HOCH SCHULE OFFEN BURG

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MODULHANDBUCH

Biotechnology (MBT) (BT-M)

Stand: 20.04.2026

Studien- und Prüfungsordnung 20222

Modulhandbuch BT-M

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MBT-11: Biotechnological Processes from Lab to Market

Empfohlene Vorkenntnisse	Fundamentals of biotechnology and process engineering.	
Lehrform	Vorlesung/Labor	
Lernziele	Students are equipped with comprehensive understanding of all process steps relating to bioproducts of industrial importance. They are able to define and assess the procedures for biomanufacturing. They know how to select the appropriate process steps and how to evaluate process alternatives.	
Dauer	1 Semester	
SWS	8 SWS	
Aufwand	Lehrveranstaltung:	120,00 h
	Selbststudium/Gruppenarbeit:	180,00 h
	Workload:	300,00 h
ECTS	10,00 ECTS	
Voraussetzungen für die Vergabe von LP	written examination, 90 minutes, and laboratory report(s) The module grade is composed of the exam grade (50%) and the laboratory grade (50%).	
Modulverantwortung	Professor Dr. rer. nat. Thomas Eisele	
Empfohlenes Semester	1. Semester	
Häufigkeit	jedes Jahr (WS)	
Verwendbarkeit	Master MBT	

LEHRVERANSTALTUNG: Biotechnological Processes from Lab to Market

Art	Vorlesung
Nr.	M+V2500
SWS	4,00 SWS
Lerninhalt	The students will aquire knowledge in the preparation of business cases and the finacial evaluation of biotechnological projects. Moreover, an introduction in the protection of intellectual property will be given. In a case study, students will aquire knowledge how to develop industrial products starting with bioinformatics via the recombinant expression of proteins in Pichia pastoris. The purification of proteins as well as the characterization of enzymes will be covered in depth. Bioanalytical knowledge is acquired in the field of Circular Economy. In detail, methods for bioanalytics are discussed (HPTLC, HPLC, GC and IC). Finally, knowledge is imparted in the area of upstream and downstream processing. This includes, for example, the production of cellulases in Trichoderma reesei.
Lehrveranstaltungs-sprache	de
Literatur	- Doran, P.M.: Bioprocess Engineering principles, second edition,

	Elsevier 2013 - Villadssen, J.; Liden, G.; Nielsen, J.: Bioreaction Engineering Principles, Springer 2011 - Dunn, I.J.; Heinzle, E.; Ingham, J.; Prenosil, J.E.: Biological Reaction Engineering, Wiley-VCH, 2003 - Dutta, R.: Fundamentals of Biochemical Engineering. Springer 2008 - Chmiel, H.: Bioprozesstechnik, Elsevier Spektrum Akademischer Verlag, 2006

LEHRVERANSTALTUNG: Biotechnological Processes from Lab to Market - Lab

Art	Labor
Nr.	M+V2501
SWS	4,00 SWS
Lerninhalt	The students will conduct several full day experiments: - Buffer preparation, dilutions and protein quantification - Enzyme Purification using Fast Protein Liquid Chromatography as well a SDS-PAGE - Enzyme kinetic using the previously purified Enzymes - Optinally: Bioreactor fermentation in 5 - 10 L scale
Lehrveranstaltungs-sprache	de
Literatur	Script Lab to Market: Biotechnological Processes from Lab to Market

MBT-12: Safety and Control in Biotechnology

Empfohlene Vorkenntnisse	Bachelor's level in control engineering, knowledge in process engineering	
Lehrform	Vorlesung	
Lernziele	Students have obtained comprehensive knowledge of safety and process control in bioengineering.	
Dauer	1 Semester	
SWS	4 SWS	
Aufwand	Lehrveranstaltung:	60,00 h
	Selbststudium/Gruppenarbeit:	60,00 h
	Workload:	120,00 h
ECTS	4,00 ECTS	
Voraussetzungen für die Vergabe von LP	Regulatory affairs and Safety in Biotechnology: written examination, 60 minutes, weighted 50% Process Control Engineering: written examination, 60 minutes, weighted 50%	
Modulverantwortung	Professorin Dr. rer. nat. Christiane Zell	
Empfohlenes Semester	1. Semester	
Häufigkeit	jedes Jahr (WS)	
Verwendbarkeit	Master MBT	

