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| Module name | Cell biology and microbiology | | | |
| In semester | 3rd semester BTB | | | |
| Module code | 302 | | | |
| ECTS-Points | 9 | | | |
| Working hours | Sum 270 | Contact time 135 | Self-study time 90 | Exam preparation 45 |
| Duty mark | P | | | |
| Teaching language | German | | | |
| Offered | in each semester | | | |
| Usability for participation: | no | | | |
| Conditions for participation | Modules Biology, Biochemistry 1 | | | |
| Target of the module | **Overall target (Knowledge, Skills, Competences):**  - Practical skills and safe handling of chemicals, biological materials and apparatus in  physics and chemistry   * Well-grounded knowledge of life sciences and engineering sciences * Understanding of the interdependencies within the field of biotechnology and related disciplines. * Ability to select und use the appropriate methods, materials and techniques used in biotechnology * Ability to handle biological materials and cells, and to analyze, prepare and cultivate them * Ability to recognise, analyse, formulate and – with the help of specialist literature – to solve complex and challenging problems in biotechnology and in related disciplines * Ability to organise and implement further learning processes independently * Ability to work on and solve engineering problems in the field of biotechnology, taking into account technical, scientific, social, ecological and economic as-pects, perspectives, norms and legislation   **The following modules or subjects contribute to the overall target:**  - Analytical chemistry  - Cell biology and microbiology   * Biochemistry 2 * Control engineering * Enzyme kinetics * Instrumental analytics * Molecular biology * Bioinformatics * Immunology and pharmacology * Quality management and patent system * Medical biotechnology * Bioprocess engineering * Cell culture technology * Downstream processing * Bioanalytics * All electives   **Gain of skills:**   * Laboratory Biochemistry * Laboratoiry indtrumental analytics * Laboratory bioprocess engineering * Laboratory microbiology * Laboratory molecular biology * Laboratory cell culture technology * Laboratory bioanalytics * Laboratory downstream processing   - Practical internship  **Target of this module:**  Transfer of theoretical knowledge and practical skills enabling students to work on microbiological and cell-biological questions in the biotechnology. | | | |
| Content | Lecture Microbiology  - Organisation und function of cells  - Microbiological methods: microscopy, staining methods, sterilisation techniques  - Diversity of microorganisms (bacteria, eukaryotic microorganisms, viruses  (bacteriophages)  - Growth of microorganisms: influence of physical and chemical growth parameters,  growth media, analysis of cell density and biomass  - Metabolism: aerob catabolism of glucose, fermentations, aerobic and anaerobic  respiration, photosynthesis, anabolism  - Introduction in industrial microbiology  Laboratory Microbiology  - Isolation of microorganisms (sterile working conditions, cultivation of microorganisms, generation of pure cultures)  - Phenotypical characterisation of microorganisms (microscopical,  biochemical and physiological methods)  - Substance analysis with microorganisms  Lecture Cell biology   * eukaryotic cell structure, function of cell organelles * molecular organisation of the cell * Biomembrane and substance transport, signal transduction by neurotransmitters * intracellular vesicular transport * Signal transduction, receptors * Cell cycle, apoptosis * Cytoskeleton and extracellular matrix, cell adhesion * Tissues and histology * Cancer | | | |
| Literature | - Lecture notes and lab manual  - M.T . Madigan, J.M. Martinko, Brock Mikrobiologie, Pearson Studium, 2006  - K. Munk, Grundstudium Biologie – Mikrobiologie. Spektrum Akademischer Verlag, 2000  - G. Fuchs, H.G. Schlegel, Allgemeine Mikrobiologie, Thieme Verlag, 2006  - B. Alberts, A. Johnson, J. Lewis, Lehrbuch der Molekularen Zellbiologie, Weinheim, Wiley-VCH Verlag, 2011  - G. Karp, Molekulare Zellbiologie, Berlin, Springer Verlag 2005  - H. Plattner, J. Hentschel, Zellbiologie, Stuttgart, Thieme Verlag, 2002 | | | |
| Responsible | D. Schwartz | | | |

**Sections and efficiency statements**

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| Form of instruction | SWS | Targets | Examination form and duration | Working hours |
| Lecture Cell biology with post processing and preparation of exam and excercises | 2 | - Transfer of fundamental knowledge in  cell biology | written exam part  60 min | 60 |
| Lecture Microbiology with post processing and preparation of exam and excercises | 4 | - Transfer of fundamental knowledge in  general and industrial microbiology | written exam part  60 min (also including laboratory microbiology) | 120 |
| Laboratory Microbiology | 3 | - Handling and characterization of  microorganisms  - Ability to work on and solve microbio-  logical problems in biotechnology | all experiments passed successfully  with reports | 90 |
| Sum | 9 |  |  | 270 |