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| **Title of the course:**  **Basic Biotechnology** | | *NEPTUN-code:*  RKWBI1ABNE  RKKBB1ABNF | ***Weekly teaching hours:*** *l+cw+lw*  2+0+0  2+0+0 | ***Credit*:** 3  ***Exam type****:* tm  ***Credit*:** 4  ***Exam type****:* tm |
| ***Course leader:***  Prof. Dr. habil. Hosam Bayoumi Hamuda | | ***Position:***  Private university professor  Associate professor | ***Required preliminary knowledge: -*** | |
| ***Curriculum:*** | | | | |
| The task of the subject is to provide a foundation for the basic and fundamental processes in biotechnology, to present the methods used in biotechnology. Furthermore, it is to introduce the role of biotechnology in nature, agriculture and the food economy as well as the medical industry.  Topics: Basic introduction of biotechnology, discipline of biotechnology, and highlights both conventional and modern approaches. The main subfields of biotechnology. The five branches into which modern biotechnology. Aspects of biotechnology, from basics to applied and industrial levels. Uses and applications of biotechnology. Biotechnological innovations. Advantages and disadvantages of biotechnology. Molecular biotechnology, microbial biotechnology, industrial biotechnology, agricultural biotechnology, medical biotechnology, or animal biotechnology. Genes and Genomics. Proteins and Proteomics. Recombinant DNA Technology. Microbial Biotechnology. Agricultural Biotechnology: Plant biotechnology and its applications, Animal Biotechnology. Environmental Biotechnology. Industrial Biotechnology. Medical Biotechnology. Nanobiotechnology. Product Development in Biotechnology. Ethics in Biotechnology. [Sustainability and Global Health Biotechnology](https://www.mccormick.northwestern.edu/biotechnology/student-research/areas/sustainability-global-health-biotechnology.html). | | | | |
| **Detailed description of the subject, timetable** | | | | |
| **Weeks** | **Topics of lectures and practices** | | | |
| 1. | **Lecture**: Basic introduction of biotechnology, discipline of biotechnology, and highlights both conventional and modern approaches. The main subfields of biotechnology. The five branches into which modern biotechnology  Practical: | | | |
| 2. | **Lecture**: Aspects of biotechnology, from basics to applied and industrial levels. Uses and applications of biotechnology. Biotechnological innovations. Advantages and disadvantages of biotechnology.  Practical: | | | |
| 3. | **Lecture**: Molecular biotechnology, microbial biotechnology, industrial biotechnology, agricultural biotechnology, medical biotechnology, or animal biotechnology.  Practical: | | | |
| 4. | **Lecture**: Genes and Genomics.  Practical: | | | |
| 5. | **Lecture**. Proteins and Proteomics.  Practical: | | | |
| 6. | **Lecture**: Recombinant DNA Technology  Practical: | | | |
| 7. | **Lecture**: Microbial Biotechnology Practical: | | | |
| 8. | **Lecture**: Agricultural biotechnology: plant biotechnology and its applications, animal biotechnology. Practical: | | | |
| 9. | **Lecture**: Environmental Biotechnology Practical: | | | |
| 10. | **Lecture**. Industrial Biotechnology Practical: | | | |
| 11. | **Lecture**: Medical Biotechnology  Practical: | | | |
| 12. | **Lecture**: Nanobiotechnology  Practical: | | | |
| 13. | **Lecture**: Product Development in Biotechnology.  Practical: | | | |
| 14. | **Lecture**: Ethics in Biotechnology. [Sustainability and Global Health Biotechnology](https://www.mccormick.northwestern.edu/biotechnology/student-research/areas/sustainability-global-health-biotechnology.html).  Practical: | | | |
| **Mid-term requirements** | | | | |
| **Participation in occupations:**  Participation in lectures is obligated.  Students should not absent more than 4 lectures If more, the course result is disable | | | | |
| **Mid-terms, protocols, reports, etc.:**  Solving homework and writing essays, etc., taking 2 written exams. The failed written exam will be made up in the 14th week, and the HKR will be made up during the exam period. | | | | |