LEHRVERANSTALTUNG: Regulatory Affairs and Safety in Biotechnology

Art	Vorlesung
Nr.	M+V2502
SWS	2,00 SWS
Lerninhalt	Students get to know the procedures and suppositions for working in the field of biotechnology, concerning regulatory affairs, biosafety and QM. - Biotechnology and Regulatory affairs I - Regulatory affairs II - Biosafety - QM in the industrial community Students will be introduced in the different areas of biotechnologies. Within this for designing biodevices or executing procedures for bioanalysis, nowadays an enlarged understanding for regulatory affairs, IVD (in-vitro diagnostic) guidelines is getting mandatory. In addition to that aspects to biosafety and overall quality management has to be considered for commercial bioengineering.
Lehrveranstaltungs-sprache	de
Literatur	reading list: - Bill Griffiths. The role of the regulatory affairs function during mergers

	and acquisitions. Regulatory Rapporteur. February 2011. - Ronan Donelan. Good decision-making practice in the regulatory arena. Regulatory Rapporteur - Vol 10, No 6, June 2013. - Monique Garrett. The reality of regulatory leaders in pharma today. Regulatory Rapporteur - Vol 10, No 11, November 2013. - Satesh, M. K.: Bioethics and Biosafety, I K International Publishing House Pvt. Ltd 2008 - Mike Page. The regulatory affairs function as a global development strategic partner. Regulatory Rapporteur - Vol 11, No 1, January 2014. downloads: http://www.raps.org/personifyebusiness/portals/0/documents/2010_sop_report.pdf http://edma-ivd.eu/library/the-proposal-for-new-ivd-regulation#

LEHRVERANSTALTUNG: Process Control Engineering

Art	Vorlesung
Nr.	M+V2503
SWS	2,00 SWS
Lerninhalt	The course is structured as follows: - the automation pyramid - norms and regulations - the most relevant DCS systems - sensors and actuators - fieldbus systems - controller and DCS levels
Lehrveranstaltungs-sprache	de
Literatur	- Schildt, H.-H.; Kastner, W.: Prozeßautomatisierung; Springer, 1998 - Polke, M. (ed.): Process Control Engineering; VCH Weinheim 1994 - Siemens: Manual of Siemens Simatic PCS 7, part 1 and 2 Available online: - www.pacontrol.com/siemens-manuals/Process-Control-System-PCS-7-Part1.pdf - www.pacontrol.com/siemens-manuals/Process-Control-System-PCS-7-Part2.pdf

MBT-13: Bioeconomy

Empfohlene Vorkenntnisse	Bioenergy fundamentals and basic laboratory skills Basics of biology and bioengineering	
Lehrform	Vorlesung/Seminar/Labor	
Lernziele	Students know trends, perspectives and limits of the future biobased economy. They understand the close relationship between energy, raw materials, end products, processes, equipment, and process control, and can apply their knowledge in research and development as well as production.	
Dauer	1 Semester	
SWS	8 SWS	
Aufwand	Lehrveranstaltung:	120,00 h
	Selbststudium/Gruppenarbeit:	180,00 h
	Workload:	300,00 h
ECTS	10,00 ECTS	
Voraussetzungen für die Vergabe von LP	Biotechnological conversion process: written examination, 60 minutes, weighted: 50% Renewable energy conversion: lab work and oral presentation, weighted: - Biobased industries: written examinations, 90 minutes, weighted: 50%	
Modulverantwortung	Professorin Dr. rer. nat. Christiane Zell	
Empfohlenes Semester	1. Semester	
Häufigkeit	jedes Jahr (WS)	
Verwendbarkeit	Master MBT	

