone uses mobiles. You can buy a telephone card at kiosks or the post-office. The Telecom’s “Telefonkarte Comfort” enables you to ring within Germany and to many other countries without using

coins. The international code starts with 00 then country code. In the Yellow Pages you can find the numbers of doctors and other occupational groups. Emergency: 110 (police), Fire Brigade: 112 (emergency medical services and ambulance). In the internet you can find numbers to dial before the actual phone number that link you to different providers which can be considerably cheaper for international or long distance calls.

Waste separation

Germans are ecologically conscious people. They enthusiastically separate waste paper, bottles, cans, corks, batteries, bio- degradable waste, and everything you can collect and recycle. Paper, glass, and cans are put in special containers. Many bottles are return bottles that are taken back to the shop where the initial deposit (10-35 Cents) is refunded. Anything with a specific green-white symbol on it goes into the "yellow bags" to be recycled. In order to reduce the number of plastic bags used, many shops charge 10-20 cents for a plastic carrier bag.

A LITTLE GUIDE TO GERMAN HABITS AND OTHER PECULIARITIES

Etiquette & attitudes

As in all countries there are certain forms of behaviour and manners that are considered polite or impolite. You should know about the German version of these if you don't want to put you foot in it. Students are more informal so it is advisable to take note of behavioural codes.

Greeting people

Students who know each other usually greet each other at all times of the day and night by saying "Hallo" or "Grüß dich". They do not usually shake hands. Otherwise, it is polite and common to say "Guten Morgen" until about midday, "Guten Tag" until about 6 pm and "Guten Abend" later on. You usually say "Auf Wiedersehen" if you leave, students just say "Tschüs". If you are introducing people to each other you simply add (by way of explanation) "(Das ist) Herr Schmidt - (Das ist) Frau Meier". Young people of the same age merely say "Max - Ingrid". Usually you introduce the men to the women first and then the women to the men, just as you usually greet the women first and then the men. If it is a formal occasion you use the formula. "Darf ich vorstellen?" or „Darf ich bekannt machen? ("May I introduce...?") - Herr Meier - Frau Schmidt".

To shake hands or not to shake hands.

The rule of thumb is: do not shake hands with other students or in public offices. If you attend an interview or a consultation session with a professor, always shake hands. In such cases you wait until the senior

person (i.e. the professor or prospective boss) offers you his/her hand. Employees of the institution of higher education or large companies do not shake hands when they meet. If you see someone you know in the street you greet him or her, at least in passing. There are also situations in which it is polite to greet strangers, for example, in lifts, on the stairs of a block of flats, or in the waiting room at the doctor's. You also greet the postman bringing the post and the dustmen taking away the rubbish.

Dress code

On the whole, there are no strict rules about what to wear in Germany: You wear more or less what you like. Youngsters can get away with holes, patches, and (far too short) short trousers. Adults, on the other hand, will not find it so easy. Students wear whatever they like, but people who wear slashed jeans will certainly attract different sorts of friends than those who prefer a more conservative dresscode.

Punctuality

It cannot be denied that Germans place a lot of emphasis on punctuality. If you have an appointment with your professor or a doctor, there is one thing you should certainly not do - keep him or her waiting! Amongst themselves students are usually more easy-going. Perhaps this is due to the fact that university lectures seldom begin on the hour ("s. t." = sine tempore) but only 15 minutes after the full hour at the "academic quarter" ("c. t." = cum tempore). The academic quarter can also come into play if you have been invited to someone's home. For casual invitations you could be a few minutes late. If the invitation is more formal or you are invited to a big dinner, however, you should try to be on time.

Invitations

Germans are often rather reserved with invitations to begin with. Only good friends can just drop in on each other unannounced. If you are invited to dinner with your professor or boss you should take a bunch of flowers with you for the hostess. When you are invited to share a pan of spaghetti with other students in their "WG" you do not need to take flowers with you, but it is common to ask if you can bring anything. If you are told no, a bottle of wine will certainly be welcome.

Relations between the sexes

As in many other parts of the world, the women's emancipation movement in Germany means that both, the traditional image of women and traditional role patterns have shifted. Women have gained themselves equal rights and achieved the similar professional status as men. They are self-assured and do not permit being ruled, although good manners like opening doors are certainly appreciated. The very least a man must accept that a woman saying "no" actually means "no". Depending on which culture you come from you might be shocked by German's liberality with regard to dress. Flimsy clothing in summer is not acceptable

in every country, but in Germany it is tolerated. In the wake of the "sexual revolution" of the Sixties both men and women take the initiative in making contacts. Homosexuals, too, live openly and the topic is not longer taboo. In any case, the requisite precautions should be taken: unfortunately, AIDS is a problem in Germany, too.

LECTURERS & TECHNICAL STAFF

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ISATEC draws primarily on the resources and staff of the University of Bremen and the Leibniz Center for Tropical Marine Ecology (ZMT). Staff from the Alfred-Wegener-Institute for Marine and Polar Research (AWI), the Max Planck Institute for Marine Microbiology (MPI), and other universities including partner universities in the tropics, augments them. With their expertise and infrastructure for conducting marine teaching and research, these experts offer students the opportunity to obtain first hand experience in all relevant and up-to-date approaches to aquatic ecosystem research and coastal zone management.

Lecturers

PD Dr. Holger Auel
University of Bremen - *Marine Zoology*

Prof. Dr. Wolfgang Balzer
University of Bremen - *Aquatic Chemistry*

Prof. Dr. Kai Bischof
University of Bremen - *Marine Botany*

PD Dr. Broder Breckling
University of Bremen - *General and Theoretical Ecology*

Dr. Annette Breckwoldt
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Social Sciences*

Prof. Dr. Thomas Brey
Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research (AWI), Bremerhaven - *Biosciences/Functional Ecology*

Dr. Werner Ekau
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Ecology*

Dr. Sebastian Ferse
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Ecology/Social Sciences*

Prof. Dr. Wilhelm Hagen
University of Bremen - *Marine Zoology*

Prof. Dr. Jens Harder
Max Planck Institute for Marine Microbiology, Bremen - *Microbiology*

Dr. Lucia Herbeck
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Biogeochemistry/Geology*

Dr. Ximena Hinrichs
HafenCity University Hamburg – *Marine Law*

Prof. Dr. Thomas Hoffmeister
University of Bremen - *Population and Evolutionary Ecology*

PD Dr. Tim Jennerjahn
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Biogeochemistry/Geology*

Dr. Andreas Kunzmann
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Ecology*

Dr. Alice Lefebvre
University of Bremen - *MARUM*

Dr. Inga Nordhaus
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Ecology*

PD Dr. Roland Pesch
University of Vechta - *Landscape Ecology*

Dr. Benjamin Rabe
Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research (AWI), Bremerhaven - *Climate Sciences*

PD Dr. Hauke Reuter
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Ecological Modelling*

Prof. Dr. Claudio Richter
Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research (AWI), Bremerhaven - *Biosciences*

Prof. Dr. Achim Schlüter
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Social Sciences*

Prof. Dr. Winfried Schroeder
University of Vechta - *Landscape Ecology*

Dr. Kathleen Schwerdtner Máñez
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Social Sciences*

Dr. (cand) Karin Springer
University of Bremen - *Marine Botany*

Dr. Marc Taylor
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Ecological Modelling*

Dr. Mirta Teichberg
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Ecology*

Dr. (cand) Gabriela Weber de Morais
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Social Sciences*

Dr. Frank Wenzhöfer
Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research (AWI), Bremerhaven / Max Planck Institute for Marine Microbiology, Bremen - *Deep Sea Ecology and Technology*

Prof. Dr. Christian Wild
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Ecology*

Prof. Dr. Matthias Wolff
Leibniz Center for Tropical Marine Ecology (ZMT), Bremen - *Ecological Modelling*

PARTNER INSTITUTIONS

Partner institutions in Bremen

The ZMT is member of MARUM, an association of marine research institutions in the state of Bremen. This facilitates a multidisciplinary link between the scientists working in the fields of marine science at the University of Bremen. Good relationships have been established particularly between the biological and geosciences faculties, and also with the Max-Planck-Institute of Marine Microbiology (MPI), the Alfred-Wegener-Institute for Polar and Marine Research (AWI) and with the "Biologische Anstalt Helgoland" (BAH), part of the AWI.

Partner institutions abroad

Partnership and co-operation agreements have been established with the following universities and institutions abroad:

Brazil

Universidade Federal do Pará, Belém, Brazil (UFPa)

Dr. Victoria Isaac, Campus Universitário do Guamá, Rua Augusto Corrêa, 01, CEP 66075-110 - Caixa postal 479 , PABX +55 91 211-2121 - Belém - Pará – Brasil

Universidade Federal de Pernambuco, Recife, Brazil (UFPE)

Universidade Federal de Pernambuco, Av. Prof. Moraes Rego, 1235, Cidade Universitária CEP 50670-901 Recife – PE - Brazil, phone: (081) 271-8000

Visa information for Brazil:

Embassy of Brazil, Wallstr. 57; 10179 Berlin; phone: +30-726280; fax: +03-72628320/21;
email: brasil@brasemberlim.de

A visa is required to travel to Brazil. A letter of invitation from the Brazilian partner university / supervisor should be sent by fax to the visa department in Berlin.

