

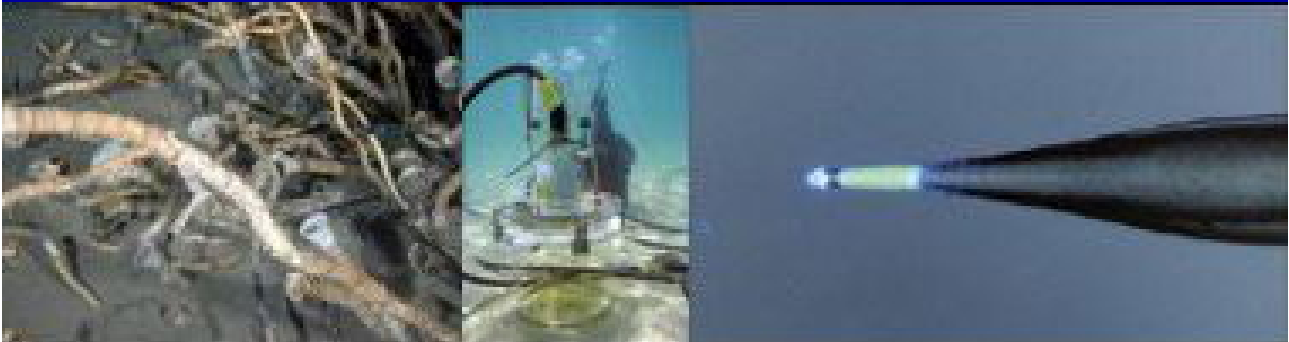
## *M.Sc / Ph.D. - Program*

*in Bremen - Germany*

***marmic***

International  
Max Planck Research School  
of Marine Microbiology

*[www.marmic.mpg.de](http://www.marmic.mpg.de)*



## ***Why study marine microbiology ?***

Marine microorganisms are essential to the maintenance of our biosphere, yet we have only fragmentary understanding of the diversity and function of the microbial life in our oceans. The study of marine microbiology involves research on fundamental issues such as the evolution of life, the functioning of marine food webs, global warming, the fate of pollutants, and the biodiversity of oceans.



## ***What is marmic ?***

The international Max Planck Research School of Marine Microbiology (marmic) is an M.Sc. / Ph.D. graduate program for highly qualified and motivated national and international students. marmic is a joint program of the Max Planck Institute for Marine Microbiology (MPI-MM), the University of Bremen (UniB), the Alfred Wegener Institute for Polar and Marine Research (AWI), and the International University of Bremen (IUB).

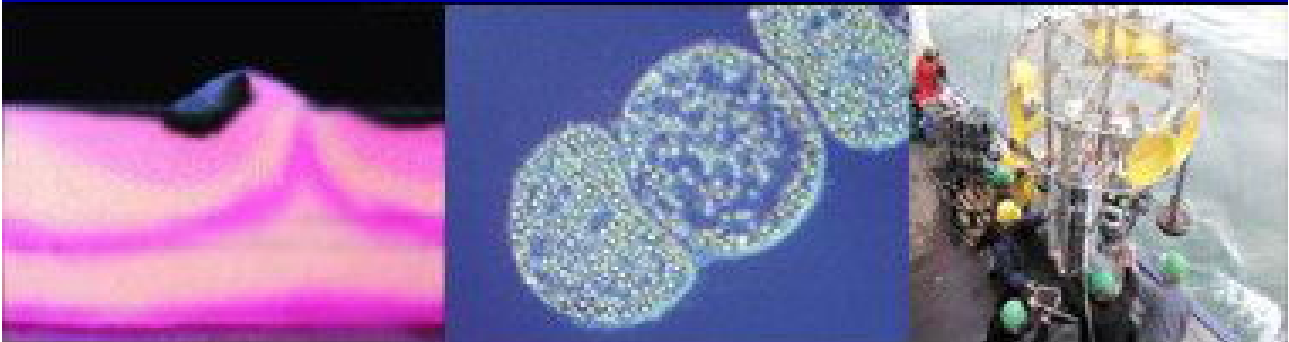
marmic teaches students to take an interdisciplinary approach to the understanding of marine prokaryotic and eukaryotic microbiology, offering training in physical and chemical oceanography, biogeochemistry, physiology, ecology, evolution, molecular biology, bioinformatics, and other related subjects.