LEHRVERANSTALTUNG: Biotechnological Conversion Processes

Art	Vorlesung
Nr.	M+V2504
SWS	2,00 SWS
Lerninhalt	The course is structured as follows: - Fundamentals in Bioprocess Engineering: Basic Bioreactors, Mode of Operation (Batch/Fedbatch/Continous), Characterization of Bioreactors, Compartment Model - Biogas process: Engineering aspects, biological stages, economic and ecological aspects, current research topics - Biotechnological ethanol process: Microbiological background, application, current research topics - Biotechnological acetone/butanol process: Microbiological background, application, current research topics - Research in biotechnological conversion processes: Microbial fuel cells, microalgae technology

Lehrveranstaltungs-sprache	de
Literatur	- Gabriele Di Blasio, Avinash Kumar Agarwal, Giacomo Belgiorno, Pravesh Chandra Shukla: Clean Fuels for Mobility, E-Book, Springer, 2022 - Deublein, D.; Steinhauser, A.: Biogas from Waste and Renewable Resources, Wiley-VCH, Weinheim, 2. rev. and exp. Edition, 2011 - Blaschek, H.-P.; Ezeji, T.; Scheffran, J.: Biofuels from Agricultural Wastes and By-Products, Wiley Blackwell, 2010 - Vertes, A. (ed.); Qureshi, N.; Yukawa, H.; Blaschek, H.-P.: Biomass to Biofuels: Strategies for Global Industries, Wiley, 2010

LEHRVERANSTALTUNG: Renewable Energy Conversion

Art	Seminar/Labor
Nr.	M+V2505
SWS	4,00 SWS
Lerninhalt	Students enhance their theoretical knowledge with practical aspects of the following exemplary process steps: - Literature research focusing on the production of bioethanol from lignocellulosic material, especially from wheat straw - Selection of one pretreatment variant to be performed in lab including discussion on technical limitations - Create a Design of Experiments (DoE) Approach to investigate influence of selected process parameters on pretreatment efficiency including the definition of response of interest - Perform corrseponding experiments in lab including the process steps of pretreatment, enzymatic hydrolysis and fermentation to produce Bioethanol - Perform required analysis to obtain information on process efficiency, performance of enzymatic hydrolysis and finally bioethanol fermentation - Use statistical software, e.g. Minitab, to evaluate, illustrate and discuss experimental results - Write a scientific report on the overall topic and results including literature-based discussion
Lehrveranstaltungs-sprache	de
Literatur	- Jaisamut et al., Biomass and Bioenergy (2016) 95, 1-7 - Mandenius and Brundin (2008) Bioprocess Optimization Using Design-of-Experiments Methodology - Ursachi and Gutt (2020) Production of Cellulosic Ethanol from Enzymatically Hydrolysed Wheat Straw - Carillo et al. (2005) Effect of alkali pretreatment on the cellulosic hydrolysis of wheat straw

