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| **Title and Code** of the subject: **Molecular Genetics and Proteomics , MTMAL7014A** | **ECTS Credit Points: 3** |
| **Type** of the subject: compulsory | |
| **Ratio of theory and practice: 40/60** (credit%) | |
| **Type and number of classes per semester**: 14 hour(s) lecture and 28 hour(s) practice per **semester**  Number of teaching hours / week : eg.:1+2 (lecture and practice) | |
| **Type of exam**: exam | |
| **Subject in the curriculum:** semester 3 | |
| Preliminary requirements:- | |

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| **Summary of content - theory**: |
| Course objectives: Students will have the knowledge on basic molecular genetic and proteomic methods, importance of genes and genetic markers in relation to quantity and quality traits of livestock production. Students will see the relationship between genetic, protein markers and animal performance concerning livestock species. Major proteins in animal products will be discussed.   1. Characteristics of DNA 2. DNA and protein synthesis 3. Genome projects 4. Genes, gene mapping 5. Molecular genetic markers and their application in animal production 6. Molecular genetic methods I. 7. Molecular genetic methods II. 8. QTL-s and candidate genes of ruminants 9. QTL-s and candidate genes of swine 10. QTL-s and candidate genes of poultry 11. Cloning, transgenic animals, ethical issues 12. Methods in proteomics 13. Proteomics of milk and egg 14. Proteomics of meat and wool |
| **Summary of content - practice**: |
| Skills to be learnt: during the practical course students will get experience in molecular genetic and protein studies such as DNA and protein isolation, concentration measurement, PCR reactions, single strand conformation polymorphism.     1. Basic laboratory calculations on solutions and their preparation 2. Multiple alignment of mitochondrial DNA sequence 3. PCR (Polymerase Chain Reaction) optimization 4. PCR (Polymerase Chain Reaction) optimization 5. Touchdown PCR 6. Chicken sex typing with polymerase-chain reaction (PCR) method 7. Single-strand conformation polymorphism (SSCP), detection of pig DNA from different foodstuffs 8. Single-strand conformation polymorphism (SSCP), detection of pig DNA from different foodstuffs 9. Single-strand conformation polymorphism (SSCP), detection of pig DNA from different foodstuffs 10. PCR and SSCP troubleshooting 11. Protein isolation from milk or tissue samples, concentration measurement, SDS-PAGE 12. Protein isolation from milk or tissue samples, concentration measurement, SDS-PAGE 13. Protein isolation from milk or tissue samples, concentration measurement, SDS-PAGE 14. Protein isolation from milk or tissue samples, concentration measurement, SDS-PAGE |
| **Literature, handbooks in English** |
| Brooker R. (2008): Genetics: Analysis and principles. McGraw-Hill Science/Engineering/Math; 3 edition. 1-864.  Womack J. (2012): Bovine Genomics. Wiley-Blackwell. 1-284.  Marinus F. W. te Pas et al. (2004): Muscle Development of Livestock Animals: Physiology, Genetics and Meat Quality. CABI. 1-432.  Almeida A. eds (2014): Farm Animal Proteomics 2014. Wageningen Academic Publishers. 1-289. |
| **Competencies gained** *(acc. to the Regulation on training and outcome requirements)* |
| 1. **Knowledge:**  * Knows the life science and biological basics of animal breeding  1. **Skills:**  * Able to conduct research activity in agricultural science  1. **Attitude:**  * Keen on professional self-improvement as take part in postgradual education  1. **Autonomy and responsibility:**  * Makes decisions independently on breeding, improvement strategy of a certain population |

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| **Responsible lecturer: Levente Czegledi PhD, Associate Professor** |
| **Other lecturer(s): Adam Simon PhD, postdoc** |

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| **Terms of course completion:** |
| 1. Completing exercises 2. Giving presentation |
| **Form of examination:** |
| written |
| **Requirement(s) to get signature:** |
| Attendance at lectures is recommended, but not compulsory.  Participation at practice is compulsory. Students must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Attendance at practice classes will be recorded by the practice leader. |

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| **Exam questions:** |
| 1. Characteristics of DNA 2. DNA and protein synthesis 3. Genome projects 4. Genes, gene mapping 5. Molecular genetic markers 6. Application of molecular genetic markers in animal production 7. Molecular genetic methods 8. QTL-s and candidate genes of ruminants 9. QTL-s and candidate genes of swine 10. QTL-s and candidate genes of poultry 11. Cloning, transgenic animals, ethical issues 12. Proteomic tools 13. Proteomics of milk 14. Proteomics of egg 15. Proteomics of meat 16. Proteomics of wool 17. Theory and steps of DNA and protein isolation, quantitative and qualitative characterisation |