Chile

Universidad Católica del Norte, Coquimbo, Chile

Dr. Wolfgang Stotz, Universidad Católica del Norte, Coquimbo, Chile, wstotz@ucn.cl, wstotz@nevados.ucn.cl,

Universidad de Antofagasta, Antofagasta, Chile

Dr. Marcelo Oliva ,marcelo.oliva@uantof.cl

Dr. Marco Ortiz, marco.ortiz@uantof.cl

Visa information for Chile:

Generalkonsulat Chile, Kleine Reichenstr. 1, 20457 Hamburg, phone: +40 - 335835, fax: +40 – 326957

Embassy of Chile; Mohrenstr. 42; 10117 Berlin; phone:+03-726203-5; fax: +03-726203603

Costa Rica

Universidad de Costa Rica de San José, Costa Rica (UCR)

Dr. Alvaro Morales, alvaro.morales@ucr.ac.cr /alvarodelfin@yahoo.com; Dr. Jorge Cortes, Jorge.cortes@ucr.ac.cr;

Centro de Inv-stigaciones Marinas y Limnológicas (CIMAR), Universidad de Costa Rica, Apdo. 2060, San José, CR

Visa information for Costa Rica:

Embassy of Costa Rica, Dessauer Str. 28/29; 10963 Berlin; +03-26389990; +03-26557210; email: 100730.1020@compuserve.com

You need to apply for a visa with an application written in Spanish to the Office of Migration and Foreign Affairs in Costa Rica (address: Dirección General de Migración y Extranjeria; Apartado 762-1150-La Uruca; San José; Costa Rica; phone: +220 0355; fax +231 7575). You need to enclose in your application the usual personal data and the purpose of your stay in Costa Rica.

Cuba

Instituto de Oceanologia (IDO)

Dr. Sandra Loza Álvarez, sandra@oceano.inf.cu

Centro de Investigaciones Pesquera (CIP)

Dr. Rafael Puga, rpuga@cip.alinet.cu

Egypt

National Institute of Oceanography and Fisheries, Cairo, Egypt (NIOF)

Prof. Dr. Ekram Amin

National Institute of Oceanography & Fisheries, 101 Kasr Al-Ainy Street, Cairo, Egypt

Visa information for Egypt:

Embassy of Egypt, Waldstr. 15; 13156 Berlin; phone: +03-4775470; fax: +03-4771049; email: egembassy@hotmail.com

Ghana

University of Cape Coast, Cape Coast, Ghana

Prof. Dr. John Blay

University of Cape Coast, Cape Coast, Ghana

Prof. Dr. C.J. Vanderpuye

Department of Oceanography & Fisheries, University of Ghana, P.O. Box 99, Legon, Ghana, 774381, Ext. 8449

Visa information for Ghana:

Embassy of Ghana, Rheinallee 58; 53173 Bonn, Tel: 0228-367960

You need to apply for a visa application form at the above mentioned address, enclose a prepaid envelope with your address

Israel

Interuniversity Institute for Marine Sciences, Eilat, Israel (IUI)

Visa information for Israel:

Embassy of Israel, Konsularabteilung; Auguste- Victoria- Str. 74-78; 14193 Berlin; phone: +03-89045500; fax: +03-89045222; email: botschaft@israel.de

Indonesia

Fisheries Faculty of Bogor University, Bogor, Indonesia (IPB)

Dr. Indra Jaya & Dr. Harry Palm

Marine Center Building 4th Floor, Faculty of Fisheries, Kampus IPB Darmaga, Jl, Rasamala Bogor, Indonesia

Fisheries Faculty of Bung Hatta University, Padang, Indonesia (BHU)

MS. Yempita Efendi, Faculty of Fisheries, Bung Hatta University, Jl. Sumatra, Ulak Karang, Padang, Sumatra Barat 25133, Indonesia, posteri1@indosat.net.id

Prof. Rubiyanto Misman, Grendeng Campus, P.O. Box 15, Purwokerto, Indonesia

Soedirman University, Purwokerto, Indonesia, (BHU)

Prof. Rubiyanto Misman, Grendeng Campus, P.O. Box 15, Purwokerto, Indonesia, rektor@unsoed.ac.id, lpiu-_due@purwokerto.wasantara.net.id, edy@puskom.unsoed.ac.id

Visa information for Indonesia:

Embassy of Indonesia (Mr. Sumbayak), Lehrter Str. 16- 17; 10557 Berlin; phone: +03/47807-0; fax: +03-44737142

Requirements for visa application are: a copy of invitation from the Indonesian university, a copy of proof of enrolment at the University of Bremen, proof of financing, a copy of passport; passport photo, an informal statement that the student will not work and will observe the law while in Indonesia, an informal statement about length and purpose of the stay, in addition for Americans: residence permit for Germany.

Jordan

Yarmouk University, Irbid, Jordan
Aqaba Marine Science Station, University of Jordan, Amman

Dr.Mohammad Badran, MSS – Marine Science Station, P.O. Box 195, Aqaba, Jordan

Visa information for Jordan:

Embassy of Jordan, Beethovenallee 21; 53173 Bonn, phone: +228-357046; fax: +228-353951; email: embjor-bonn@aol.com

You need to apply for a visa application form, enclose a prepaid envelope with your address. For Ghanaians: a copy of passport & residence permit in Germany, passport photo, a confirmed letter with length and purpose of the stay, a copy of immatriculation at the University of Bremen.

Peru

Universidad Nacional Agraria, La Molina, Lima, Peru

Jaime Mendo, Universidad Nacional Agraria, Facultad de Pesquera, La Molina, Apdo. 456, Lima, Peru

Instituto del Mare del Peru (IMARPE), Lima, Peru

Dr. Dimitri Gutierrez, dgutierrez@imarpe.gob.pe

Visa information for Peru:

Embassy of Peru, Godesbergerallee 125-127; 53173 Bonn, Tel: +228-379475 or +228-3084570; email: eprfa@aol.com

Generalkonsulat Peru, Martinistr. 58, 28194 Bremen, phone +421-15629

No visa is required for a visit of less than 90 days. If you wish to stay longer, you need to apply for a student visa.

Sri Lanka

FCDRMP Fisheries Community Dev. & Resource Management Project, Tangalle Hambantota District

Bertold Schirm, FCDRMP, Matara Road No. 249 / Mihindu Marwata, Tangalle – Hambantota District, Sri Lanka, phone: +94-47-40486, -40594, fax: +94-47-486, email: FCDRMP@mega.lk

Institute of Fundamental Studies, Kandy, Sri Lanka

Prof. E. I. L. Silva: Institute of Fundamental Studies, Kandy; Sri Lanka; phone: +94-8-232002, fax: +94-8-323131, email: sil@ifs.ac.lk

Visa information for Sri Lanka:

Embassy of Sri Lanka, Niklasstr. 19, 14163 Berlin, phone: +30-80909749, fax:: +30-80909757, email: info@srilanka-botschaft.de

Tanzania

Institute of Marine Science, Zanzibar

Dr. Christopher Muhando, muhando@ims.udsm.ac.tz

Dr. Matern Tolera, mtolera@ims.udsm.ac.tz

USEFUL INTERNET LINKS

University of Bremen

University of Bremen Homepage	http://www.uni-bremen.de
ISATEC Homepage	http://www.isatec.uni-bremen.de
Study Programme Database of the University of Bremen	http://dbs.uni-bremen.de
Secretariat for Students-International (SfS-I)	http://www.uni-bremen.de/en/sfsi.html
International Office information about **study grants**, housing, etc.	http://www.uni-bremen.de/en/international/your-stay-in-bremen.html

Other links

Leibniz Center for Tropical Marine Ecology GmbH	http://www.zmt-bremen.de/en/zmt.html
DAAD - German Academic Exchange Service	http://www.daad.de
GOETHE Institute, Cultural affairs, Language courses	http://www.goethe.de
German Foreign Office	http://www.auswaertiges-amt.de
Trains, Connections and prices	http://www.db.de
Lufthansa, German airlines	http://www.lufthansa.de
Deutsche Welle, International Radio and TV programmes	http://www.dwelle.de
HRK Hochschulkompass, Information about Universities	http://www.hrk.de
Virtual Library Catalogue	http://www.ubka.uni-karlsruhe.de/kvk.html
Telephone Directory of Germany	http://www.dastelefonbuch.de/
Travelcenter, City maps and interactive routing	http://www.falk-online.de/travelcenter

ISATEC COURSE CATALOGUE

(June 2016)

Content

Number and name of module	02-321-M1 **Module 1: Aquatic Ecology**
Credit points	9 CP
Period	winter term (1st semester)
Course titles	M1-01 Concepts of Aquatic Ecology M1-02 Tropical Coastal Ecosystems M1-03 Introduction to Marine Microbiology M1-04 Aquatic Flora & Fauna
Assessment	combined examination (17 % M1-01; 33 % M1-02; 17 % M1-03; 33 % M1-04)
Person responsible for the module	Prof. Dr. Kai Bischof

