

ANGOL NYELVŰ

COURSE DESCRIPTION

Title:	<i>Feed toxicology</i>
Neptun code:	
Lectures/Practices:	2
Credit:	6
Program:	<i>PhD</i>
Type:	<i>full-time / part-time</i>
Requirements:	<i>none</i>
Semester:	<i>autumn</i>
Language:	<i>English</i>
Pre-requirements:	<i>none</i>
Institute/Department:	<i>MATE Institute of Physiology and Nutrition</i>
Course leader:	<i>Dr. Mézes Miklós MHAS</i>
Description: In this course, students will learn the basic principles of toxicology and the fundamental processes involved in the metabolism of toxic substances within the body. The course discusses in detail toxicoses caused by nutrients and the effects on the body of natural and artificial toxic substances found in livestock feed. In addition, the course covers methods of protection against toxic substances in feed.	
Aims: The main purpose of this course to add information about the toxic materials in feeds. The other purpose is to inform the students about the mode of action of toxicants, xenobiotic transforming enzyme systems, and the toxic effects of nutrients and nonnutritive materials.	
Syllabus: <ol style="list-style-type: none"> 1. Terminology of toxicology 2. Detoxification mechanisms of toxicants in the animals 3. Toxic effects of amino acids and derivatives 4. Oxidation of lipids and toxic effects of peroxidised lipids 4. Toxic effect of vitamins 5. Metal toxicoses – macro elements 6. Metal toxicoses – trace elements 7. Plant protectants (pesticides, herbicides) toxicosis 8. Toxic effects of rodenticides 9. Coccidiostat toxicosis 10. Mechanisms of the formation of mycotoxins and sources of mycotoxin contamination 11. Toxic effect of mycotoxins – Fusarium, Stachybotrys and Alternaria toxins 12. Toxic effect of mycotoxins – Aspergillus and Penicillium toxins 13. Preventive methods against toxic effects of mycotoxins 	
Grading: Attend the lectures and write an essay on one topic of feed toxicology	
References: Lecture materials Gupta, R.C. ed. (2007): Veterinary toxicology. Academic Press, New York	

COURSE DESCRIPTION

Title:	Feeding stuff analysis
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Neptun code:	<i>ELTAK129N</i>
Lectures/Practices:	<i>2</i>
Credit:	<i>6</i>
Program:	<i>PhD</i>
Type:	<i>full-time/ part-time study programme</i>
Requirements:	<i>none</i>
Semester:	<i>spring/autumn</i>
Language:	<i>English</i>
Pre-requirements:	<i>none</i>
Institute/Department:	<i>MATE Institute of Physiology and Nutrition</i>
Course leader:	<i>Éva Vargáné Dr. Visi PhD</i>
<p>Description: Within the framework of the course, in addition to the chemical analytical determination of the main component groups constituting feed, methods suitable for the analysis of individual components are also presented. To support the understanding of their theoretical background, students become acquainted with the basic principles and key relationships of chromatographic and spectroscopic measurement techniques, as well as the performance characteristics of analytical methods. The course primarily focuses on the following areas: analysis of carbohydrate fractions; determination of the fatty acid composition and oxidative status of acyl lipids; determination of the amino acid composition of proteins; measurement of mineral content; and the analysis of toxic substances occurring in feed and food.</p>	
<p>Aims: Students gain knowledge of the methods of chemical analysis used to determine the compositional parameters that define feed quality and safety. The training provides background knowledge for professionals working in the fields of animal science and nutrition, supporting the development and deepening of collaborations related to feed composition analysis.</p>	
<p>Syllabus:</p> <ol style="list-style-type: none"> 1. Concepts and principles of measurement techniques; analytical performance characteristics I. 2. Concepts and principles of measurement techniques; analytical performance characteristics II. 3. Fundamentals of spectroscopy I. 4. Fundamentals of spectroscopy II. 5. Fundamentals of chromatography I. 6. Fundamentals of chromatography II. 7. Determination of moisture content, ash content, and mineral content 8. Crude fiber and fiber fraction analysis; determination of mono- and polysaccharides 9. Methods for determining protein content; determination of nitrogen-containing compounds 10. Amino acid analysis 11. Determination of fat content and fatty acid composition 12. Analytical methods used for the qualification and characterization of fats 13. Analysis of toxic substances 	
<p>Grading: Preparation of a study based on the specified criteria.</p>	
<p>References: The course materials made available to students on the e-learning platform created for the course.</p>	