LEHRVERANSTALTUNG: Biobased Industries

Art	Vorlesung
Nr.	M+V2506
SWS	4,00 SWS

Lerninhalt	- Basics in Polymer Chemistry a. Definition of Polymers, Copolymers and Biopolymers b. Synthetic Polymers vs. Biopolymers c. Spatial Structure of Biopolymers d. R/S configuration e. Polysaccharides - Production, sources of raw materials and biogedradabtity of Bioplastics a. Polylactid acid b. Cellulose-based plastics c. Starch-based plastics d. Polyhydroxyalkanoates e. Bio-derived Polyethylene f. Paramylon derivatives - Cellulose and its derivates: chemical, physical, technical properties, applications, composition and chemical structure a. Nitrocellulose b. (Carboxy-)Methylcellulose c. Cellulose acetate d. Viscose - Widely used Agro-Polymers: chemical, physical, technical properties, applications, composition and chemical structure a. Xanthan gum b. Alginate c. Agar d. Carrageenan e. Scleroglucan f. Pullulan g. Chitin h. Chitosan i. Pectin j. Galactomannans - Starch and its derivates: chemical, physical, technical properties, applications, composition and chemical structure a. Temperature/enzymatically modified starch (Maltodextrin, Dextrin, Glucose syrup) b. Cyclodextrin c. Oxidized Amylose = Superabsorber d. Hydroxyethyl starch (HES) e. Foamed starch - Production and sources of raw materials for Biofuels a. Bioethanol b. Biomethanol c. Biodiesel d. Microalgae biofuels - Bioleaching a. Heap leaching vs. Bioleaching b. Bioleaching of electronic waste - Synthetic routes of bio-based chemicals, applications, composition and chemical structure a. Methane b. Carbon Monoxide

	c. Methanol d. Ethylene e. Mono-Ethyleneglycol f. Lactic acid g. Propylene h. Acrylic acid and derivatives i. Butanol
Lehrveranstaltungs-sprache	de
Literatur	- Lewandowsky, I.: Bioeconomy. Springer; 1st ed. 2018 - OECD: The Bioeconomy to 2030. 2009

MBT-14: Complementary Subjects

Empfohlene Vorkenntnisse	none	
Lehrform	Seminar	
Lernziele	The students know important trends and ethical issues in biotechnology. They understand the context of engineering and technology, economy, ecology and ethics, and accept it as a foundation of their future professional conduct. They will gain an understanding of variation and uncertainty and how it affects the performance of business, commerce and manufacturing. They will understand the fundamentals of a learning organization, what influences the way people behave, and appreciate how all of this fits into the systemic whole.	
Dauer	1 Semester	
SWS	6 SWS	
Aufwand	Lehrveranstaltung:	90,00 h
	Selbststudium/Gruppenarbeit:	90,00 h
	Workload:	180,00 h
ECTS	6,00 ECTS	
Voraussetzungen für die Vergabe von LP	Bioperspectives and Bioethics: oral presenation; weight of grade within module: 50% Intercultural competences: oral presentation; weight of grade within module: - Language skills: grade according to the specifications of the language center; weight of grade within module: 50%	
Modulverantwortung	Professorin Dr. rer. nat. Christiane Zell	
Empfohlenes Semester	1. Semester	
Häufigkeit	jedes Jahr (WS)	
Verwendbarkeit	Master MBT	

LEHRVERANSTALTUNG: Bioperspectives and Bioethics

Art	Seminar
Nr.	M+V2507
SWS	2,00 SWS
Lerninhalt	Part 1: Introduction to bioethics Basic knowledge about bioethics is presented by the lecturer and completed in group discussions Part 2: Bioethical case study and acitivity Current topics from biotechnology are presented by students/lecturer. Both scientific background and arising ethical issued are discussed. Ethical guidelines will be developed in group discussions.
Lehrveranstaltungs-sprache	de

Literatur	Beauchamp, T.; Childress, J. (1979): The Principles of Biomedical ethics, 1979, 7th edition. Oxford University Press Online Ressources: https://www.coe.int/en/web/bioethics/home http://dal.ca.libguides.com/c.php?g=256990&p=1715961 Students are recommended to follow current bioethics media debates, relevant current biotechnological research media ....

LEHRVERANSTALTUNG: Language Skills

Art	Seminar
Nr.	M+V2509
SWS	2,00 SWS
Lerninhalt	Depending on the offers of the language center.
Lehrveranstaltungs-sprache	de
Literatur	Materials and resources will be provided during the course.