## ***Why choose marmic ?***

The marmic concept is unique: we are educating a new breed of marine microbiologists, and providing them with the tools to better understand microbial life and the manner in which it affects our biosphere. marmic students are trained to think globally and to choose from both holistic and reductionistic research approaches. The breadth of theoretical and practical experiences at marmic enables students to address questions ranging from biogeochemistry to genomic analysis, from single-cell interactions to behaviour in mixed communities. These abilities make marmic students attractive scientists for international research teams, institutes, universities, and industry.

marmic offers an ideal environment for such a synergistic and state of the art training in marine microbiology. Bremen has an international reputation as an outstanding location for research in the field of marine biology and geology that successfully attracts both national and international scientists and students. The MPI for Marine Microbiology is recognized worldwide as one of the most successful and productive institutes in the field of marine microbiology. Several microbiological and biogeochemical research groups at the University of Bremen, the Alfred Wegener Institute for Marine and Polar Research (AWI), and the International University of Bremen (IUB) are among the leading laboratories in their field, providing a further source of internationally recognized expertise.



## ***marmic, a place of excellence***

The unique concentration of so many marine institutes and universities in the immediate vicinity of marmic offers students an unparalleled education and the opportunity for innovative and interdisciplinary research for their thesis.

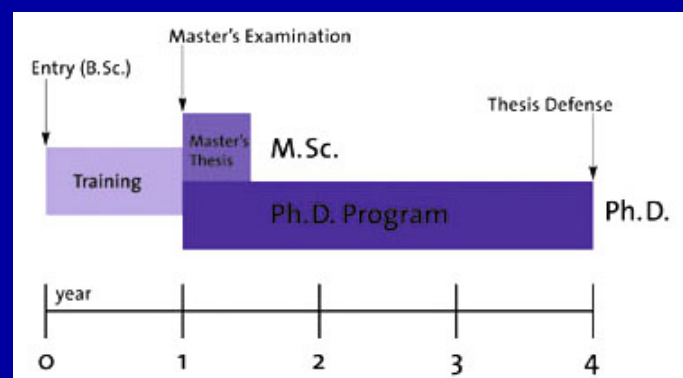
## ***marmic Faculty***

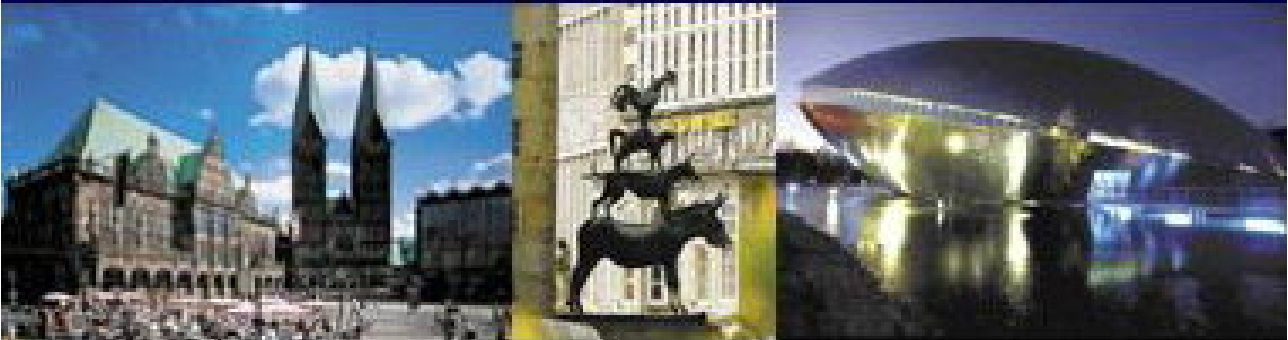
Biogeochemistry	Bo Barker Jorgensen (MPI-MM)
	Laurenz Thomsen (IUB)
Microsensors	Dirk de Beer (MPI-MM)
Marine Chemistry	Wolfgang Balzer (UniB)
Biological Oceanography	Antje Boetius (MPI-MM)
	Victor Smetacek (AWI)
Prokaryotic Microbiology	Friedrich Widdel (MPI-MM)
	Ulrich Fischer (UniB)
Eukaryotic Microbiology	Gunter Kirst (UniB)
Molecular Ecology	Rudolf Amann (MPI-MM)
Symbiosis and Parasitism	Nicole Dubilier (MPI-MM)
	Matthias Ullrich (IUB)
Bioinformatics	Otthein Herzog (UniB)
Modelling	Dieter Wolf-Gladrow (AWI)



## *Structure of the program*

marmic offers a 4 year program with the first year consisting of theoretical and practical training with lectures, tutorials, practical courses, laboratory rotations, and seminars. After the first year, the majority of the marmic students enter the Ph.D. program and graduate with a Ph.D. thesis within 3 years. A Master of Science (M.Sc.) degree is available to those students that do not qualify for the Ph.D. program, or for Ph.D. students that wish to also gain an M.Sc. degree. Students in the Ph.D. program are supervised by a thesis committee that meets at least twice a year to discuss the progress of their. Ph.D. students participate in seminars, workshops, summer schools, and a yearly retreat with international scientists. Exchange programs with universities in the USA are available for 6 - 12 month research visits. The school language is English. Students receive stipends to cover their costs of living, as the marmic program is too intensive and demanding to work on the side.

