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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
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| 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 successfullywith reports  | 90 |
| Sum | 9 |  |  | 270 |