Module variant to: Advanced Biodiversity, Evolution and Ecology

Module: Evolution and diversity of vegetative structures and growth forms in Land Plants, with special focus on flowering plants

University/Department/Teaching Unit: Freie Universität Berlin/Department of Biology, Chemistry, Pharmacy/Biology

Module coordinator: Prof. Dr. Julien B. Bachelier

Prerequisites: none

Learning objectives:
After this course, students will have a better understanding of the evolution and diversity of the vegetative structures and growth forms of the main lineages of Land Plants, especially flowering plants. Students will learn first about plant development from the formation of the embryo up to the sexually mature plant in all Land Plants lineages, and the correlation between the morphology and anatomy of their vegetative structures and tissues, and their functions. Students will thus be able to identify and describe vegetative structures of any Land Plants, and by looking at their structure and architecture, reconstruct their development and life history. Importantly, students will become able to disentangle the different processes and mechanisms, especially evolutioanary tinkering and convergences, which drive and shape the diverstiy of vegetative structures and their ecological adaptions.. In the course, students will also learn how to search and identify relevant scientific literature to prepare a presentation on a topic of their choice, as long as it is relevant to the class. They will also learn how to read and evaluate critically the quality of scientific publications.

Content:
A detailed syllabus will be provided at the beginning of the course and comprises general information on the organisation and contents. However, we will basically introduce students to the diversity of the vegetative structures and growth forms of the main lineages of Land Plants, especially of flowering plants. Based on the most recent and up-to-date phylogenies, we will thus start from non-vascular plants, i.e., mosses, and explore step-by-step the diverstiy of extinct and extant lineages of vascular plants.
Using living plants in the collection of the BGBM, fresh and fixed plant material, and fossils, we will demonstrate how evolutionary tinkering led not only to the successive evolution of the 3 vegetative ground organs, i.e., shoot, root, and leaf, but also to the repeated and independent evolutionary origins of organs like roots and leaves, or tissues like cambium and wood. We will also explore in detail the diversity of plant growth forms from the formation of the embryo up to the sexually mature plants, and their potential evolutionary and ecological correlations with the habitus and habitat of the plants, e.g., adaptiation to extreme environments, and/or differentiation of specialized structures or tissues, e.g., thornes and spikes, bark, etc..

Modes of instruction	**Contact hours** (hours per week during the semester)	**Types of active participation**	**Workload** (in hours)	
Lecture (V)	2	–	Class attendance (lecture) Preparation, before and after (lecture)	30 30
Seminar (S)	1	Presentation and discussion	Class attendance (seminar) Preparation, before and after (seminar)	15 30
Safety Lab (sP)	5	Carrying out and documenting experiments	Class attendance (safety lab) Preparation, before and after (safety lab) Exam preparation and exam	75 40 80

Module assessment	Written exam (60 minutes), wholly or partially in multiple-choice format; can also be carried out electronically or written report on research results (approx. 10 pages) or examination colloquium (approx. 20 minutes)	
Language	English	
Regular attendance required	Seminar and safety lab: yes, lecture: attendance recommended	
Total workload	300 hours	10 credit points
Duration	one semester	
Frequency	irregular	
Applicability	Master's degree program M.Sc. Biology; Master's degree program M.Sc. Biodiversity, Evolution and Ecology	

Utilization in the following specializations (decision by the examining board):

Biodiversity, Evolution and Ecology	x
Genetics and Genomics	
Microbiology	
Molecular- and Cellular Biology	
Molecular Plant Sciences	
Neurobiology	
Biology	x