COURSE DESCRIPTION

Title:	<i>Lipid peroxidation and the biological antioxidant system</i>
Neptun code:	
Lectures/Practices:	2
Credit:	6
Program:	<i>PhD</i>
Type:	<i>full-time / part-time</i>
Requirements:	<i>none</i>
Semester:	<i>spring</i>
Language:	<i>English</i>
Pre-requirements:	<i>none</i>
Institute/Department:	<i>MATE Institute of Physiology and Nutrition</i>
Course leader:	<i>Dr. Mézes Miklós MHAS</i>
Description: This course covers the mechanisms underlying the formation of oxygen free radicals and their biological effects. It also covers the non-enzymatic and enzymatic factors that constitute the antioxidant defense system against oxygen free radicals, as well as the regulation of antioxidant defense. Furthermore, the harmful processes attributable to the effects of oxygen free radicals are described in detail.	
Aims: The main aim of this course is to show the cellular damage caused by oxygen free radicals and the antioxidant defense system that counteracts them. A further objective is to describe the harmful processes that can be attributed to the effects of oxygen free radicals.	
Syllabus: <ol style="list-style-type: none"> 1. The formation of oxygen free radicals in biological systems. 2. The effects of oxygen free radicals on biological macromolecules 3. The process of lipid peroxidation 4. The biological antioxidant system and its regulation 5. The role of oxygen free radicals in certain physiological processes 6. The role of oxygen free radicals in certain pathophysiological processes 7. The role of mitochondria in oxygen free radical formation 8. Oxidative stress induced by dietary factors 9. Non-enzymatic components of the biological antioxidant system 10. Enzymes of the biological antioxidant system 11. Natural and synthetic antioxidant compounds 12. Sensitivity of certain tissues to lipid peroxidation 	
Grading: attend the lectures and write an essay about a selected topic of the course	
References: lecture materials Halliwell, B., Gutteridge, J.M.C. (2007) Free radicals in biology and medicine. 4 th rd. Oxford University Press, Oxford	

COURSE DESCRIPTION

Title:	<i>Lipids in the animal organism</i>
Neptun code:	
Lectures/Practices:	<i>4/week</i>
Credit:	

Program:	<i>PhD</i>
Type:	<i>Normal</i>
Requirements:	-
Semester:	<i>Both semesters</i>
Language:	<i>English and Hungarian</i>
Pre-requirements:	-
Institute/Department:	<i>Inst. Of Physiology and Animal Nutrition</i>
Course leader:	<i>Dr. András Szabó, DSc</i>
Description:	
<p>Aims: The aim of the course is to provide students with a methodological foundation for writing academic papers. The course covers the most common academic databases, optimal methods for searching for sources, rules for using content, and the structure of theses and other academic papers. Students will learn about the copyright framework related to thesis writing, the proper preparation of a bibliography, and the relevant software tools. We also cover topics such as typesetting, image management, and table formatting, though we limit these discussions to the field of the life sciences. The ultimate goal is to produce a well-structured and publishable work, for which the general guidelines for peer review are also presented.</p>	
Grading:	
References:	
<p>Lichtfield, C. 1972. Analysis of triglycerides. Academic Press, New York, USA. Mead, Howton, Alfin-Slater, Popjak (1986): Lipids: Chemistry, Biochemistry, and Nutrition. Plenum Publ. NY, USA</p>	

COURSE DESCRIPTION

Title:	<i>Physiological aspects of environmental adaptation in domestic animals</i>
Neptun code:	
Lectures/Practices:	<i>2</i>
Credit:	<i>6</i>
Program:	<i>PhD</i>
Type:	<i>Full time/Correspondence</i>
Requirements:	-
Semester:	<i>Spring/Autumn</i>
Language:	<i>English</i>
Pre-requirements:	-

