

Enzymes and proteins	
Code	(not yet made available)
Credits (as per ECTS)	6
Attendance time	6 SWS
Course language	German (5 th Semester), English (4 th Semester)
Duration	2 Semester
Rota	annually
Module coordinator	Prof. Dr. Ebert
Assistant professor(s)	Prof. Dr. Ebert
Incorporation in the degree programs	Industrial biotechnology BSc, mandatory module, 4 th and 5 th semester
Required knowledge	<ul style="list-style-type: none"> Content: Recommendations: Biochemistry
Learning outcomes	<p>Students that have successfully completed this module,</p> <ul style="list-style-type: none"> understand the development, characterisation and application possibilities of technical enzymes master the basics of enzyme kinetics and regulation can characterise biomolecules via the measurement of enzyme activities
Content	<p>The following technical contents are taught in this module:</p> <p>Lecture "Protein chemistry"</p> <ul style="list-style-type: none"> Introduction to protein chemistry Structure and composition of proteins: Stereochemistry of the main chain, structure and mobility of the side chain, acid-base behaviour of the side chain, polarity of the side chain, chemical differentiation Structure systems in proteins (helix, folding pattern, reverse turn, domains), X-ray diffraction analysis, interaction between protein side chains Non-protein structure components (glycosylation, phosphate groups, N-terminal acyl residues) Enzyme screening and protein engineering (rational design, directed evolution, saturated mutagenesis (CAST, B-Fit)) Coenzymes and reaction mechanisms <p>Lecture "Enzyme kinetics"</p> <ul style="list-style-type: none"> Fundamentals of chemical kinetics Enzyme-substrate complex and Michaelis-Menten equation Enzyme assays Reversible inhibition and activation, competing substrates Irreversible inhibitors Reactions with several substrates Temperature and pH effects <p>Regulation of enzyme activities</p> <p>Seminar "Proteins used in the industry"</p> <ul style="list-style-type: none"> Hand out of selected subjects on proteins used in the industry Primary articles appropriate to the subjects are to be

	<p>researched</p> <ul style="list-style-type: none"> • This literature will be summed up, analysed and explained in a written and oral presentation • A handout is created for the presentation
Literature	<p>Lecture "Protein chemistry"</p> <ul style="list-style-type: none"> • Alfred Schellenberger (Hrsg.) Enzymkatalyse: Einführung in die Chemie, Biochemie und Technologie der Enzyme, Springer-Verlag, ISBN: 978-3642734366 • Buchholz, Klaus, Kasche, Volker, Bornscheuer, Uwe Theo. Biocatalysts and Enzyme Technology, Wiley VCH-Verlag GmbH, ISBN: 9783527329892 • Aehle, W. Enzymes in Industry, Production and Application, Wiley VCH Verlag GmbH, ISBN 9783527316892 <p>Lecture "Enzyme kinetics"</p> <ul style="list-style-type: none"> • Athel Cornish-Bowden "Fundamentals of Enzyme Kinetics" Wiley-Blackwell <p>Seminar "Proteins used in the industry"</p> <ul style="list-style-type: none"> • Selected articles on relevant subjects concerning enzymes and proteins in the industry
Forms of teaching and learning	<ul style="list-style-type: none"> • Protein chemistry (V), 2 SWS, 2 LP, 4th Semester • Enzyme kinetics (V, 2 SWS, 2 LP), 5th Semester • Proteins used in the industry (S), 2 SWS, 2 LP, 4th Semester
Workload	<p>Lecture "Protein chemistry" Attendance time: 30 h Individual study: 30 h</p> <p>Lecture "Enzyme kinetics" Attendance time: 30 h Individual study: 30 h</p> <p>Seminar "Proteins used in the industry" Attendance time: 30 h Individual study: 30 h</p> <p>Total Attendance time: 90 h Individual study: 90 h Total: 180 h</p>
Evaluation method	<p>The evaluation is a written exam (60 minutes) covering the entire module.</p> <p>Participation in this written examination requires students to have successfully completed the prerequisite seminar "Proteins used in the industry (S)" (written composition).</p>
Grading	<p>The module grade corresponds to the result of the examination.</p>