Name of Module unit	M1-01 **Concepts of Aquatic Ecology**
Lecturer(s)	PD Dr. Broder Breckling, Prof. Dr. Matthias Wolff
Teaching form	x Lecture; x Seminar; Laboratories; Excursion
Workload	Presence at the course: Lecture & Seminar 30 h Individual studies: 6 h
Learning outcome	Students understand modern concepts of aquatic ecology, of pioneering thoughts and personalities, and of the historical development of this science; they know the differences between aquatic and terrestrial systems and are competent to contextualize the content of the following modules
Content	The course provides an overview of major concepts and their roots used in aquatic and marine sciences with an ecological focus. It covers general ecological concepts; specific aquatic approaches and describes the historical and biographic backgrounds of important researchers. A focus of this unit is on definitions and explanations of terms used in Aquatic ecology to refresh and update the students' knowledge, and to provide the basis for a better understanding of subsequent courses. The didactic concept is highly interactive: students elaborate oral presentations of guided group work, which parallels the lectures. In a co-operative process a syllabus is elaborated, which can be directly used for examination preparation.
Part of combined examination	17 % of Module 1 examination
Assessment	Study performance: oral presentations of group work in class Examination: written examination
Literature	Barnes, R.S.K.; Mann, K.H. 2009 Fundamentals of Aquatic Ecology. John Wiley & Sons, 280 p. Elton, C. 1997. Animal Ecology. New York. Maximilian 207p. Lindemann, R.L. 1942. The Trophic-dynamic aspects of ecology. Ecology 23.399-418 Odum, E.P. 1953. Fundamentals of Ecology. Saunders, Philadelphia, 384.p Wolff, M. 2009. Fundamentals of Aquatic Ecology, p. 3-23. In: Wolff, M. (ed.) 2009. Tropical waters and their living resources: ecology, assessment and management. 1 ed. 2009, Hauschild, Germany: Bremen. 343. Wolff, M.; Gardener, M. 2012. The Role of Science for Conservation. Routledge 34, 299p

Number and name of unit	M1-02 **Tropical Coastal Ecosystems**
Lecturer(s)	Prof. Dr. Claudio Richter, Prof. Dr. Martin Zimmer, Dr. Inga Nordhaus, Dr. Mirta Teichberg
Teaching form	x Lecture; x Seminar; x Laboratories; Excursion
Workload	Presence at the course: Lecture 35 h, Seminar 10 h, Laboratories 9 h Individual studying: 18 h
Learning outcome	Students know the structure and function of tropical marine and coastal ecosystems and understand their global role; they know anthropogenic drivers that negatively impact these systems and are able for a rough global mapping of these impacts.
Content	The lecture will give an introduction into general characteristics of the tropics (geography, astronomy, climate, trade winds and monsoon influence, large currents etc.) and coastal ecosystems (tides, marine-terrestrial gradients, etc.). Tropical coastal habitats will then be introduced in detail (mangroves, coral reefs, sandy beaches, mudflats, rocky shores and seagrass meadows). Interactions and connectivity of individual ecosystems with each other will be addressed as well as biodiversity, productivity, biomass and turnover. Examples will be given from current and former projects of the ZMT. The economic and social importance of these ecosystems for local populations and human influences, as well as issues of coastal conservation and management are discussed.
Part of combined examination	33 % of Module 1 examination
Assessment	Study performance: oral presentations of group work in class, seminar talk, practical exercise Examination: written examination
Literature	Duarte. C.M. 2001. Seagrasses. Encyclopedia of Biodiversity,. Vol. 5 Academic Press, pp. 255-268 Hogart, P.J. 1999 The biology of mangroves (Biology of habitat series). Oxford University Press, 238pp. Little, C., Williams, G.A., Trowbridge, C.D. 2009. The biology of rocky shores. 2nd edition. Oxford University Press, Oxford. Little, C. 2000. The Biology of soft shores and estuaries. Oxford University Press. 264 pp. Longhurst, A.R. and Pauly, D. 1987. Ecology of Tropical Oceans. Academic Press, 407 pp. McLachlan, A., Brown, A.C. 2006. The ecology of sandy shores. 2nd edition. Elsevier Academic Press, 392pp. Nagelkerken, I. 2009. Ecological connectivity among tropical coastal ecosystems. Springer Dordrecht Heidelberg, London, New York, 614pp. Saint-Paul. U.and H. Schneider (eds) 2010 *Mangrove Dynamics* and Management in North Brazil. Series: Ecological Studies, Vol. 211., 402 p.Schlesinger, W.H. 1997. Biogeochemistry: An analysis of Global Change. 2nd edition. Academic Press, San Diego, 588pp. Sherman, K. and Duda, A.M. 1999. An ecosystem approach to global assessement and management of coastal waters. Mar. Ecol. Progr Ser. 190:271-287 Sorotkin, Y.I. 1995. Coral Reef Ecology. Springer, Berlin. 465 pp.

Number and name of course	M1-03 **Introduction to Marine Microbiology**
Lecturer(s)	Dr. Frank Wenzhöfer, Prof. Dr. Jens Harder, Dr. Anne Schwedt, Dr. Christina Bienhold, Dr. Katrin Knittel, Dr. Arjun Chennu
Teaching form	x Lecture; Seminar x Laboratories; Excursion
Workload	Presence at the course: Lecture 15 h, Laboratories 11 h Individual studying: 10 h
Learning outcome	Students know microbial processes and their diversity, and are competent to describe element cycling in the ocean and to present basic concepts of marine microbial ecology and techniques for microbial studies
Content	The focus of the course is on microbial processes in marine sediments and their impact on the geochemistry and ecology of the benthos. The course provides an overview to the field of marine microbiology and to some of the methods used to study it. Students will be introduced to the field of general microbiology, molecular ecology, biogeochemistry, geomicrobiology and microbial ecology. This includes the cultivation and physiology of bacteria involved in the turnover of carbon, nitrogen sulphur and iron. The cycling of elements, the regulation and interaction of microbial and geochemical processes in the marine environment will be presented. The link between habitat properties (physical, chemical, geological hydrological and biological), microbial processes and the phylogenetic diversity will be explored to provide an overview on ecosystem structures and changes. The physiological diversity and metabolism of aquatic bacteria will be introduced, and will include discussion of the function of bacteria in the natural cycle of the elements. Students will be exposed to experimental approaches used in marine microbiology, such as enrichment of bacteria, incubation experiments with electron donors and acceptors, microscopic techniques, and identification of bacterial populations using stains and probes directed at the bacterial nucleic acids. Micro-scale analysis of microbial processes in marine sediments will be performed.
Part of combined examination	17 % of Module 1 examination
Assessment	Study performance: -- Examination: written examination
Literature	Canfied, D.E.; Thamdrup, B and Kristensen, E. (eds) 2005 Aquatic Geomicrobiology. Elsevier Academic Press. 640pp.

Number and name of unit	M1-04 **Aquatic Flora and Fauna**
Lecturer(s)	Prof. Dr. Kai Bischof, Dr. Karin Springer. Prof. Dr. Wilhelm Hagen and PD Dr. Holger Auel
Teaching form	x Lecture; x Laboratories x Seminar; x Excursion
Workload	Presence at the course: Lecture 15 h, Seminar 12 h, Laboratories 55 h, Excursion 18 h Individual studies: 26 h
Learning outcome	Students are competent to identify marine algae, invertebrates and vertebrates using identification keys. For addressing species ecology students are able to apply their knowledge about taxonomy, phylogeny,

	life history patterns and biogeography. Through extensive field observations, students are able to put in context species ecology, natural intertidal patterning of communities and the driving abiotic and biotic factors determining zonation and succession.
Content	Anatomy and morphology of major marine micro- and macroalgae (kelps). Systematics and biology: phylogeny, life-history patterns (haploid and diploid stages), ecology and physiology. Presentation of major groups of marine invertebrates, their taxonomy, biology and ecology. Selected specimens of the various taxa will be studied during the practical course for a better understanding of the morphology and anatomy of these groups, practical work includes microscopy, species identification and field excursions. This course will be conducted at the Biological Station on the island of Helgoland.
Part of combined examination	33 % of Module 1 examination
Assessment	Study performance: -- Examination: written examination
Literature	Evert RF, Eichhorn SE: Raven Biology of Plants, 8th edition, WH Freeman 2012 van den Hoek C, Mann DG, Jahns HM: Algae – An introduction to phycology.Cambridge University Press, 1995 Hurd CL, Harrison PJ, Bischof K, Lobban CS.: Seaweed ecology and physiology, 2nd edition. Cambridge University Press, 2014 Ruppert, E.E. and Barnes, R.D.: Invertebrate zoology. 6. ed. Saunders College Publ., 1994 Various identification keys to be provided during the course

Number and name of module	02-321-M2 **Module 2: Resource Use and Assessment**
Credit points	6 CP
Period	winter term (1st semester)
Course titles	M2-01 Introduction to Fisheries Biology M2-02 Monitoring of Marine Ecosystems and GIS M2-03 Tropical Aquaculture and it's Physiological Basics M2-04 Tropical Fisheries and Catching Methods
Assessment	combined examination (25 % M2-01; 25 % M2-02; 25 % M2-03; 25 % M2-04)
Person responsible for the module	Dr. Werner Ekau (ZMT)

