Plant Genetics					
Identification number	Workload	Credit points	Term of studying	Frequency of occurence	Duration
MN-BC-GSM-02	360 h	12 CP	1st or 2nd term of studying	each term, 1st half	7 weeks

1	Type of lessons	Contact times	Self-study times	Intended group size*
	a) Lectures	20 h	30 h	max. 16
	b) Tutorials	14 h	14 h	max. 16
	c) Practical/Lab	144 h	109 h	max. 6
	d) Seminar	5 h	24 h	max. 4

2 Aims of the module and acquired skills

Students who successfully completed this module …

- have gained in-depth knowledge in up-to-date plant research topics. As this module also includes a section on molecular plant breeding which is co-taught by a plant breeder from a commercial breeding company, students will also gain transferable knowledge.
- are trained in modern techniques in advanced molecular biology, biochemistry and cell biology (see contents of the module).
- can independently carry out small scientific projects related to the topic of the module.
- have learned how to present research results in oral and written form and to critically discuss scientific publications related to the topic of the module on a professional level.
- are able to transfer skills acquired in this module to other fields of biology.

3 Contents of the module

- Theory of modern methods in molecular plant sciences (also used in other sciences)
- Molecular breeding of crop plants in Germany
- Plant developmental biology
- Molecular biology of plant-environment interactions (e.g. flowering time regulation by day length and temperature)
- Biotic interactions (e.g. symbiosis with mycorrhizal fungi)
- Protein-protein interactions (e.g. co-immunoprecipitations, FRET, co-localization)
- Genetic and molecular analysis of cell-cell communication (mutant analysis, plant transformation)
- Cell imaging using flourescent and confocal microscopy
- Analysis of reporter gene activities, particle bombardment
- Real-time RT-PCR to analyze gene expression
- Computational analysis of next generation sequencing data (e.g. RNAseq)
- Other methods in modern molecular biology, biochemistry and cell biology

4 Teaching/Learning methods

- Lectures; Interactive tutorials; Practical/Lab (Project work); Seminar; Guidance to independent research; Training on presentation techniques in oral and written form

5	Requirements for participation Enrollment in the Master´s degree course "Biological Sciences" or in the Master´s degree course "Biochemistry" Additionally recommended: Previous participation in a basic-level Bachelor course on plant science (normally taught during the first two years of Bachelor studies). You should know basic plant anatomy, plant hormones such as auxin and Mendelian genetics. Students with a more specialized BSc degree in Biotechnology sometimes lack this knowledge. In cases of doubt, please contact the module coordinator (see 10) before choosing this subject module.
6	Type of module examinations The final examination consists of three parts: Two hours written examination about topics of the lectures and the practical/lab part (50 % of the total module mark), oral presentation (25 % of the total module mark) and seminar paper in form of a grant proposal (25 % of the total module mark)
7	Requisites for the allocation of credits Regular and active participation; Each examination part at least "sufficient" (see appendix of the examination regulations for details)
8	Compatibility with other Curricula Subject module in the Master´s degree course "Biology"
9	Significance of the module mark for the overall grade In the Master´s degree course "Biochemistry": 10 % of the overall grade (see also appendix of the examination regulations)
10	Module coordinator Prof. Dr. Ute Höcker, phone 470-6897, e-mail: hoeckeru@uni-koeln.de
11	Additional information General Subject Module of the Master´s degree course "Biochemistry", Participating faculty: Prof. Dr. M. Albani, Prof. Dr. M. Bucher, Prof. Dr. U. Höcker, Prof. Dr. M. Hülskamp, Dr. G. Strittmatter Literature: • Smith, A., Coupland, G., Dolan, L., *et al.* (2009) Plant Biology. Garland Science • Buchanan, B., Gruissem, W., Russell, J. (2002) Biochemistry and Molecular Biology of Plants. Wiley-Blackwell • Taitz, L., Zeiger, E. (2006) Plant Physiology. 4th edition, Sinauer Associates • Lecture slides and a script containing all protocols used in the experimental part will be provided. General time schedule: Week 1-5 (Mon.- Fri.): Lectures, tutorials, practical/lab and writing seminar paper in form of a grant proposal; Week 6 (Mon.-Fri): Preparation for the seminar talk (held at the end of week 6); Week 7 (Mon.-Fri): Preparation for the written examination Note: The module contains hands-on laboratory work conducted in groups of max. two people and is taught in a course room fully equipped with up to date research technoilogy. The module does not contain computer-based practicals/research as a main component. Introduction to the module: April 09, 2018 at 8:45 a.m., Cologne Biocenter, room 4.004 (fourth floor) Written examination: May 29, 2018; more details will be given at the beginning of the module

* 15 students from the Master´s degree course "Biological Sciences" and 1 student from the Master´s degree course "Biochemistry".