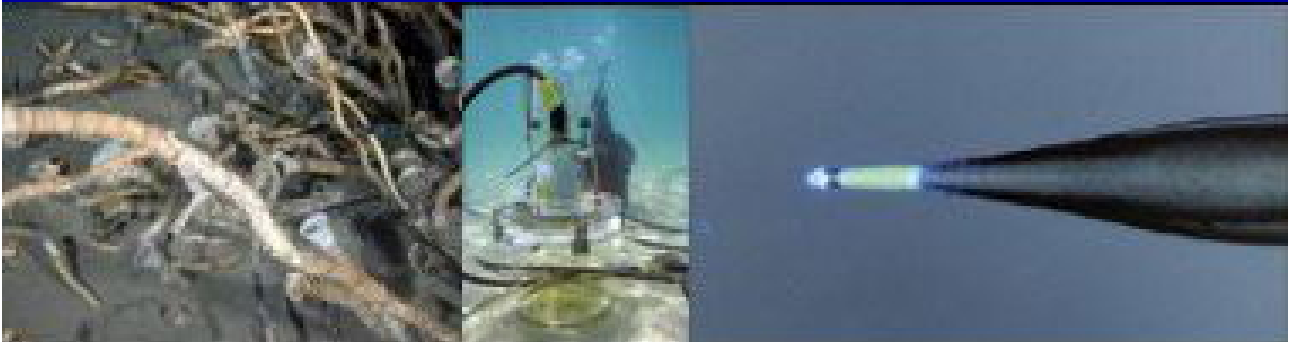




## *The city of Bremen*

Bremen is a lively and international city in northern Germany with more than half a million inhabitants. The city has a long tradition as city state and port, and is renowned for being safe, tolerant, vibrant and multicultural. The city hosts many restaurants, bars, cafes, museums, art galleries, cinemas and theatres and is home to one of the world's most famous brewing companies (Beck's Beer). Despite the metropolitan nature of Bremen, it is also a green city with many parks and waterways and a beautiful countryside that is easily accessible with the excellent Bremen public transportation system or via a network of bicycle paths. The Bremen railway station and airport offer many national and international connections, making the city just a short stop away from the rest of Europe and the world.





## ***Year 1 at marmic***

The first year at marmic consists of an intensive 30 hours per week training with lectures, tutorials, seminars, practical courses, and laboratory rotations. The goal is to give students the theoretical and practical tools they need for their future research in the field of marine microbiology.

The school year begins in October with a 1 week orientation course and ends in August with final exams, with Christmas, spring, and summer breaks. A lecture series in marine microbiology, accompanied by tutorials is held throughout the school year, the practical courses during months 1 - 4, and the laboratory rotations during months 5 - 10 of the school year. At the end of the school year, students take their final exams, consisting of a written test based on the lecture series, and two oral exams based on practical courses and laboratory rotations.



## **Years 2 - 4**

In years 2 - 4 students work on their Ph.D thesis in a research group of the MPI-MM, the University of Bremen, the AWI or the IUB. Students have the option of working in a foreign laboratory for up to 12 months. Students from abroad are encouraged to cooperate with an institute from their home country.

In addition to an immediate research advisor that works closely with the student on their Ph.D. project, a thesis committee is appointed consisting of 2 - 3 marmic faculty members, and if suitable, an external international scientist. The thesis committee meets at least twice a year with the student to provide advice, and support, and ensure that the thesis project progresses well. Students submit a written thesis proposal to the committee at the end of their first year of Ph.D. research that is discussed in detail with the committee and presentes orally in the MPI-MM seminar series.