Number and name of course	M2-01 **Fisheries Biology**
Lecturer(s)	Dr. Werner Ekau
Teaching form	x Lecture; Seminar; x Laboratories; Excursion
Workload	Presence at the course: Lecture 10 h, Laboratories 20 h Individual studying: 16 h
Learning outcome	Students have background knowledge in fisheries biology and resource assessment. They are skilled to do simple calculations of fisheries growth and mortality parameters using Excel work sheets.
Content	Lectures - Introduction to fisheries - Egg development in fishes - Larval development - Age and growth in fish Practical course work - Microscope observations on eggs and larvae. Determination of different development stages. Drawings of different stations and comparison of two species of different evolutionary levels. - The students will practice age determination on otoliths from larval and adult fishes. Daily growth rings will be counted in anchovy otoliths under the microscope. Annual growth rings will be investigated under a dissecting microscope with reflected light. These exercises will provide the possibility to the students to produce their own age data of two different species for later statistical analysis. - An important part of the practical work is the statistical analysis of the data produced during the course work. Simple spreadsheet programmes are used to determine the relevant parameters of growth (Gompertz and v. Bertalanffy growth function) and mortality (e-function) curves and thus produce basic information for stock management.
Part of combined examination	25 % of Module 2 examination
Assessment	Study performance: -- Examination: written examination
Literature	Beverton, R. and Holt, S. 2004: On the Dynamics of Exploited Fish Populations. The Blackburn Press, 1954/2004, p 533

	Hart and Reynolds (eds.) (2002) Handbook of Fish Biology and Fisheries. Blackwell Publishing, 2 volumes King (2007) Fisheries Biology, Assessment and Management. Blackwell Publishing Fuiman, L. A. & Werner, R. G. (2002) (eds.): Fishery Science. The unique contributions of early life stages. Blackwell Publishing, 326pp

Number and name of course	M2-02 **Monitoring of Marine Ecosystems and GIS**
Lecturer(s)	PD Dr. Roland Pesch
Teaching form	[ ] Lecture [x] Seminar [x] Laboratories [ ] Excursion
Workload	Presence at the course: Seminar 8 h, Laboratories 20 h Individual studying: 10 h
Learning outcome	Knowledge of theoretical and practical considerations of monitoring marine ecosystems and GIS applications; the capability to collect information on selected issues of marine environmental monitoring and compile them comprehensively as well as basic knowledge in application of GIS software.
Content	Specific issues on fundamentals of marine ecosystems and application of GIS in monitoring marine environments − Monitoring programmes worldwide − Sediment mapping as part of marine ecosystem monitoring − Monitoring marine and estuarine Biodiversity − Monitoring impacts of eutrophication − Monitoring impacts of heavy metals in marine environments Applications of GIS methods in monitoring marine environments − Practise of Geographical Informationsystems − Visualisation and map layouts − Working with vector and raster data − Logical and Spatial Queries − Attribute Tables − Digitalising of Geodata − Geoprocessing strategies of marine data layers − Environmental (spatial) data analysis
Part of combined examination	25 % of Module 2 examination
Assessment	Study performance: seminar presentation or protocol Examination: written examination
Literature	Di Zio S., Fontanella L. and Ippoliti L., 2004. Optimal spatial sampling schemes for environmental surveys. Environ. Ecol. Statistics. 11, 397-414 Parr TW, Ferretti M., Simpson IC, Forsius M, Kovács-Láng E, 2002. Towards a longterm integrated monitoring programme in Europe: Network design in theory and practice. Environ. Monit. Assess. 78, 253-290 Wackernagel, H., 2003. Multivariate geostatistics. An introduction with applications. 3rd ed., Springer, Berlin Webster R, Oliver, MA, 2001. Geostatistics for Environmental Scientists. John Wiley & Sons, Ltd., Chichester

Number and name of course	M2-03 **Tropical Aquaculture and its Physiological Basics**
Lecturer(s)	Dr. Andreas Kunzmann
Teaching form	x Lecture; x Seminar; x Laboratories; Excursion
Workload	Presence at the course: Lecture 12 h, Seminar 12 h, Laboratories 8 h Individual studying: 20 h
Learning outcome	Background knowledge in worldwide aquaculture, linking fisheries and controlled aquatic production, first management tools, improve understanding on nutrition and environmental impact, physiological basics of cultured organisms. Hands-on experience with selected marine organisms in the Aquarium facilities of ZMT (four physiological experiments).
Content	The course will focus on the actual aquaculture production and its potential for future development. Emphasis is on tropical production systems and the role of environmental parameters. The Seminar gives the chance to include local problems from the participants' countries of origin. The recent developments of Integrated Multitrophic Aquaculture IMTA, blue revolution, organic aquaculture and Aquaponics are introduced. Chapters are: World aquaculture production; Principles of aquaculture, Mariculture, Techniques incl. RAS, Planning, Environmental impact, Economics, Diseases, Physiological basics, full day experiments
Part of combined examination	25 % of Module 2 examination
Assessment	Study performance: Searching FAO databases, brainstorming with TOPP cards, seminar talks Examination: written examination
Literature	*A. Kunzmann, C. Schulz* 2016 Kultur von Meerestieren– mehr Proteine aus dem Meer. In: Hempel G. et al. Faszination Meeresforschung, Hausschild Verlag, in press *FAO* 2014 SOFIA The state of world fisheries and aquaculture, Rome, 223 pp. *J.S. Lucas, P.C. Southgate 2012* Farming Aquatic Animals and Plants. Wiley-Blackwell, Oxford, 2nd Edition, XVI + 629 pp *FAO 2009* Integrated mariculture, Technical paper 529, Rome 183 pp. *Naturland 2005* Standards for Organic Aquaculture, Naturland Gräfeling, 20 pp. J.C. Cato, C.L. Brown (eds.) 2003, Marine Ornamental Species: Collection, Culture and Conservation, Wiley-Blackwell, 395 pp. *J. E. Bardach, W. O. McLarney, J. H. Ryther.* 1995. Aquaculture: The Farming and Husbandry of Freshwater and Marine Organisms. John Wiley & Sons (Paperback)

Number and name of course	M2-04 **Tropical Fisheries and Catching Methods**
Lecturer(s)	Dr. Werner Ekau
Teaching form	x Lecture; x Seminar; Laboratories; x Excursion
Workload	Presence at the course: Lecture 12 h, Seminar 8 h, Excursion 8 h Individual studying: 16 h

Learning outcome	Students know the main species that contribute to both marine and freshwater living resources, especially in tropical and subtropical regions. These comprise fish, shellfish and shrimp species with special emphasis on their auto-ecology and the major fishing areas where they are exploited. Students will be able to describe the main fish catching methods and will know the population dynamics of key resources. The Management strategies such as the ICES or the Large Marine Ecosystem concept are understood.
Content	1. Introduction to fisheries resources and their management in tropical seas, catching methods (artisanal fisheries, commercialised fisheries) 2. Geographical approach (relevance of different aquatic areas, open sea, Mediterranean seas, marginal seas, rivers & lakes). 3. Inland fisheries (lake & river fisheries). 4. Estuarine and coastal fisheries 5. The open ocean and its fisheries resources 6. Invertebrates, Fish preservation and processing 7. Large Marine Ecosystem concept 8. Excursion to Bremerhaven/Cuxhaven to visit fish industry
Part of combined examination	25 % of Module 2 examination
Assessment	Study performance: -- Examination: written examination
Literature	Gabriel, O. 2005. Fish Catching Methods of the World., Wiley, 523 pp. Mann, K.H. 2000 Ecology of Coastal Waters. Blackwell Science, UK. 2nd ed. 406pp. King, M. 2007: Fisheries Biology, Assessment and Management. 2nd edition, Blackwell Publishing, p 382 Hart, P. and Reynolds, J. 2002: Handbook of Fish Biology and Fisheries. 2 volumes, Blackwell Publishing Sarhage, D. and Lundbeck, J. 1992. A history of fishing. Springer Verlag Berlin, 348 pp. www.fao.org/fishery/statistics/en www.seaaroundus.org/ www.fishbase.org

Number and name of module	02-321-M3 **Module 3: Fundamentals of Scientific Work**
Credit points	9 CP
Period	winter term (1st semester)
Course titles	M3-01 Introduction to Systems Analysis M3-02 Experimental Design and Data Analysis M3-03 Scientific Writing
Assessment	combined examination (20 % M3-01; 60 % M3-02; 20 % M3-03)
Person responsible for the module	Prof. Dr. Matthias Wolff

Number and name of course	M3-01 **Introduction to Systems Analysis**
Lecturer(s)	PD Dr. Broder Breckling, PD Dr. Hauke Reuter
Teaching form	x Lecture; x Seminar; ☐ Laboratories; ☐ Excursion
Workload	Presence at the course: Lecture 18 h, Seminar 12 h, Individual studying: 50 h
Learning outcome	Participants know to analyse complex interaction networks and to formally represent complex interactions. Participants know to deal with interdisciplinary applications of systems approaches in different fields and as a management tool. They have basic knowledge on different mathematical representation of ecological dynamics. The participants acquire an understanding of the role of models in ecological knowledge acquisition.
Content	The course gives a basic understanding of systems in general with its elements and relations including an epistemological background of systems analysis. This is extended by approaches of system theory and principles of self-organisation and self-construction with a special focus on ecological processes. General aspects of system analysis are included. Flow chart representations and the transformation of flow charts into a system dynamic representation with the compartment – connection – control principle is explained and practically applied. Difference and ordinary differential equations are introduced together with their general system properties and system dynamics. Principals of model development are discussed including conceptual development, coding and validation. In the practical part of the course the students learn to work with types of representation of ecological knowledge (e.g. differential equations with POPULUS, flow chart representations with SIMILE) as well as applying cause-effect diagrams to ecological systems and a further interdisciplinary context.
Part of combined examination	20 % of Module 3 examination
Assessment	Study performance: -- Examination: written examination
Literature	Bertalanffy, L. von 1995: General system theory: foundations, development, applications. New York (Braziller), 12th print Jopp, Breckling, Reuter 2011 Modelling Complex Ecological Interactions, Springer, Chapters 2-4,6 Scheffer, M. 1998: Ecology of shallow lakes. London (Chapman & Hall)

