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| **Program of Studies:** | **Master Program Bioinformatics** |
| **Name of the module:** | **Bio-Reaction Engineering** |
| **Abbreviation:** | **B-M-4** |
| **Subtitle:** | - |
| **Modules:** | Lecture, tutorial, and seminar |
| **Semester:** | 1st – 3rd semester / every winter semester |
| **Responsible lecturer:** | Prof. Dr. Christoph Wittmann |
| **Lecturer:** | Prof. Dr. Christoph Wittmann, Prof. Dr. Elmar Heinzle |
| **Language:** | English |
| **Level of the unit/ Mandatory or not :** | Graduate course / mandatory elective |
| **Course type/weekly hours:** | Lecture: 2 h (weekly)<br>Tutorial: 1 h (weekly)<br>Seminar: 1 h (weekly) |
| **Total workload:** | 180 h = 60 h of classes and 120 h private study and assignments |
| **Credits:** | 6 |
| **Entrance requirements:** | Basic knowledge mathematics, biochemistry |
| **Aims/Competences to be developed:** | Comprehension of the basics of bio-reaction engineering (kinetics, drug transport, bio-reactors) and bioprocess simulation (modeling with Berkeley Madonna) |

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| **Content:** | - Thermodynamics of biological processes<br>- Mass and energy balances<br>- Enzyme kinetics<br>- Growth kinetics<br>- Kinetics of cellular processes<br>- Metabolic balances<br>- Material transport<br>- Bioreactors<br>- Interpretation of bioreactors (enzymes, bacteria, fungi, cell cultures)<br>- Recycling systems (membrane processes, perfusion)<br>- Integrated separation of products<br>- Diffusion and reaction<br>- Immobilized biocatalysts<br>- Online measurement and control- |
| **Assessment/Exams:** | Exam, assignments |
| **Literature:** | Biological Reaction Engineering (Dunn, Heinzle, Ingham, Prenosil, 2003, Wiley) |