

Name des Moduls: Structure, Function and Evolution of Chloroplast Genomes (Wahlpflichtmodul)		Anzahl der Leistungspunkte (LP): 8		
Modulart (Pflicht- oder Wahlpflichtmodul):		Wahlpflichtmodul		
Inhalte und Qualifikationsziele des Moduls:		<p><u>Contents:</u> In a two-day seminar preceding the practical course, general aspects of the structure, function, inheritance and evolution of chloroplast genomes will be presented and discussed.</p> <p>A 90 min lecture will be held each day preceding the practical lab work. In the lectures, chloroplast genetics and molecular biology will be broadly covered. Methods of chloroplast genome engineering and their applications in basic and applied research will also be discussed.</p> <p>In the practical course, chloroplasts will be isolated and the high molecular isoforms of their DNA will be visualized by pulsed-field gel electrophoresis. Complete chloroplast genomes of mutants will be assembled from Next Generation Sequencing datasets in order to identify the underlying mutations in the chloroplast DNA. The impact of the mutations on photosynthetic parameters will be determined by chlorophyll-a fluorescence analysis. Selected processes in chloroplast gene expression, such as intron splicing and mRNA editing, will be investigated and compared between different plant species. To this end, DNA and RNA will be isolated, cDNA synthesized, amplified by PCR, sequenced by Sanger sequencing and analyzed bioinformatically.</p> <p><u>Target qualifications:</u> <u>1.) Scientific competences:</u> The students gain basic knowledge on cytoplasmic genetics as well as the structure and evolution of chloroplast genomes. They will extend their knowledge about the organization and inheritance of chloroplast genomes and the complexity and plasticity of chloroplast gene expression.</p> <p><u>2.) Methodological competences:</u> Cell disruption & subcellular fractionation Isolation of nucleic acids PCR and RT-PCR Pulsed-field gel electrophoresis Sanger sequencing and Next Generation Sequencing Assembly and bioinformatic analyses of sequencing data Chlorophyll-a fluorescence analyses</p> <p><u>3.) Capacity building / complementary skills:</u> The students will learn to assess and present original scientific literature and review articles. They will learn to document, present and discuss their own scientific work.</p>		
Modulprüfung (Anzahl, Form, Umfang):		Seminar presentation, documentation of experimental work (lab book), data presentation in a concluding seminar at the end of the practical work, protocol		
Selbstlernzeit (in Zeitstunden (h)):		115		
Veranstaltungen (Lehrformen)	Kontaktzeit (in SWS)	Prüfungsnebenleistungen (Anzahl, Form, Umfang)		Modulteilprüfung (Anzahl, Form, Umfang)
		Für den Abschluss des Moduls	Für die Zulassung zur Modulprüfung	

Lecture „Methods in Molecular Genetics“	2			
Seminar „Molecular Genetics, Cell Biology and Evolution of Chloroplasts and their Genomes“	2			1 seminar presentation (45 min) and discussion (45 min)
Practical course „Genomics and Gene Expression of Chloroplasts“	5			1 lab book, 1 final oral presentation (90 min), 1 protocol (30-40 pages)
Häufigkeit des Angebots:		every winter semester		
Voraussetzung für die Teilnahme am Modul:		completed BSc in biological sciences		
Anbietende Lehrinheit(en):		Professor Dr. Ralph Bock, Dr. Stephan Greiner, Dr. Michael Tillich, Dr. Mark Aurel Schöttler (Max Planck Institute of Molecular Plant Physiology; Institute for Biology, University of Potsdam)		