Number and name of courses	M3-02 **Experimental Design and Data Analysis**
Lecturer(s)	N.N.
Teaching form	x Lecture; x Seminar; x Laboratories; Excursion
Workload	Presence at the course: Lecture 21h, Seminar 4 h, Laboratories 32 h Individual studying: 78 h
Learning outcome	Knowledge of the basic approaches and possible pit-falls in experimental design; the ability to critically verify the adequateness of a chosen design as well as the capability to develop an adequate experimental design for an ecological research question. Knowledge of generalised linear models and mixed statistical models and the competence to apply these to the research question at hand. Ability to apply statistical models to empirical data using R
Content	The consequences of bad experimental design; formulation of hypotheses, manipulative experiments and correlative studies; replication, pseudoreplication and randomisation; controls, factorial and block designs, crossover and split-pot designs; BACI designs; bias of the measurement; General and generalised linear models with one or more metric or factorial variables; GLMs with repeated measurements, generalised linear mixed models, nested models, model selection using Akaike and other criteria
Part of combined examination	60 % of Module 3 examination
Assessment	Study performance: oral presentation of experimental design Examination: written examination
Literature	Ruxton, G. and, Colegrave, N. 2010: Experimental design for the life sciences, 3drf edition, OUP, 200pp. Knell, R. 2014: Introductory R: A Beginner's Guide to Data Visualisation and Analysis Using R. 543 pp. Grafen, A. and Hails, R. 2002: Modern Statistics for the Life Sciences, OUP, 284 pp. Quinn, G.P. and Keough. M.J. 2002: Experimental Design and Data Analysis for Biologists, Cambridge, 557 pp. Zuur, A.F. Ieno, E.N. Walker, N.J., Saveliev. A.A. Smith, G.M. 2009: Mixed Effects Models and Extensions in Ecology with R. 527pp.

Number and name of course	M3-03 **Scientific Writing**
Lecturer(s)	Prof. Dr. Matthias Wolff
Teaching form	x Lecture; x Seminar; Laboratories; Excursion
Workload	Presence at the course: Lecture 17h, Seminar 8 h, Individual studying: 30 h
Learning outcome	Students understand the basics of scientific writing and presenting
Content	This course is divided into a theoretical and a practical part, during which students shall practise their writing skills with examples given by the course instructor. It is shown how a classical paper/thesis should be organised and how its different parts (Abstract, Introduction, Material &

	methods, Results and Discussion) should be written in terms of content and style. Students dedicate a substantial part of the course to critically review and re-write sections of past ISATEC Master thesis. The course is seen as preparation for the essay written in the second semester and the final thesis. The course also introduces into the art of blogging and provides blogging tips for beginners. It moreover provides general rules for the organization of posters and of talks on conferences
Part of combined examination	20 % of Module 3 examination
Assessment	Study performance: -- Examination: written examination
Literature	Day, R.A. 2006. How to Write & Publish a Scientific Paper. Cambridge University Press. Gopen, G.D. and Swan, J.A. 1990 The Science of Scientific Writing. American Naturalist, 16pp. Harmon, J.E.; Gross, A.G. 2010. The Craft of Scientific communication. University of Chicago Press, Chicago, Il. 225p. Tufte, E.D. 2001. The visual display of quantitative information, 2nd edition, Graphic Press, Cheshire CN, 200p. Wolff, M. 2009 Communicating science. p. 295-300 In: Wolff, M (ed). Tropical Waters and their living resources: Ecology, Assessment and Management. Hauschild. 343 p. www.jamesborrell.com/how-to-cumunicate-science/

Number and name of module	02-321-M4 **Module 4: Semester Study and its Oral Presentation**
Credit points	6 CP
Period	winter term (1st semester)
Course titles	M4-01 Oral Presentation (Seminar)
Assessment	module examination
Person responsible for the module	Prof. Dr. Matthias Wolff

Number and name of unit	M4-01 **Oral Presentation**
Lecturer(s)	all ISATEC lecturers
Teaching form	[ ] Lecture; [x] Seminar; [ ] Laboratories; [ ] Excursion
Workload	Presence at the course: Seminar 8 h, Individual studying: 172 h
Learning outcome	The student knows to elaborate and present an oral presentation based on a profound literature study, followed by the planning and preparation of a Powerpoint presentation.
Content	The student selects from a list of topics provided by the ISATEC lecturers, a topic of his/her interest. During the winter semester he/she revises diverse literature sources (Internet, libraries, special literature bases) on this topic, summarises the main findings and starts to conceptualize and structure a Powerpoint presentation, which is then presented at the end of the semester in front of the ISATEC student group. The presentation is qualified by the supervisor of the oral presentation (the person who has offered the topic) and the ISATEC program director.
Assessment	Examination: Seminar presentation
Literature	Day, R.A. 2006. How to Write & Publish a Scientific Paper. Cambridge University Press. Gurak, L.J. 2000. Oral presentations for technical communication. Series inTechnical Communication, Dragga, S. (ed.) 263p. Spurr, B. 2006. Successful Public Speaking, Debating and Oral presentation. New Frontier Publishing, Wolff, M. 2009 Communicating science. p. 295-300 In: Wolff, M (ed). Tropical Waters and their living resources: Ecology, Assessment and Management. Hauschild. 343 p.

Number and name of module	02-321-M5 **Module 5: The Abiotic Environment**
Credit points	9 CP
Period	summer term (2nd semester)
Course titles	M5-01 Fundamentals in Physical Oceanography M5-02 Biogeochemical Cycling of Elements in the Aquatic Environment M5-03 Aquatic pollution M5-04 Coastal geomorphology & Coastal Processes
Assessment	combined examination (25 % M5-01; 25 % M5-02; 25 % M5-03; 25 % M5-04)
Person responsible for the module	PD Dr. Tim Jennerjahn

Number and name of course	M5-01 **Fundamentals in Physical Oceanography**
Lecturer(s)	Dr. Benjamin Rabe
Teaching form	x Lecture; Seminar; x Laboratories; x Excursion
Workload	Presence at the course: Lecture 15 h, Laboratories 5 h, Excursion 8 h Individual studying: 40 h
Learning outcome	The student: • is familiar with the basic principles and physical processes that determine important environmental conditions of marine ecosystems in the ocean, • knows examples of regional characteristic in the oceans and marginal seas, • knows how to calculate basic oceanographic parameters • is able to carry out basic oceanographic measurements, • has obtained basic skills in data processing and analysis during the exercise sessions
Content	Lectures: • Physical properties of sea water • Forces in the Ocean and their interactions • The tides and their generating forces. • The Coriolis force and the geostrophic balance. • Wind stress, wind-induced currents, upwelling and the equatorial current system. • Fundamental relationships in ocean waves. • Regional characteristics of the world's oceans. • Circulation in marginal seas and estuaries. • The oceans in changing climate and relevant processes. • Measuring methods of Oceanography o Variables of state o Water level, currents Exercises: • Plotting of oceanographic sections • The use of a TS-diagram • Problem sheets/ reports related to the course lectures and the exercises
Part of combined examination	25 % of Module 5 examination

Assessment	Study performance: -- Examination: written examination
Literature	Introduction to Physical Oceanography, Robert Stewart, Texas A&M University, 2007, http://oceanworld.tamu.edu/ocean410/ocng410_text_book.html Tomczak & Godfrey: Regional Oceanography: an Introduction 2nd edn (2003), http://www.es.flinders.edu.au/~mattom/regoc/index.html Open University. 1989. Ocean Circulation. Oxford: Pergamon Press. Open University. 1989. Seawater: Its Composition, Properties, and Behavior: Pergamon Press. Open University. 1989. The Ocean Basins: Their Structure and Evolution. Pergamon Press. Open University. 1989. Waves, Tides, and Shallow-water Processes. Pergamon Press.