Institute/Department:	<i>MATE Institute of Physiology and Nutrition</i>
Course leader:	<i>Prof. Ferenc Husveth, DsC</i>
Description:	
Aims: To give detail knowledge about the physiological adaptation to different environmental conditions of domestic animals	
Syllabus: <ol style="list-style-type: none"> 1. Physiological basis of neurohormonal control in animals 2. Role of hypothalamic-hypophyseal and adrenal axis in adaptation 3. Physiological aspects for adaptation of animals to heat environment 4. Physiological aspects for adaptations of animals to cold environment 5. Biochemical and physiological indicators of stress in animals 6. Effects of stress conditions on metabolic processes in animals 7. Effect of manipulations of environment in the physiology of domestic animals 	
Grading: Essay composition in from the theme of the subject	
References: Environmental Physiology of Livestock , Editor(s):R. J. Collier, J. L. Collier, 2012. Wiley_ Blackwell ISBN:9780813811765 Online ISBN:9781119949091 DOI:10.1002/9781119949091Copyright © 2012 John Wiley & Sons, Inc. Environmental Stress and Amelioration in Livestock Production , Veerasamy Sejian • S. M. K. Naqvi, Thaddeus Ezeji • Jeffrey Lakritz,,Rattan Lal, Editors 2012, Springer Environmental Physiology and Thermoregulation in Farm Animals . Krishnan, G., Silpa, M.V., Sejian, V. (2023). In: Das, P.K., Sejian, V., Mukherjee, J., Banerjee, D. (eds) Textbook of Veterinary Physiology. Springer, Singapore. https://doi.org/10.1007/978-981-19-9410-4_28 Physiological adaptability of livestock to climate change (2026): A global model-based assessment for the 21st century by:, Angela Maria de Vasconcelos, Silvana Cavalcante Bastos Leite, Jacinara Hodoy Gurgel Moraes Leite, Edilson Paes Saraiva ^e , Luiz Paulo Fávero, Luis Orlindo Tedeschi, Iran José Oliveira da Silva, Environmental Impact Assessment Review, https://doi.org/10.1016/j.eiar.2025.108061	

COURSE DESCRIPTION

Title:	<i>Production physiology</i>
Neptun code:	
Lectures/Practices:	<i>2</i>
Credit:	<i>6</i>
Program:	<i>PhD</i>
Type:	<i>Full time/Correspondence</i>
Requirements:	<i>-</i>
Semester:	<i>Spring/Autumn</i>
Language:	<i>English</i>
Pre-requirements:	<i>-</i>

Institute/Department:	<i>MATE Institute of Physiology and Nutrition</i>
Course leader:	<i>Prof. Ferenc Husveth, DsC</i>
Description:	
Aims: This subject provides the principles of the main physiological processes in domestic animals. Details of this course give a help of the students in creating optimal nutritional and keeping conditions for high performance animals.	
Syllabus: <ol style="list-style-type: none"> 1. Digestion and metabolic processes in high performance domestic animals; species differences 2. Absorption and metabolism of carbohydrates 3. Absorption of the products of lipid digestion and lipid metabolism 4. Absorption of amino acids and N metabolism 5. Reproduction of female animals 6. Reproduction of male animals 7. Physiology of growth and development as the basis of meat production 8. Physiology of lactation 9. Physiology of egg production 10. Physiological principles of metabolic disorders in high performance domestic animals 11. Exercise physiology 	
Grading: Essay composition in from the theme of the subject	
<ol style="list-style-type: none"> 1. Husvéth F. (szerk.): Háziállatok élettana és anatómiája. Mezőgazda Kiadó (2000) 2. Ruckebush, Y., L.P. Phaneuf and R.D. Dunlop (1991): Physiology of small and large animals, B.C. Decker Inc., Philadelphia. 3. Swenson, M. J. (1984): Dukes' Physiology of domestic animals, Comstock Publishing Associates, Ithaca and London. 4. R-J Xu and P. D Cranwell (2003): The Neonatal Pig, Gastrointestinal physiology and nutrition. Nottingham University Press. 5. Akers M. (Ed.): Lactation and the mammary gland, Iowa State Press, Blackwell Publishing Comp. Iowa, 2002 6. Handbook of Egg Science and Technology, Ed. Yoshinori Mine, CRC press, 2023. 	

