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| <b>Module Name</b>              | <b>Element cycles in the ocean -<br/>Stoffkreisläufe im Meer (500040)</b>  |                                  |
| <b>Module Number</b>            | MNF-bioc-250   |                                  |
| <b>Person in Charge</b>         | Prof. Dr. Hermann W. Bange<br>Phone: +49-(0)431-600-4204, E-mail: hbange@geomar.de,<br>Homepage: www.geomar.de/  |                                  |
| <b>Semester / Duration</b>      | 2. semester / one semester   | <b>Status</b><br>optional        |
| <b>Regular Cycle</b>            | annual, in summer semester   |                                  |
| <b>Study Programme</b>          | Master of Science in Biological Oceanography   |                                  |
| <b>Classes</b>                  | <b>Class Title (Teaching Form)<br/>Lecturers</b>   | <b>Contact Time / Group Size</b> |
|                                 | <i>Marine biogeochemical cycles<br/>(Lecture)</i><br>Prof. Dr. Hermann W. Bange  | 2 hr per week / 20 students      |
| <b>Credit Points / Workload</b> | 2 ECTS / 60 hours  |                                  |
| <b>Prerequisites</b>            | Basic knowledge in chemistry, physics, and biology   |                                  |
| <b>Completion Module</b>        | None.  |                                  |
| <b>Following Module</b>         | None.  |                                  |
| <b>Educational Objectives</b>   | The goal of this lecture is to gain a deeper understanding of the marine biogeochemical cycles in the water column and their interactions with the atmosphere.   |                                  |
| <b>Content of Teaching</b>      | <ul style="list-style-type: none"> <li>(i) Evolution of biogeochemical cycles</li> <li>(ii) Basic principles and concepts</li> <li>(iii) Nitrogen cycle (incl. N<sub>2</sub> fixation, nitrification, denitrification, anammox)</li> <li>(iv) Phosphorus cycle</li> <li>(v) Sulphur cycle</li> <li>(vi) Silicon cycle</li> <li>(vii) Trace metal cycles (focus on iron)</li> <li>(viii) Coupling of biogeochemical cycles</li> </ul>   |                                  |
| <b>Examination</b>              | A graded oral exam.  |                                  |
| <b>Literature</b>               | <ul style="list-style-type: none"> <li>1) "Earth System Science – From biogeochemical cycles to global change" ed. MC Jacobson et al., Academic Press, 2000.</li> <li>2) "Biogeochemistry – An analysis of global change", 2. Auflage, WH Schlesinger, Academic Press, 1997.</li> <li>3) "Ocean Biogeochemical Dynamics", JL Sarmiento and N Gruber, Princeton University Press, 2006.</li> <li>4) "Introduction to Marine Biogeochemistry", 2<sup>nd</sup> edition, SM Libes, Academic Press, 2009</li> </ul> |                                  |
| <b>Additional Information</b>   | This lecture is interdisciplinary. Students interested in chemical oceanography, biological oceanography, marine microbiology and Earth system science are welcome. The lecture will be given regularly every week. Please check UnivIS for exact dates.   |                                  |