Number and name of course	M5-02 **Biogeochemical Cycling of Elements in the Aquatic Environment**
Lecturer(s)	PD Dr. Tim Jennerjahn; Dr. Lucia Herbeck
Teaching form	x Lecture; Seminar x Laboratories; Excursion
Workload	Presence at the course: Lecture 15 h, Laboratories 15 h, (Excursion 8 h with M5-01) Individual studying: 30 h
Learning outcome	Participants have the background knowledge on the biogeochemical cycling of elements essential for life in the aquatic environment. Emphasis is placed on the oceans and coastal ecosystems of the tropics. Knowledge is obtained through theoretical lessons accompanied by group work, video and slide presentations, a one-day cruise with research vessel RC Uthörn (jointly with M5-01) and practical work in the laboratory. Participants are familiar with modern research platforms, methodologies in field work and analytical techniques in the laboratory.
Content	5 days of theoretical and practical work + 1 day cruise with RC Uthörn (jointly with M5-01) Theoretical lessons (morning): 1. Introduction (water cycle, rock cycle, evolution of early life) 2. Transport processes (atmospheric circulation, surface and deep water circulation, particle flux) 3. Production and transport of organic matter and C, N, P, Si cycles (redox chemistry, productivity, diagenesis, physical and biological carbon pumps) 4. Biogeochemical methods for tracing human-induced change in coastal systems (application, examples, group work) 5. Biogeochemical cycling in mangroves and rivers and exchange with the ocean (productivity, transformation, import/export) 6. Biogeochemistry of rivers and coastal ecosystems affected by environmental change (damming, river diversion, land use change, eutrophication, hypoxia, plankton community structure, group work) 7. Analytical procedures

	8. Presentation of group work Practical work (afternoon): • Sample preparation • Sample weighing • Filtration of water samples • Analysis of water samples on dissolved oxygen, organic carbon, inorganic nutrients and trace elements • Analysis of sediment samples on organic and inorganic carbon and nitrogen • Analysis of sediment samples on stable carbon isotope composition • Calculation and interpretation of results Additionally: • Slides of research expeditions • Presentation of selected textbooks and topical books • Provision of selected primary literature as pdf files
Part of combined examination	25 % of Module 5 examination
Assessment	Study performance: -- Examination: written examination
Literature	Libes, S.M., 1992. An Introduction to Marine Biogeochemistry, Wiley. Schlesinger, W.H., 1997. Biogeochemistry – An Analysis of Global Change, Acadamic Press. Robertson, A.I., Alongi, D.M. (eds.), 1992. Tropical Mangrove Ecosystems. American Geophysical Union, Coastal and Estuarine Studies 41. Degens, E.T., Kempe, S., Richey, J.E. (eds.), 1991. Biogeochemistry of Major World Rivers, SCOPE 42, Wiley. Ittekkot, V., Schäfer, P., Honjo, S., Depetris, P.J. (eds.), 1996. Particle Flux in the Ocean, SCOPE 57, Wiley. Ittekkot, V., Unger, D., Humborg, C., Tac An, N. (eds.), 2006. The Silicon Cycle – Human Perturbations and Impacts on Aquatic Ecosystems, SCOPE 66, Island Press. Liu, K.K., Quinones, R., Talaue-McManus, L., Atkinson, L. (eds.), 2010. Carbon and Nutrient Fluxes in Continental Margins: A Global Synthesis. CMTT/IGBP, Springer Publishing Company, New York. Wolanski, E., Elliott, M., 2016. Estuarine Ecohydrology – An Introduction. Elsevier, 2nd edition, Amsterdam

Number and name of course	M5-03 **Aquatic pollution**
Lecturer(s)	Prof Dr. Wolfgang Balzer
Teaching form	x Lecture; x Laboratories Seminar; Excursion
Workload	Presence at the course: Lecture 26 h, Seminar 4 h Individual studying: 37 h
Learning outcome	Students have background knowledge about major classes of pollutants and their sources. They have learned and discussed about unintentional

	release and intentional uses, chemical and environmental properties, analytical identification and quantification, environmental fate and their consequences for different trophic levels. They have knowledge about methods of environmental prediction and control, governmental and international regulations as well as management tools for remediation and have learned about the influence of anthropogenic impacts on natural cycles in coastal environments.
Content	❖ Introduction: Range and classes of anthropogenic contaminants ❖ Hypertrophication (signals and consequences; favouring environmental factors, natural v´s anthropogenic sources; cause – effect relationships) ❖ Heavy metals (sources, speciation, natural cycling, basic ecotoxicology, separate analysis from the natural background, fate, analytical methods) ❖ Persistent organic pollutants (major compound classes, classification, input and uses, bioaccumulation and environmental fate, analytical methods) ❖ Radioactivity (forms and sources, properties, quantification, fate, natural decay series, anthropogenic radionuclides, governmental regulations) ❖ Management (monitoring, baseline studies and regional environmental programmes, source identification, governmental and international regulations, remediation, management tools)
Part of combined examination	25 % of Module 5 examination
Assessment	Study performance: -- Examination: written (or oral) examination
Literature	Agarwal, S.K. 2005. Aquatic Pollution. APH Publishing, 381 pp. Laws, E. 2000. Aquatic Pollution: An Introductory Text. John Wiley & Sons, 639 pp.

Number and name of course	M5-04 **Coastal Geomorphology & Coastal Processes**
Lecturer(s)	Dr. Alice Lefebvre, Dr. Marius Becker
Teaching form	x Lecture; Seminar; x Laboratories; Excursion
Workload	Presence at the course: Lecture 16 h, Laboratories 6 h Individual studying: 45 h
Learning outcome	Students have a basic understanding of coastal geomorphology; in particular the interaction between the hydrodynamic processes, the transport of sediment and the resulting shape of the coast. Their knowledge covers wave-, tide- and river-dominated coastal environments. The influence of sea level variations and anthropogenic activities on the coast are also studied. The course reflects on the dynamic nature of the coastal environment against the needs for stability and resources of human occupation.
Content	Lectures ❖ Introduction ❖ Coastal processes (waves, tidal currents and sediment transport (sediment types, erosion, transport, deposition) ❖ Beaches (beach morphology, longshore and rip currents) and coastal dunes (formation and evolution)

	❖ Estuaries (mixing, tidal wave transformation, fluid mud), lagoons (spit, tombolo and lagoon formation), deltas (types and dynamics) ❖ Tidal flats, salt marshes, seagrass (sediment zonation, tidal flat dynamics, salt marshes evolution) ❖ Sea level variations causes and effects, past sea level and future sea level rise, impact of climate change on the coast ❖ Anthropogenic impact (coastal protection, dredging, Venice Lagoon) Practical ❖ Sediment transport and coastal processes ❖ Beach profiles and storm impact ❖ Estuarine dynamics
Part of combined examination	25 % of Module 5 examination
Assessment	Study performance: -- Examination: written examination
Literature	Masselink and Hughes, 2003. Introduction to coastal processes and geomorphology. Arnold, Hodder Headline Group London, 354pp Open University Course Team, 1989. Waves, Tides and Shallow-Water Processes. Open University Oceanography, Milton Keynes, UK, ISBN: 978-0-08-036372-1 IPCC, 2014: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pp.

Number and name of module	02-321-M6 **Module 6: Computer Use and Modelling**
Credit points	9 CP
Period	summer term (2nd semester)
Course titles	M6-01 Population Dynamics & Stock Assessment M6-02 Trophic Modelling of Ecosystems M6-03 Modelling Spatio-Temporal Dynamics M6-04 Modelling in Conservation Biology
Assessment	combined examination (25 % M6-01; 25 % M6-02; 25 % M6-03; 25 % M6-04)
Person responsible for the module	Prof. Dr. Matthias Wolff

Number and name of course	M6-01 **Population dynamics &stock assessment**
Lecturer(s)	Prof. Dr. Matthias Wolff, Prof. Dr. Tom Brey
Teaching form	x Lecture x Laboratories (Computer work)
Workload	Presence at the course: Lecture 15 h, Laboratories/Computer work 15 h; Individual studying: 37 h
Learning outcome	Participants have learned to analyse the dynamics of aquatic populations and to elaborate fisheries data to provide the scientific basis (and models) for the sustainable management of fisheries
Content	The course provides: 1. An overview on the historical development of fisheries science and its scientific concepts 2. Methods for estimating growth and mortality parameters in fisheries resources 3. Models for estimating sustainable yield levels based on fisheries catch and effort time series (Production models) 4. Models for estimating sustainable yield levels based on growth, mortality and size at first capture parameters (Yield per recruit models) 5. Methods for estimating gear selectivity 6. Methods and models for estimating stock size from catch at age and mortality data (Cohort analysis, Fishing success methods)
Part of combined examination	25 % of Module 6 examination
Assessment	Study performance: -- Examination: written examination
Literature	Hilborn, R.; Walters, C.J. 2013. Quantitative Fish Stock Assessment: Choice, Dynamics and Uncertainty. Springer Science & Business Media, 570p. Hogarth, D.D. 2006. Stock Assessment for Fisheries Management: A framework guide to the stock assessment tools of the Fisheries Management Science Programme (FMSP). FAO Technical Paper 487.261p. Pauly, D.; Murphy, G.I. (eds.) 1982. Theory and Management of Tropical Fisheries. ICLARM Conference Proceedings 9, 360p. Ricker, W.E. 1975. Computation and interpretation of biological statistics

	of Fish populations. Bull.Fish.Res. Board Can. 191: 1-382 Sparre, P and Venema, S.C. 1992. Introduction to tropical fish stock assessment. Part.1 Manual. FAO. Fisheries technical Paper No. 306.1.Rev.1 Rome, FAO, 376p. Wolff, M. 2009. Population Dynamics and stock assessment, p.119-126. In: Wolff, M. (ed.) Tropical Waters and their living resources: Ecology, Assessment and Management. Hauschild. 343 p.