LEHRVERANSTALTUNG: Intercultural Competences

Art	Seminar
Nr.	M+V2528
SWS	2,00 SWS
Lerninhalt	The course is structured as follows: - Culture: relevance, differences in and sharing culture, seeing vs understanding other cultures - Values, filters and perspectives, concept of time, code of respect and contact, self-presentation, addressing people - Communication training
Lehrveranstaltungs-sprache	de
Literatur	- Meyer, Erin: The Culture Map: Decoding How People Think, Lead, and Get Things Done Across Cultures; Public Affairs, multiple editions - Hofstede, Gert: Cultures and Organizations - Software of the Mind; multiple editions - Hofstede, Gert.: Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations, Thousand Oaks CA: Sage Publication - Zein, Omar: Culture and Project Management; Gower Publishing Company - Hall, Edward T.: The Silent Language; Random House Anchor Books - Hall, Edward T.: The Hidden Dimension; Anchor Books Doubleday - Kramer, Jitske: Managing Cultural Dynamics; Human Dimension Publication Utrecht - Business case studies

2. Semester

MBT-21: Biotechnology in Environmental Sciences

MBT-21: Biotechnology in Environmental Sciences

Empfohlene Vorkenntnisse		
Lehrform		
Lernziele	Upon completion of the module the students will be able to: create and develop strategies that reflect the interdisciplinary nature of science, regulation and enterprise in the environmental biotechnology and deliver working knowledge of the various steps in the development of an environmental biotechnology - derived product from inception to the final product. For more detailed information please see the following webpage: http://wg.uwm.edu.pl/en/study-english/biotechnology	
Dauer	1 Semester	
SWS	0 SWS	
Aufwand	Lehrveranstaltung:	0,00 h
	Selbststudium/Gruppenarbeit:	0,00 h
	Workload:	900,00 h
ECTS	30,00 ECTS	
Voraussetzungen für die Vergabe von LP	written examinations, laboratory reports, oral presentations, etc.	
Modulverantwortung	Dr. Hab. Eng. Agnieszka Cydzik- Kwiatkowska (Mrs.), UWM	
Empfohlenes Semester	2. Semester	
Häufigkeit	jedes Jahr (SS)	
Verwendbarkeit	Master MBT	

3. Semester

MBT-31: Master's Thesis

MBT-31: Master's Thesis

Empfohlene Vorkenntnisse	General knowledge in Environmental Biotechnology and Scientific Writing	
Lehrform	Wissenschaftl. Arbeit/Sem	
Lernziele	The students demonstrate the ability to independently work on a problem from the subject of Environmental Biotechnology using scientific methods within a specified period. To this end, the following skills are acquired: - Formulation of a scientific approach for processing the selected task - Collecting, analyzing and evaluating information from relevant information sources (publications, books, etc.) and presenting the state of the art in the context of the task at hand - Structuring the topic - Clear presentation of the results, conclusions and further recommendations - Making a final presentation of the results achieved - Creation of a scientific publication	
Dauer	1 Semester	
SWS	0 SWS	
Aufwand	Lehrveranstaltung:	0,00 h
	Selbststudium/Gruppenarbeit:	900,00 h
	Workload:	900,00 h
ECTS	30,00 ECTS	
Voraussetzungen für die Vergabe von LP	The final thesis is defended by the student with an oral presentation of about 15 minutes, plus a discussion of about 10 minutes. The discussion constitutes a final oral examination.	
Modulverantwortung	Professorin Dr. rer. nat. Christiane Zell	
Empfohlenes Semester	3. Semester	
Häufigkeit	jedes Semester	
Verwendbarkeit	Master MBT	

LEHRVERANSTALTUNG: Master's Thesis

Art	Wissenschaftl. Arbeit
Nr.	M+V2510
SWS	0,00 SWS
Lerninhalt	The students develop the chosen topic following as a scientific project and document their approach and results in a thesis report.
Lehrveranstaltungs-sprache	de
Literatur	Depending on the topic of the master thesis.

LEHRVERANSTALTUNG: Presentation and Defense

Art	Seminar
Nr.	M+V2511
SWS	0,00 SWS
Lerninhalt	The students present the outcomes of their thesis in an oral presentation.
Lehrveranstaltungs-sprache	de
Literatur	Depending on the topic of the master thesis.