

<b>Georg-August-Universität Göttingen</b> <b>Module M.Agr.0120: Molecular Diagnostic and Biotechnology in Crop Protection</b>	6 C 4 WLH
<b>Learning outcome, core skills:</b> Participants will be able to select appropriate diagnostic techniques for specific purposes and made informed decisions regarding developnebt and application of DNA-based diagnostic methods and molecular markers. They will recognize the role biotechnology in plant protection be able to assess the potentials and risks of GM crops and other GMOs in plant protection.	<b>Workload:</b> Attendance time: 65 h Self-study time: 115 h
<b>Course: Molecular Diagnostic and Biotechnology in Crop Protection (Lecture)</b> <i>Contents:</i> Principles and applications of diagnostic techniques in plant protection with a focus on nucleic acid analysis: electrophoresis (discovery of new viruses, detection of viroids, dsRNA in confirmation of hypovirulence, electrophoretic karyotypes); nucleic acid hybridization (spot hybridization, RFLP, ASO, macro- and microarrays in diagnostic); PCR and its variants incl. qPCR and digital PCR; ligase chain reaction; ; isothermal amplification; sources of primers and primer specificity. Miniaturization of diagnostic methods: laboratory on chip. Molecular markers: RAPD, AFLP, SSR, SNP; application of molecular markers in epidemiology of pathogens, analysis of population structure and genetic diversity, genome mapping, map-based gene cloning, and marker-assisted selection. Remote detection of plant pathogens: optical methods and VOC analysis. Biotechnology in plant protection: delimitation from agriculture and fermentation technologies; limits of genetic diversity in crops and its causes; techniques to increase genetic diversity and overcome incompatibility barriers; selection for resistance in tissue culture. Genetic engineering of crops: inactivation of genes on DNA and on transcript levels; introduction of foreign genes into crops: techniques, selection markers, safety, acceptance, legal aspects; GM crops in engineering resistance to viruses, pests, herbicides, bacterial and fungal pathogens. Genomic technologies in the development of plant protection technologies: genome analysis, NGS and third generation sequencing, omics, tagged saturation mutagenesis and high-throughput screening.	4 WLH
<b>Examination: Oral examination (approx. 30 minutes)</b> <b>Examination requirements:</b> Understanding concepts and technical principles of molecular diganostic methods and the applicatoin of molecular markers and plant biotechnology in plant protection. Demonstration of the ability to read primary literature that describes applications of techniques covered by the module	6 C
<b>Admission requirements:</b> none	<b>Recommended previous knowledge:</b> none
<b>Language:</b> English	<b>Person responsible for module:</b> Prof. Dr. Petr Karlovsky
<b>Course frequency:</b> each winter semester	<b>Duration:</b> 1 semester[s]

<b>Number of repeat examinations permitted:</b> twice	<b>Recommended semester:</b>
<b>Maximum number of students:</b> 30	