| **The method of obtaining a** signature **/ mid-term mark:**  The method of obtaining a mid-term mark:  **Mid-term mark conditions**: a sufficient level of performance of the 2 written examinations, solving the homework and write the essay.  In case of mid-semester mark fail (1), correction opportunities are available according to 17§(6) of Education and Examination Regulations (TVSZ).  Signature conditions: a sufficient level of performance of the 2 written examinations, solving the homework and write the assay as well as the practical final report of the practical lessons. In case of written examination mark fail (1), correction opportunities (the replacement examination are available according at the 14th week according to 17§(6) of Student Requirement System (HKR).  **Important dates:**   1. written examination: 8th . of April 2025 2. written examination: 13th of May 2025   Supplement date of the essay and solving the homework: 30th of April 2025  Date of replacement the written examination(s): 22nd of May 2025  Requirements to pass the course: Two written exams +Solve the Homework and write an essay.  Term marks: 85-100%: excellent (5), 75-84%: good (4), 65-74%: satisfactory (3), 50-64%: pass (2), 0-49%: fail (1). | | | | |
| **Professional competencies:** | | | | |
| The subject demonstrates a broad knowledge and understanding of the fundamental principles of biotechnology and the importance of microorganisms in the development, exploitation and commercialisation of biological processes. Evaluate a range of techniques and strategies used in the biotechnology industries. Work in multi-disciplinary and multi-skilled teams to solve biotechnological problems.  The primary aim of this subject is to help the students to learn biotechnology with classical and modern approaches and take them from basic information to complex topics. There is a total of 14 lectures in this subject covering topics ranging from an introduction to biotechnology, genes to genomics, protein to proteomics, recombinant DNA technology, microbial biotechnology, agricultural biotechnology, animal biotechnology, environmental biotechnology, medical biotechnology, nanobiotechnology, product development in biotechnology, industrial biotechnology, forensic science, regenerative medicine, biosimialars, synthetic biology, biomedical engineering, computational biology, ethics in biotechnology. | | | | |
| **Literature*:*** | | | | |
| [Hallam S.](https://www.google.hu/search?hl=hu&tbo=p&tbm=bks&q=inauthor:%22Hallam+Stevens%22) (2016): Biotechnology and Society. University of Chicago Press. ISBN 022604615X  [David P. Clark](https://www.google.hu/search?hl=hu&tbo=p&tbm=bks&q=inauthor:%22David+P.+Clark%22), [Nanette J. Pazdernik](https://www.google.hu/search?hl=hu&tbo=p&tbm=bks&q=inauthor:%22Nanette+J.+Pazdernik%22) (2015): Biotechnology. Second Edition Newnes.  [Venetia A. Saunders](https://www.google.hu/search?hl=hu&tbo=p&tbm=bks&q=inauthor:%22Venetia+A.+Saunders%22) (2012): Microbial genetics applied to biotechnology: principles and techniques of gene transfer and manipulation. Springer Science & Business Media  John E. Smith (2009): Biotechnology. Cambridge University Press. ISBN: 1139476807  Cornelia Kasper, Martijn van Griensven, Ralf Pörtner (2009): Bioreactor Systems for Tissue Engineering. Springer Science & Business Media.  [Martina Newell-McGloughlin](https://www.google.hu/search?hl=hu&tbo=p&tbm=bks&q=inauthor:%22Martina+Newell-McGloughlin%22), [Edward Re](https://www.google.hu/search?hl=hu&tbo=p&tbm=bks&q=inauthor:%22Edward+Re%22) (2007): The Evolution of Biotechnology: From Natufians to Nanotechnology. Springer Science & Business Media, ISBN: 1402051492,  Ralf P. (2007): Animal Cell Biotechnology: Methods and Protocols. Springer Science & Business Media  [Colin Ratledge](https://www.google.hu/search?hl=hu&tbo=p&tbm=bks&q=inauthor:%22Colin+Ratledge%22&source=gbs_metadata_r&cad=10), [Bjorn Kristiansen](https://www.google.hu/search?hl=hu&tbo=p&tbm=bks&q=inauthor:%22Bjorn+Kristiansen%22&source=gbs_metadata_r&cad=10) (2006): Basic Biotechnology. Cambridge University Press. ISBN: 0521840317, 9780521840316  [Julian Chaudhuri](https://www.google.hu/search?hl=hu&tbo=p&tbm=bks&q=inauthor:%22Julian+Chaudhuri%22), [Mohamed Al-Rubeai](https://www.google.hu/search?hl=hu&tbo=p&tbm=bks&q=inauthor:%22Mohamed+Al-Rubeai%22) (2005): Bioreactors for Tissue Engineering: Principles, Design and Operation. Springer Science & Business Media. | | | | |
| **Comments**:  Attendance at the lectures is mandatory! Obligations of attendance can be fulfilled in case of a maximum of 4 absences. In case of 5th absence from the sessions, the course can no longer be completed. At least sufficient (50-64% = 2) completion of the med-term exams, preparation of practical reports, written of one essay and solving the homework questions. | | | | |