Number and name of course	M6-02 **Trophic modelling**
Lecturer(s)	Prof. Dr. Matthias Wolff, Prof. Dr. Tom Brey
Teaching form	x Lecture x Laboratories (Computer practical)
Workload	Presence at the course: Lecture 15 h, Laboratories/Computer practical: 15 h; Individual studying: 37 h
Learning outcome	Knowledge of the basic concepts in trophic (food web) modelling; Skills to construct a simple trophic system model using the Ecopath with Ecosim (EwE) software and to simulate system changes over time; Knowledge of how the trophic modelling approach can be used for Ecosystem Based Fisheries Management
Content	The course provides: 1. A connection to the previous Module unit (M6-01), since several of the parameters that enter the trophic model are derived from fisheries assessment studies; 2. An introduction into trophic (food web) modelling through a description of the pioneering studies of Lindeman, Polovina, Ulanowicz and Pauly & Christensen that illustrate the roots and evolution of this approach; 3. The software EwE is presented and students learn to construct a first simple trophic model at the computer; 4. Groups of 2 or 3 students reconstruct published trophic models , and present their group work in class thereafter. These presentations are then discussed on the last day of the week with the lecturers emphasizing among system differences in trophic structure as well as limits and challenges of the trophic modelling approach
Part of combined examination	25 % of Module 6 examination
Assessment	Study performance: oral presentation of experimental design Examination: written examination
Literature	Christensen, V. and Walters, C. 2004. Ecopath, Ecosim and Ecospace as tools for evaluating ecosystem impacts of fisheries. ICES J.Mar.Sci. 57: 697-706 Christensen, V.; MacLean, J. 2011. Ecosystem Approaches to Fisheries: A Global Perspective, Cambridge University Press, 322p. Ulanowicz, R.E. 1986. Growth and development: ecosystem phenomenology. Springer, New York Walters, C. Christensen, V. Pauly,D. 1997. Structuring dynamic models of exploited ecosystems from trophic mass balance assessments, Reviews in Fish biology and Fisheries 7: 139-172

Number and name of course	M6-03 **Modelling Spatio-Temporal Dynamics**
Lecturer(s)	PD Dr. Hauke Reuter, PD Dr. Broder Breckling
Teaching form	x Lecture; x Seminar; x Laboratories; Excursion
Workload	Presence at the course: Lecture 15 h, Seminar 7 h, Laboratories 8 h Individual studying: 39 h
Learning outcome	Participants have learned the presentation and significance of spatially distributed processes using a generalised cellular automata (CA) approach and individual-based models (IBM) as facilitated by object-oriented programming.
Content	• Processes on a grid, states, updating rules, topologies • The generality of the CA concept • Self-organisation • Examples of Ecological applications • Working with simple CA • Object-oriented programming (OOP): technical background and terminology • OOP-application for individual-based models • IBM Examples of Ecological applications • Principles of model construction and validation
Part of combined examination	25 % of Module 6 examination
Assessment	Study performance: -- Examination: written examination
Literature	Breckling, B., Müller, F. Reuter, H., Hölker, F. and Fränzle, O. 2005. Emergent properties in individual-based ecological models introducing case studies in ecosystem research context. Ecol. Model. 186: 376-388 Jopp, Breckling, Reuter 2011 Modelling Complex Ecological Interactions, Springer, Chapters 2-4,8,12 Grimm, V. and Railsback, S.F. 2005. Individual-Based Modeling and Ecology. Princeton University Press ISBN 0-691-09666-X Prusinkiewicz, Przemyslaw and Lindenmayer, Aristid (1990). The Algorithmic Beauty of Plants. Springer-Verlag Toffoli, T and Margolus N. (1987) Cellular Automata Machines: A New Environment for Modeling, MIT Press

Number and name of course	M6-04 **Modelling in Conservation Biology**
Lecturer(s)	Dr. Marc Taylor
Teaching form	x Lecture; Seminar; x Laboratories; Excursion
Workload	Presence at the course: Lecture 17 h, Laboratories 13 h Individual studying: 37 h
Learning outcome	Students learn the theoretical background of risk assessment in conservation biology and the ecological concepts related to this topic. They will also be introduced to fundamental techniques of development and evaluation of dynamic models to analyse the risk of extinction as a basis of a PVA (Population Vulnerability Analysis). The participants of the course will develop models for the analysis of single species

	population dynamics; e.g. age-structured models, life stage–structured models, and metapopulation models. Case studies are presented within the context of management strategy explorations and risk assessment for species that are in critical states due to small population size. All examples make use of the free statistical and programming language "R", which allows students to build upon skills learned in the previous statistical course and familiarize themselves with basic programming.
Content	• Introduction into the framework of risk assessment (stochasticity, causes of extinction, “Population Viability Analysis” - PVA) • Formulation of Birth-and-Death- Recruitment-mortality Models (deterministic prediction, demographic stochasticity, environmental variation, indicators for risk assessment) • Models of population growth (independent and density dependence) • Models of structured populations (age structure, stage structure, simulating variability, correlation and auto-correlation, migration and dispersal, density dependence) • Spatial structure and meta-population dynamics
Part of combined examination	25 % of Module 6 examination
Assessment	Study performance: -- Examination: written examination
Literature	Burgmann, M.A., Ferson, S. and Akcakaya, 1993. Risk assessment in conservation biology. London: Chapman & Hall. Crawley, M.J., 2011. The R book, Reprinted with corrections 2009, reprinted. ed. Wiley, Chichester.Hanski, I. 1990. Metapopulation Ecology. Oxford University Press Gerber, L.R., Buenau, K.E. and Vanblaricom, G.R. 2004. Density dependence and risk extinction in a small population of sea otters. Biodivers. Conserv. 13(14): 2741-2757 Morris, W.F., Doak, D.F. 2002. Quantitative Conservation Biology: Theory and Practise of Population Viability Analysis. Sinauer Associates, Sunderland

Number and name of module	02-321-M7 **Module 7: Coastal Planning and Management**
Credit points	9 CP
Period	summer term (2nd semester)
Course titles	M7-01 Ecological Economics & Social-Ecological Systems M7-02 Participatory Techniques & Stakeholder Analysis M7-03 Interdisciplinarity between Natural & Social Sciences M7-04 Law of the Sea and International Environmental Marine Law
Assessment	combined examination (25 % M7-01; 25 % M7-02; 25 % M7-03; 25 % M7-04)
Person responsible for the module	Dr. Sebastian Ferse

Number and name of course	M7-01 **Ecological Economics & Social-Ecological Systems**
Lecturer(s)	Prof. Dr. Achim Schlüter
Teaching form	x Lecture; x Seminar; ☐ Laboratories; ☐ Excursion
Workload	Presence at the course: Lecture 10 h, Seminar 15 h Individual studying: 42 h
Learning outcome	Students have a basic knowledge on the principles of modern ecological economics and social-ecological systems as related to tropical coastal and marine environments.
Content	The basic purpose of this course is to provide a brief chronological account of the evolution of ideas relating to ecology in economic analysis with a special focus on collective dilemmas on resource use and institutional problems. Then it reports on applications of those theories to the coastal and marine realm in the tropics. Showing various methodologies of application, particularly the structural and conceptual evolution of social-ecological systems thinking. This will allow the students to see similarities and differences with natural science approaches as well as the integration of knowledge generation across disciplines. The students will apply the knowledge to a short case study of their choice to demonstrate this knowledge practically.
Part of combined examination	25 % of Module 7 examination
Assessment	Study performance: -- Examination: written examination
Literature	Agrawal, A. 2001 'Common Property Institutions and Sustainable Governance of Resources', World Development 29(10): 1623-48. Common, M. and Stagl, S. 2005 Ecological Economics: an introduction, Cambridge: University Press. Schlüter, A. and Madrigal, R. 2012 'The SES Framework in a Marin Setting: Turtle Egg Harvesting in Costa Rica', Rationality, Moral and Markets 3 (Special Issue about: Coevolving Relationships between Political Science and Economics; reflecting the work of Elinor Ostrom): 148-167. Ostrom, E. 2009 'A general framework for analysing sustainability of social-ecological systems', *Science 325(5939) 419-422.* Hinkel, J., M. E. Cox, M. Schlüter, C. R. Binder, and T. Falk. 2015. A diagnostic procedure for applying the social-ecological systems framework in diverse cases. *Ecology and Society 20(1).*

	Vogt, J. M., G. B. Epstein, S. K. Mincey, B. C. Fischer, and P. Mccord. 2015. Putting the " E " in SES : unpacking the ecology in the Ostrom social-ecological system framework. *Ecology and Society 20(1).*

Number and name of course	M7-02 **Participatory Techniques & Stakeholder Analysis**
Lecturer(s)	Dr. Sebastian Ferse
Teaching form	x Lecture; Seminar; x Laboratories; Excursion
Workload	Presence at the course: Lecture 15 h, Laboratories 10 h Individual studying: 43 h
Learning outcome	Knowledge of basic social science research principles for natural scientists. Overview of the theoretical and contextual background for participatory research methodologies and their practical applications. Understanding of legal and ethical considerations of participatory research. Practical understanding of participatory research methods and further methodologies that originate from the participatory approach, such as stakeholder analysis.
Content	Transdisciplinary research, stakeholder analysis and participation, and Access and Benefit Sharing are increasingly emphasized in the context of marine natural resource use and management (e.g. in the new EU regulations implementing the Nagoya Protocol), yet often prove challenging to people with a background in natural sciences. This course will provide an introduction to the basics of social sciences, overview of methodology and research methods (with particular reference to social sciences), introduction to local forms of knowledge and resource management, and practical, legal and ethical considerations of data collection (e.g. intellectual property rights and prior informed consent). Introduction to governance, resource use and management in light of participation, as well as the concept and forms of participation and participatory research. Basics of questionnaire design and stakeholder analyses. A strong emphasis is placed on practical exercises, including role playing, simulation of research methods, and the design and implementation of an actual stakeholder study. The interactive nature of the course allows the participants to better grasp the practical aspects of participatory research and prepare them for the design, execution and evaluation of participatory studies.
Part of combined examination	25 % of Module 7 examination
Assessment	Study performance: -- Examination: written examination
Literature	Various peer-reviewed papers and books (to be announced in the lecture), including: Bernard, R. 2006. Research Methods in Anthropology, 4th Edition. Lanham, MD: AltaMira Press. Bryman, A. 2012. Social Research Methods, 4th Edition. Oxford, UK: Oxford University Press. Bunce, L., Townsley, P., Pomeroy, R.S., Pollnac, R. 2000 Socioeconomic Manual for Coral Reef Management. Townsville, Austalia: Global Coral Reef Monitoring Network (GCRMN) and Australian Institute of Marine Science (AIMS). Ruddle, K., Davis, A., 2013. Local Ecological Knowledge (LEK) in Interdisciplinary Research and Application: a Critical Review. Asian Fish. Sci. 26, 79-100.

