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| **Title and Code** of the subject: **Animal Nutrition, MTMAL7007A** | **ECTS Credit Points: 4** |
| **Type** of the subject: compulsory | |
| **Ratio of theory and practice: 70/30** (credit %) | |
| **Type and number of classes per semester**: 28 hours lecture and 14 hour practice per **semester** | |
| **Type of exam**: written exam | |
| **Subject in the curriculum:** semester 2 | |
| Preliminary requirements:- | |

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| **Summary of content - theory**: It is quite clear, that the quality of the food products of animal origin can be substantially influenced by means of feeding. However, it has to be noted that feeding may not only improve but deteriorate quality of the food product of animal origin as well. Thus, the responsibility of the feeding experts is extremely high as far as quality and safety of food products of animal origin are considered.  Nowadays up-to-date feeding utilizes the latest knowledge of not just the classic  (traditional) animal nutrition science, but that of the associated sciences (physiology, molecular biology, molecular genetics, immunology, microbiology, information technology, some areas of the technical sciences) as well, for the production of a safe, good quality food product of animal origin more appropriate for the human nutritional demand.  In the state-of-art feeding systematic thinking, systematic integration of the professional  and scientific knowledge to answer a specific question is of vital importance. It is helped by the concept of the so-called precision feeding, where information technology and its knowledge is also an important precondition for the economic production of food commodity of animal origin. |
| Course objectives:  The aim of the course is to present the latest animal nutrition knowledge based on the scientific findings of the above mentioned associated sciences.   1. Brief introduction to animal nutrition and feeding; Challenges of 21st Century Animal Nutrition. 2. Concept of the total nutrition and precision animal nutrition. 3. Chemical composition of feedstuffs. 4. Micro-minerals and vitamins. 5. Determination of digestibility of amino acids by cannulation (surgical) techniques in livestock (pig, poultry, ruminants). 6. Using ideal protein concept in diet formulation. 7. Energy metabolism of livestock. 8. Measuring of energy transaction in farm animals (measuring the heat production of animals in respiration chamber). 9. Energy requirements for maintenance and production. 10. Nutrition, immunity and production. 11. Mathematical modeling of growth. 12. Nutrition based on genetic profile; Nutrition and environmental pollution. 13. Elimination of harmful effects of climate change (heat stress) by nutritional tools. 14. Biotechnology in the feed industry and in animal nutrition |
| **Summary of content - practice**: |
| Skills to be learnt: Skill level mastery of feed processing and conservation; moreover, acquisition of knowledge of the diet formulation for all important farm animals and viewing the practical application of the knowledge acquired during the course on farms.   1. History of animal nutrition. 2. Feed conservation. 3. Feed processing. 4. Feed additives. 5. Split-sex and phase feeding of animals. 6. Principle and basis of feed formulation. 7. Practice of diet formulation with PC program. Part 1. 8. Practice of diet formulation with PC program. Part 2. 9. Practice of diet formulation with PC program. Part 3. 10. Visit to a livestock farm 11. Visit to a livestock farm 12. Visit to a livestock farm 13. Consultation |
| **Literature, handbooks in English** |
| 1. Moughan, P.J., Verstegen, M.W.A., Visser-Reyneveld, M.I. (Eds) 2000. Feed Evaluation: Principles and Practice. Wageningen Pers, Wageningen, the Netherlands. 2. McDonald, P., Edwards, R.A., Greenhalgh, J.F.D., Morgan, C.A., Sinclair, L.A., Wilkinson, R.G. 2011. Animal Nutrition. Seventh edition. Pearson Education, Limited. Harlow, UK.   3. Babinszky L., V. Halas, M.W.A. Verstegen. 2011. Impacts of Climate Change on  Animal Production and Quality of Animal Food Products (Chapter 10). In: J. A.  Blanco and H. Kheradmand (Eds): Climate Change, Socioeconomic Effects.InTech  Publisher. London. UK. 165-190.p.  4. Babinszky, L., Bársony. P. 2013. Animal Nutrition. University Lecture Note.  University of Debrecen, Hungary.  5. Hendricks, W. H., Verstegen, M.W. A., Babinszky, L. (Eds). 2019. Poultry and Pig  Nutrition, Challenges of the 21st Century. Wageningen Academic Publishers, the  Netherlands. |
| **Competencies gained** *(acc. to the Regulation on training and outcome requirements)* |
| 1. **Knowledge:** The student acquires the up-to-date knowledge necessary for practical animal nutrition and possibly for starting a scientific career. They also learn about the relationships between animal nutrition and the production of high-quality and safe food raw materials of animal origin. 2. **Skills**: The student will be able to perform research and innovation activities, furthermore to coordinate and organize advisory service for animal nutrition organizations. They will also be able to manage feed production plants and direct work there. 3. **Attitude**: Students are able to adequately answer current questions about sustainable animal nutrition in order to produce high quality and safe animal origin foodstuffs. 4. **Autonomy and responsibility:** The student can independently decide which feeding technology to use in a given situation. In addition, the student is able to responsibly decide on feeding issues on farm level or in science, or in an authority. |

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| **Responsible lecturer:** Prof. Dr. László Babinszky (emeritus) |
| **Other lecturer(s):** Dr. Péter Bársony, PhD, assistant professor |

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| **Terms of course completion:** |
| 1. The presence on 2/3-rd of the classes (in both cases: theoretical lesson and practice) 2. In practice: accepted two self-made diet formulations. |
| **Form of examination:** |
| Written exam: 10 comprehensive questions to be answered. |
| **Requirement(s) to get signature:** |
| 1. The presence on 2/3-rd of the classes (in both cases: theoretical lesson and practice) 2. In practice: accepted two self-made diet formulations (See: section“Terms of course completion”). |

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| **Exam questions (Examples of possible questions):** |
| 1. What does precision livestock nutrition mean? Please list the most important elements of the precision animal nutrition. 2. Please list the most important feed additives and characterize one of them. 3. Please list the general benefits of NGPs. 4. Please give the definition of non-starch polysaccharides and list its components. 5. Please give the definition of probiotics, prebiotics and symbiotics and characterize one of them. 6. Please describe the linear-plateau concept and its importance in animal nutrition. 7. Please list the most important nutrients which are influencing the cellular and humoral immune status of farm animals. 8. Please list the types of mathematical growth models and please characterize one of them. 9. Please list some feed ingredients and feed additives which are pose potentially risks for food safety and what are the possible solutions? 10. Please list the cannulation techniques in pig, birds and ruminants and characterize methods which can be used in an animal species (e.g. pig). |