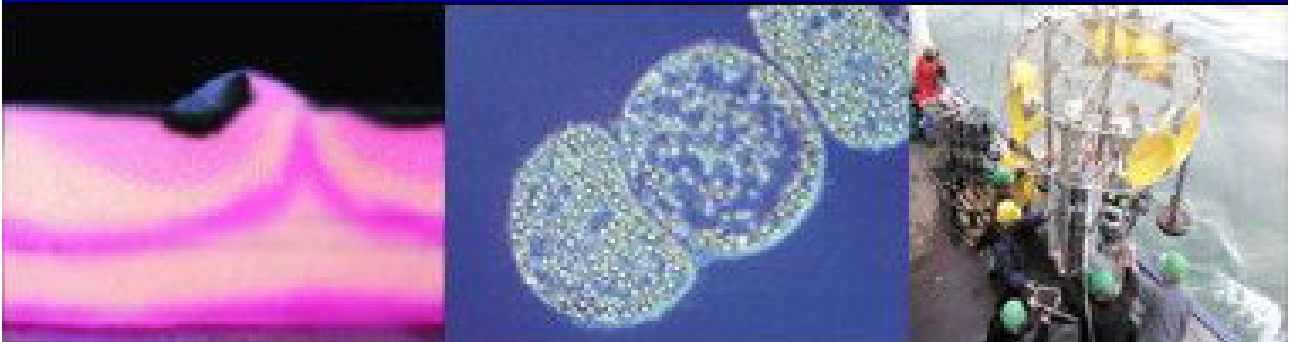
Courses in areas relevant to the research of the Ph.D. students are offered as 2 - 3 day workshops or in the form of a weekly seminar and are taught by marmic faculty and leading international scientists. Some of the courses offered are: Statistics in microbial ecology, Thermodynamics workshop, How to design an experiment, Sequence analysis workshop, Deep sea ecology and in situ experminetation, Fluid dymanics workshop, or How to write a proposal.



## ***Practical Courses***

In the practical courses students are offered a state of the art training in methods used in marine microbiological research, such as:

- isolation and cultivation of marine microorganisms
- aerobic and anaerobic techniques
- light and confocal microscopy
- flume experiments
- modelling
- gas and high pressure liquid chromatography
- isotope ratio mass spectrometry
- enzymology
- PCR, cloning, sequencing, phylogenetic analysis
- differential gene expressions, genomics
- fluorescent in situ hybridization



## ***Laboratory rotations***

After learning general techniques and methods in their first 4 months of practical courses, students work actively at the bench during 3 laboratory rotations of 7 weeks each in research groups of the MPI-MM, the University of Bremen, the AWI, or the IUB. Students work closely with a senior graduate student or postdoc (rotation advisor) on a defined project. The rotations teach students to work independently and help them in their choice of a thesis subject. Students are trained in keeping a reliable and complete laboratory notebook that is regularly supervised by their rotation advisor. At the end of each rotation, students summarize their project in an oral presentation and written paper to gain experience in evaluating their results and putting the into context, and to become confident in scientific speaking and writing.



## ***Lecture series and tutorials***

The lecture series in marine microbiology covers the entire field of marine microbiology and gives students the theoretical background they need for their Ph.D. research. The lectures are accompanied by tutorials in which the students can work in small groups on questions raised in the lecture series in more depth and detail.

The lecture series includes the following topics:

- Marine physics, chemistry and geology
- Biogeochemistry
- Transport process in sediments and the water column
- Principles of the marine sulfur, nitrogen and carbon cycle
- Pelagic and benthic environments,  
microbial life in extreme environments
- Microbial diversity
- Biology and ecology of marine bacteria, archaea and eukaryotes
- Molecular ecology and evolution



## ***Summer schools***

Summer schools are offered by marmic faculty and leading international scientists in the form of either

- 1) Technique workshops in Bremen that introduce new, highly specialized techniques in theory and practice, or
- 2) Habitat workshops at selected field sites with intriguing or unique habitats for the study of microorganisms. The study sites will be sampled and investigated in an interdisciplinary approach, with students and faculty participating in a hands-on program.

## ***Yearly retreat***

A yearly retreat of 2 - 3 days with marmic faculty and student body offers an informal and relaxed atmosphere for getting to know one another, discussing student's short and long term goals, exchanging ideas, and having fun together!



## Application

The marmic program is designed for Ph.D. students, with the M.Sc. program offered only to those students that do not qualify for the Ph.D. program after their first year. Students require a B.Sc. as a minimum, but should preferably have had additional university or research experience. Students from Germany without a B.Sc. require the Vordiplom / Zwischenprüfung, and at least 2 Semesters of Hauptstudium. Exceptionally qualified students can begin their Ph.D. thesis immediately, provided they have an M.Sc. or a Diplom / Staatsexamen. Students are encouraged to apply for scholarships in their home country, at the Germany embassy, or the local office for the German Academic Exchange Service (DAAD), as this greatly increases their chances of being accepted to the marmic program. Details of application requirements and application forms are available via internet or mail.

