

Module number	EM 13 (pre-existing 275)
Module name	Biological Systems as Bioreactors
Program of Study	MSc mandatory module
Offered	Once a year, summer semester
Module coordinator	PD Dr. Michael Kleine
Module advisor	PD Dr. Michael Kleine
Courses and teachers	Lecture: Structure and use of bioreactors for the production of recombinant proteins, PD Dr. M. Kleine Seminar: Bioreactors, PD Dr. M. Kleine
Prerequisites	Advanced understanding of genetics and gene technology
Language	English
Module capacity on campus students	Maximum 12 Registration starts one week before the lecture begins at PLANTON GmbH, Am Kiel-Kanal 44, 24106 Kiel, Tel 0431-380150
Module capacity off campus students	
Course types (classroom/ total workload)	Lecture, (30 h /90 h), Seminar (30 h/90 h)
Schedule	Weekly
Grading	Oral exam 100% PD Dr. M. Kleine
ID-card	Required for exams
European Credit Points	6
Module Objectives	Advanced understanding of the structure and function of different biological reactors (plants, animals, microbes, cell cultures) and its use for the production of recombinant proteins for pharmaceutical and industrial applications.
Contents	<ul style="list-style-type: none"> - Description of different protein expression systems: plant, animal, microbes, cell culture systems. Molecular structure of expression vectors, transfection technology and culture conditions - Analysis and monitoring processes, e.g. chromatography, mass spectrometry etc. - Downstream purification processes - Adaptation of these processes to a technical scale - Economical and ecological aspects - Approval processes
Module Skills	Professional and practical key competence
Study Resources	Printed contents, review articles and textbooks, internet links. Production of Recombinant Proteins (2004), Gerd Gellissen (Editor), Wiley-VCH, Weinheim Molecular Farming – Plant-made Pharmaceuticals and Technical Proteins (2004), Rainer Fischer, Stefan Schillberg (Editors), Wiley-VCH, Weinheim