

Module BTB-0319 Purification strategies

1	Module Number 0319	Study Programme BTB	Semester 6	Offered in ☒WS ☒SS	Duration 1 Semester	Module Type Required	Workload (h) 150	ECTS Points 5
2	Courses		Teaching and Learning Forms		Contact Time		Self-Study Time	Language
	a)	Fundamentals of purification strategies	Lecture		(SWS) 2	(h) 30	(h) 90	German
	b)	Laboratory Fundamentals of purification strategies	Laboratory		2	30		English
						[1 SWS = 15h]		
3	<p>Learning Outcomes and Competences Once the module has been successfully completed, the students can...</p> <p>Knowledge and Understanding</p> <ul style="list-style-type: none"> explain and describe the basic technical components and subsequent steps of purification strategies. understand the process fundamentals of biochromatography, extraction and filtration and describe the connections between them. understand and explain methods of biochromatography for the isolation and purification of proteins from cultured cells. mathematical balance and dimension individual system components. recognize the significance of purification strategies within the biotechnological production. realize and evaluate possibilities and alternatives to individual purification steps. <p>Use, Application and Generation of Knowledge</p> <p><i>Use and Transfer</i></p> <ul style="list-style-type: none"> carry out mass balancing calculations and dimensioning evaluations of purification processes. (a) apply distinct purification techniques and chromatographic modes practice-oriented. (b) perform and optimize necessary work procedures. (b) use and apply purification strategy specific measurement and testing technologies. (b) <p><i>Scientific Innovation</i></p> <ul style="list-style-type: none"> examine the results of calculations in terms of their practicability. (a,b) apply the acquired tools and the gained knowledge to new purification processes. (a,b) recognize and employ future technology options and approaches. (a, b) <p>Communication and Cooperation</p> <ul style="list-style-type: none"> analyze, present and interpret process engineering data as well as data of a purification process and draw admissible conclusions. (a, b) write reports on the results of own scientific work. (b) communicate and cooperate within the group in order to find adequate solutions for the task at hand. (a, b) <p>Scientific Self-Conception/ Professionalism</p> <ul style="list-style-type: none"> based on the knowledge gained choose applicable purification techniques and chromatographic modes. (a, b) derive recommendations for decisions from a social and ethical perspective on the basis of the analyses and evaluations made (b). justify the process of selecting individual technical components theoretically and methodically (a, b). 							
4	<p>Contents</p> <p>a) Lecture Fundamentals of purification strategies (3 ECTS Points): General separation operations and systematic approach Methods of solid/liquid separation (filtration, sedimentation, centrifugation) Isolation (cell and tissue disruption, extraction, ultrafiltration) Purification (membrane procedure, crystallisation and precipitation, chromatography) Process chromatography (ion-exchange chromatography, hydrophobic interaction chromatography, affinity chromatography and gelfiltration) Product formulation, conservation and storage (lyophilization, spray-drying, freezing, sterile filtration)</p> <p>b) Lab Fundamentals of purification strategies (2 ECTS Points): Practical industry-relevant applications of individual purification techniques such as extraction und filtration Isolation and purification of recombinant proteins from cell lysates Isolation and formulation of proteins from natural sources</p>							

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5	<p>Participation Requirements</p> <p>recommended: Physics, Mathematics, Biochemistry 2, Basics of Chemical Engineering, Principals of Bioprocess Technology</p>
6	<p>Examination Forms and Prerequisites for Awarding ECTS Points</p> <p>a) Lecture: Written examination (90 minutes, graded)</p> <p>b) Laboratory: Passing all experiments including written reports (not graded; 2 ECTS). The lab takes place on four Thursdays per semester.</p>
7	<p>Further Use of Module</p> <p>Mandatory module for Bachelor in Biotechnology</p>
8	<p>Module Manager and Full-Time Lecturer</p> <p>Prof. Dr. Cristina Maria Sirrenberg-Cruciat / Prof. Dr. Andreas Scheibe</p>
9	<p>Literature</p> <p>H. Chmiel, R. Takors, D. Weuster-Botz: Bioprozesstechnik. 4. Auflage. Springer Spektrum, Berlin 2018</p> <p>H. Bisswanger: Enzyme – Struktur, Kinetik und Anwendungen, 1. Auflage. Wiley-VCH, Weinheim 2015</p> <p>W. Storhas: Bioverfahrensentwicklung. 2. Auflage. Wiley-VCH, Weinheim 2013</p> <p>A. Einsele, R. K. Finn, W. Samhaber: Mikrobiologische und biochemische Verfahrenstechnik, Wiley-VCH, 1985</p> <p>M. Bohnet: Mechanische Verfahrenstechnik, Wiley-VCH, 2004</p> <p>A. Mersmann: Thermische Verfahrenstechnik, Springer Verlag, 2005</p> <p>R.K. Scopes, Protein Purification, Springer Verlag, 1994</p> <p>D. Walls, S.T. Loughran: Protein Chromatography, Methods and Protocols, Springer Protocols, 2017</p> <p>GE Healthcare, Protein Purification Handbook, (company document, latest issue)</p> <p>Lecture notes and practical training notes</p>
10	<p>Last Updated</p> <p>23.01.2024</p>