|  |  |
| --- | --- |
| **Title** of the subject: **PCR in microbiology** | **Credit: 3** |
| **Type** of the subject: optional | |
| **Ratio of theory and practice: 50 / 50** (credit%) | |
| **Type and number of classes per semester**: 9 hour(s) lecture and 9 hour(s) practice per **semester** | |
| **Type of exam**: practical course mark | |
| **Subject in the curriculum:** semester 4 | |
| Preliminary requirements:Molecular Biology | |

|  |
| --- |
| **Summary of content - theory**: |
| Course objectives: The basic concept of standard PCR will be overviewed, and different PCR techniques will be introduced to the students. Practical information about the design and run of PCR as well as the possibilities for the usage of the different PCR techniques for plant protection problems will be discussed. The aim is that students will be able to choose the appropriate PCR techniques for plant protection questions, and able to make, run and interpret the results.   1. The basic concept of polymerase chain reaction (PCR), and the standard PCR 2. Basic concept and application of real time PCR. 3. Application of PCR for cloning of genes 4. PCR methods for identification of taxons. 5. PCR methods for the identification of phylogenetic connections. 6. PCR applications in biotechnology. 7. PCR applications in the plant-pathogen interactions. 8. Detection of plant pathogens with different PCR techniques. 9. Setup and optimization of the PCR reactions. |
| **Summary of content - practice**: |
| Skills to be learnt: How to design and run o PCR reaction, how to those or design primers for the PCR reaction. Finally how to interpret the result of the PCR reaction.  1 – 2. Design primers with restriction endonuclease cleavage site.  3 – 5. Primer design for a given gene based on BankIT information. Order of primers, and design the PCR reaction for amplification.  6 – 9. Introduction of different PCR machines. Basic concept, and practice of writing a PCR program. Put and run a PCR. Check the reactions on agarose geles. Interpret the results. |
| **Literature, handbooks in English** |
| 1. Bridge, P. D., Arora, D. K., Reddy, C.A., Elander., R.P (1998): Applications of PCR in Mycology, CABI New York, 2. Stryer; et al. (2019). Biochemistry (9th ed.). Palgrave Macmillan. ISBN 978-1319114657. 3. Madigan, M. T, Martinko, J. M., Bender K., Buckley, D., Stahl, D (2015): Brock Biology of Microorganisms, Benjamin Cumming, 14th edition pp1061, ISBN 978-1-292-01831-7 4. Recent publications from Phytopathology, Plant Diseases, Crop protection, Mycology, Weed Science, Agricultural and Forest Entomology etc. |
| **Competencies gained** *(acc. to the Regulation on training and outcome requirements)* |
| 1. **Knowledge:**  * Have a good understanding of basic molecular techniques.  1. **Skills:**  * It identifies specific problems in the field of plant protection with an interdisciplinary approach.  1. **Attitude:**  * Committed to his profession, he solve problems on a professional basis.  1. **Autonomy and responsibility:** |

|  |
| --- |
| **Responsible lecturer: Erzsébet Karaffa, PhD** |
| **Other lecturer(s): Károly Pál, PhD; Csilla Kovács, PhD** |

|  |
| --- |
| **Terms of course completion:** |
| 1. Completing exercises |
| **Form of examination:** |
| Written |
| **Requirement(s) to get signature:** |
| Participate in the practice and accepted lab notes. |

|  |
| --- |
| **Exam questions:** |
| 1. How would you design a PCR reaction (time and temperature profile) based on the description of the provided primers, length of the amplicon and description of the provided polymerase enzyme and reaction components? 2. How would try to optimize the PCR reaction? 3. Design a master mix for the given number of PCR reaction with provided components and description. 4. Which PCR techniques would you choose to answer a dedicated question on the field of plant protection? Justify your decision. 5. Justify the result of the PCR reaction based on the provided agarose picture. The aim and the description of the PCR reaction will be provided. |