Number and name of course	M7-03 **Interdisciplinarity between Natural & Social Sciences**
Lecturer(s)	Dr. Annette Breckwoldt
Teaching form	x Lecture; x Laboratories Seminar; Excursion
Workload	Presence at the course: Lecture 20 h, Laboratories 10 h Individual studying: 38 h
Learning outcome	Knowledge about interdisciplinary concepts and research approaches in coastal planning and management (CPM). Students learn about being an “interdisciplinary researcher”, about the role of stakeholders’ perspectives in CPM, and how stakeholders’ perceptions may differ in coastal marine resource use and management. Students learn about different co-management settings, about the role of poverty and gender aspects for coastal planning and integrated resource management, and effectively about the necessity to approach CPM from more than just one discipline.
Content	Coastal planning and management (CPM) is an area of research that is inherently interdisciplinary. Therefore, the main purpose of this week is the exploration of disciplinary boundaries, potential pitfalls and complexities (theoretical and practical) found in inter- and transdisciplinary research and fieldwork. This includes the examination and understanding of aspects relevant for local CPM, such as local leadership, resource ownership, poverty and gender, coastal protection measures (incl. waste management) and tourism. In addition to the examination of interdisciplinarity for coastal marine resource management, this week is also designed to have a strong focus on the researching students themselves. How can the student prepare their social-ecological fieldwork, how can the research setting be approached, the data collected using both qualitative and quantitative approaches? What expectations exist - on the side of the researcher as well of the local population? The course will facilitate clearing some of the interdisciplinary ‘smog’ and, by drawing on a number of case studies from ZMT researchers, encourage students to achieve a holistic view on CPM settings. Part of the daily study is set aside for discussions and questions on the own project plans which the students have developed by this time of the semester. The reading will be done in self-study and discussions take place with the entire group to facilitate the exchange of viewpoints, personal and professional experiences.
Part of combined examination	25 % of Module 7 examination
Assessment	Study performance: -- Examination: written examination
Literature	Berkes, F. & Seixas, C.S. (2005) Building Resilience in Lagoon Social–Ecological Systems: A Local-level Perspective. Ecosystems, Vol. 8: 967–974. Cinner, J. E. and R. B. Pollnac (2004) Poverty, perceptions and planning: why socioeconomics matter in the management of Mexican reefs, Ocean & Coastal Management, 47: 479-493. Denzin, N. K. and Y. Lincoln (2013). Collecting and interpreting qualitative materials. Los Angeles, California, USA, SAGE. Govan, H. Aalbersberg, W. Tawake, A., and Parks, J. 2008. Locally-Managed Marine Areas: A guide to supporting Community-Based

	Adaptive Management. The Locally-Mangaed Marine Area Network www.lmmanet.org Oeberg, G. (2011) Interdisciplinary Environmental Studies: A Primer. Wiley-Blackwell. Siar, S.V. (2003) Knowledge, gender, and resources in small-scale fishing: the case of Honda Bay, Palawan, Philippines. Environmental Management 31: 569-580. McClanahan, T. R., Davies J. and J. Maina (2005) Factors influencing resource users and managers' perceptions towards marine protected area management in Kenya. Environmental Conservation, 32(1): 42-49.

Number and name of course	M7-04 **Law of the Sea and International Environmental Marine Law**
Lecturer(s)	Dr. Ximena Hinrichs
Teaching form	x Lecture; Seminar — x Laboratories; x Excursion
Workload	Presence at the course: Lecture 10 h, Seminar 7 h, Excursion 8 h Individual studying: 42 h
Learning outcome	Basic knowledge on public international law, law of the sea and marine environmental law. Emphasis is placed on the conservation and management of marine natural resources, marine scientific research, deep seabed regime, and settlement of disputes. The students' knowledge will be enhanced through video and slide presentations as well as a visit to the International Tribunal for the Law of the Sea in Hamburg. Moreover, they are asked to do a research and give a presentation on selected topics, which is tutored by the instructor.
Content	Lectures: • Introduction to Public International Law • Introduction to Law of the Sea (natural resources, marine scientific research, deep seabed) • Introduction to Marine Environmental Law • Settlement of disputes Topics for Presentations: • Illegal, unreported and unregulated fishing • Deep seabed regime • Special regimes (polar, tropical coastal zones) • Marine protected areas • Extended continental shelf
Part of combined examination	25 % of Module 7 examination
Assessment	Study performance: -- Examination: written examination
Literature	• United Nations Convention on the Law of the Sea of 1982 • Textbook on International Law (by Martin Dixon, Oxford University Press 2007) • Handbook of International Law (by Anthony Aust, Cambridge University Press 2005) • The Law of the Sea: in a Nutshell (by L.B. Sohn, Publisher West 2010) • The International Law of the Sea (by Donald Ruthwell, Publisher Hart 2010) • The International Law of the Sea (by Yoshifumi Tanaka, Cambridge University Press 2012) • The Law of the Sea (by Churchill & Lowe, NY: Juris Public., 1999)

Number and name of module	02-321-M8 **Module 8: Scientific Essay**
Credit points	6 CP
Period	summer term (2nd semester)
Course titles	M8-01 Scientific Essay
Number and name of course	M8-01 Scientific Essay (semester study incl. mentoring)
Lecturer(s)	all ISATEC lecturers
Teaching form	[ ] Lecture [ ] Laboratories [x] Seminar [ ] Excursion
Workload	Presence at the course: Seminar 4 h, Individual studying: 172 h
Learning outcome	Competence to prepare, plan and conduct the process of (scientific) essay writing
Content	A list of essay topics will be provided by the group of ISATEC lecturers at the beginning of the second semester; Students will then select from this list a topic of their interest and shall meet with the respective supervisor for a first discussion about the work: Thereafter the student shall start to draft a first essay outline to be discussed with the supervisor. After agreeing on the general approach, structure and tentative content of the essay, the student works on his/her essay over the course of the second semester by him/herself. Prior to handing the final product in at the ISATEC office, the supervisor should have a last review of the essay and should provide recommendations for its finalization (if necessary). The supervisor qualifies the essay before the second semester ends.
Assessment	Module examination: written essay
Literature	topic related
Person responsible for the module	Prof. Dr. Matthias Wolff

Number and name of module	02-321-M9 **Module 9: Student Project** (abroad term)
Credit points	27 CP
Period	winter term (3rd semester)
Course titles	--
Lecturer(s)	
Teaching form	☐ Lecture ☐ Laboratories x Seminar ☐ Excursion
Workload	Presence at the course: Seminar 2 h, Individual studying: 810 h
Learning outcome	The student learns how to plan a field work period in the tropics, how to write a research proposal and how to conduct the fieldwork in the tropics
Content	Prior to leaving for the field work at a tropical partner institution of ZMT, the student has to develop a research proposal. Once this proposal is prepared, it needs to be communicated to the supervisors in Bremen and at the foreign partner institution. When agreed by the supervisors, the student travels for a period of 3-5 months (depending on the project) to the tropical partner institution. Upon arrival, the student presents his/her project to the local partners in order for them to know about the research concept and plan of the student. Prior to returning to Bremen (after completing the field work), the student needs to again give an oral presentation at the partner institution presenting the preliminary findings of the field work period. Prior to leaving for the field work in the 3rd semester, the ISATEC Coordination Office provides the student with a form/template to write down the topic of the field work research and to collect the signatures from the partners when the two oral presentations have been done.
Assessment	Study performances: written proposal, oral presentation / report
Literature	project related
Person responsible for the module	Prof. Dr. Matthias Wolff

Number and name of module	02-321-M10 **Module 10: Master Thesis & Colloquium**
Credit points	30 CP
Period	summer term (4th semester)
Course titles	Thesis Seminar Subject specific research for the MSc thesis Thesis Colloquium
Lecturer(s)	all ISATEC lecturers
Teaching form	☐ Lecture ☒ Seminar ☐ Laboratories ☒ Thesis
Workload	Presence at the course: Seminar 20 h Individual studying, field and/or lab work, thesis preparation: 880 h
Learning outcome	Implementing the scientific competence and knowledge in the field of aquatic tropical ecology in independent research. Competence in planning, designing, and conducting a scientific research project. Proficiency to analyse the results and report on the research project in a written thesis.
Content	Definition of an independent research theme, planning and discussion of the contents and the time frame of the research work in lab meetings; introduction to research subject related methods; realization of the research project; analysis and discussion of the data; structuring and writing of the thesis under the guidance of a university lecturer.
Assessment	Study performance: Thesis Seminar presentation combined examination: Thesis (70 %), Defence (30 %)
Literature	Subject specific research articles from international journals
Person responsible for the module	Prof. Dr. Matthias Wolff