

Module Name	Module Code
Applications of Genomics in Agriculture	agrigAEF007-01a
Module Coordinator	
Prof. Dr. Daguang Cai	
Organizer	
Institute of Phytopathology - Molecular Phytopathology	
Institute of Plant Nutrition and Soil Science - Plant Nutrition	
Institute of Crop Science and Plant Breeding - Plant Breeding	
Institute of Animal Breeding and Husbandry - Animal Breeding and Genetics	
Faculty	
Faculty of Agricultural and Nutritional Sciences	
Examination Office	
Faculty of Agricultural and Nutritional Sciences - Examination Office	
ECTS Credits	6
Evaluation	Graded
Duration	one semester
Frequency	Only takes place during summer semesters
Workload per ECTS Credit	30 hours
Total Workload	180 hours
Contact Time	60 hours
Independent Study	120 hours
Teaching Language	English
Further Information on the Teaching Language	
one semester	
Recommended Requirements	
Advanced understanding of genetics, molecular biology, animal and plant breeding as well as plant nutrition and phytopathology (according to modules: agrig001-agrig004)	

Module Courses			
Course Type	Course Name	Compulsory/Optional	SWS
Lecture	Application of Genomics in Animal Breeding	Compulsory	1
Lecture	Application of Genomics in Plant Breeding	Compulsory	1
Lecture	Application of Genomics in Plant Nutrition	Compulsory	1
Lecture	Application of Genomics in Phytopathology	Compulsory	1

Examination(s)				
Examination Name	Type of Examination	Evaluation	Compulsory / Optional	Weighting
written Examination: Applications of Genomics in Agriculture	written Examination	Graded	Compulsory	100

Further Information on the Examination(s)

1.+2. period in summer semester
1. period in winter semester

examiner: 100% Prof. Dr. Thaller, Prof. Dr. Jung, Prof. Dr. Mühlhng, Prof. Dr. Cai QIS: xxxxxx with number of Examination xxxxxxxxxxxxxxxxxx

Course Content

- Genomics of inherited defects and disease resistance in livestock; procedures and techniques to identify causal genes and causal polymorphisms including SNPs and CNVs.
- Approaches and procedures to capitalize massive array information to address aggregated gene action in terms of genomic selection.
- Application of genomics in plant genetics and breeding: Genomics based selection, genomic resources for markers, genomics for increasing genetic variation, gene identification from plant genomes
- Genomics of plant defence systems: PTI, ETI, R genes and RGAs; genetic and technical engineering of plant disease resistance; genomics-based molecular diagnosis; molecular plant-parasite interaction-based plant protection strategy
- molecular characterization of transport carrier and channels, quality aspects as affected by plant nutrition, molecular adaptation and tolerance mechanisms under abiotic stresses

Learning Outcome

- Students are learning how to harness whole genome resources in breeding livestock and field crops
- Advanced knowledge and understanding of the principles of genomics and functional genomics and their potential in agriculture
- Appropriate methodology and strategy for genetic improvement of animals and crops
- Professional competence and skills for applying genomics and functional genomics in agricultural research and practice

Reading List

Lecture contents and slides, scientific literatures, review articles and textbooks, internet links are online available, and will be introduced at the beginning of the course.

- Kole C, Abbott AG (2008) Principles and Practices of Plant Genomics. Science Publishers, Enfield, New Hampshire
- Xu X, Liu X, Ge S, Jensen JD, Hu F, Li X, Dong Y, Gutenkunst RN, Fang L, Huang L, Li J, He W, Zhang G, Zheng X, Zhang F, Li Y, Yu C, Kristiansen K, Zhang X, Wang J, Wright M, McCouch S, Nielsen R, Wang J, Wang W (2012) Resequencing 50 accessions of cultivated and wild rice yields markers for identifying agronomically important genes. Nat Biotech 30: 105-111
- Muñoz, M., et al. "Genomic diversity, linkage disequilibrium and selection signatures in European local pig breeds assessed with a high density SNP chip." Scientific reports 9.1 (2019): 1-14.
- Mackay, T. F. et al. (2009). The genetics of quantitative traits: challenges and prospects. Nature Review Genetics 10(8): 565-77.
- Thomas Wolpert, Tomonori Shiraishi, Alan Collmer, Kazuya Akimitsu, and Jane Glazebrook (2017): Genome-Enabled Analysis of Plant-Pathogen Interactions
- Singh, Archana, Singh, Indrakant K. (2018) Molecular Aspects of Plant-Pathogen Interaction Molecular Aspects of Plant-Pathogen Interaction
- Medina, Carlos, López-Baena, Francisco Javier (2018) Host-Pathogen Interactions: Methods and Protocols

Additional Information

Maximum number of participants: 20

Enrollment by OLAT within workdays Monday through Friday in the 1st week of the 2. audit period of the preceding semester. Following information are necessary:

matriculation number

last name, first name

striven degree

study program

stu-Email

The allocation of the places takes place in the 2nd week of the 2. audit period of the preceding semester.

Acceptance of the place by students only through participation at the first day of the course.

Students without a place can get a place at the first day of the course by move-up procedure.

Use	Compulsory / Optional	Semester
Master, 1-Subject, Agricultural Sciences, Specialisation Agricultural Economics, (Version 2017)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Agribusiness, (Version 2017)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Crop Sciences, (Version 2017)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Animal Sciences, (Version 2017)	Optional	-
Master, 1-Subject, Agricultural Sciences, Specialisation Environmental Sciences, (Version 2017)	Optional	-
Master, 1-Subject, AgriGenomics, (Version 2017)	Compulsory	-
Master, 1-Subject, AgriGenomics, (Version 2010)	Compulsory	-
Master, 1-Subject, Dairy Science, (Version 2017)	Optional	-
Master, 1-Subject, Nutritional and Food Science, (Version 2013-01)	Optional	-
Master, 1-Subject, Nutritional and Consumer Economics, (Version 2017)	Optional	-