COURSE DESCRIPTION

Title:	Ruminant Nutrition
Neptun code:	
Lectures/Practices:	2
Credit:	6
Program:	PhD
Type:	full-time/part-time
Requirements:	no
Semester:	spring/autumn
Language:	english
Pre-requirements:	no
Institute/Department:	MATE Institute of Physiology and Nutrition
Course leader:	Robert Tóthi PhD

Description: Building on the fundamental knowledge acquired during undergraduate studies, this course aims to provide PhD students with advanced knowledge that summarizes the latest scientific developments in the field. The course content is designed to support students in conducting high-quality research by integrating current scientific findings and methodological advances relevant to their area of study.	
Aims: To refresh, deepen, and update students' knowledge of ruminant nutrition and feeding management, and to facilitate the application of this knowledge in their research activities.	
Syllabus (main topics): <ol style="list-style-type: none"> 1 Energy and protein evaluation systems in the World 2 Nutrition and rumen fermentation, digestibility studies 3 Feeding management of ruminant livestock 4 Relationships between reproduction and nutrition 5 Dairy cow nutrition based on the new experimental results 6 Actual questions of beef cow herd and finishing beef cattle nutrition 7 New aspects of sheep, goat, farmed red deer, roe deer and mouflon nutrition 8 Relationships between nutrition and environmental pollution 	
Grading: Mandatory personal attendance at the course and successful completion of the oral examination.	
References: Material presented during the lectures. Babinszky, L. (Ed.). (2024). <i>Latest Scientific Findings in Ruminant Nutrition – Research for Practical Implementation</i> . In <i>Veterinary Medicine and Science</i> . https://doi.org/10.5772/intechopen.1001764 Current scientific publications related to the PhD student's research activities.	

COURSE DESCRIPTION

Title:	Stress Physiology of Crop Plants and Investigational Methodologies
Neptun code:	
Lectures/Practices:	2
Credit:	6
Program:	<i>SDI</i>
Type:	<i>full-time/correspondence program</i>
Requirements:	-
Semester:	<i>spring</i>
Language:	<i>Hungarian/English</i>
Pre-requirements:	-
Institute/Department:	<i>Institute of Agronomy</i>
Course leader:	<i>Dr. Ildikó jócsák</i>

<p>Description: The course provides a theoretical knowledge base and practical skills regarding plant physiology under stress conditions, using examples of field crops that are commonly used as forage. The curriculum reviews the effects of the most important abiotic and biotic environmental stressors on plants. Furthermore, with current agricultural challenges in mind, the course emphasizes the combined mechanisms by which stressors that most frequently occur together affect plant metabolism and productivity. All these topics are discussed from an interdisciplinary perspective, integrating the latest research findings from related fields—biochemistry, molecular biology, and biotechnology—into the core curriculum. The course also provides an overview of the most commonly used laboratory (classical and molecular biological) methods, as well as non-invasive in vivo plant stress testing methods.</p>	
<p>Aims: The course aims to provide an understanding of the physiological background of biotic and abiotic stresses affecting forage crops and to introduce modern physiological, biochemical, molecular, and non-invasive phenotyping methods used in stress research. Students will gain skills in designing stress-related experiments and evaluating experimental results.</p>	
<p>Syllabus: Week 1: Introduction to the stress physiology of forage crops Week 2: Plant stress perception and signal transduction processes Week 3: Physiological effects of drought stress in forage crops Week 4: Salt stress and disturbance of ion homeostasis Week 5: Physiological background of heat and cold stress Week 6: Oxidative stress and antioxidant defense mechanisms Week 7: Stress responses of the photosynthetic apparatus Week 8: Chlorophyll fluorescence-based stress assessment methods Week 9: Application of non-invasive phenotyping methods Week 10: Investigation of biochemical stress indicators Week 11: Molecular methods for studying plant stress physiology Week 12: Experimental design and data evaluation in stress research Week 13: Complex case studies in the stress physiology of forage crops</p>	
<p>Grading: Personal attendance during the course, completion of an assigned coursework task, and an oral exam.</p>	
<p>References:</p> <ul style="list-style-type: none"> - what was discussed in class - A növényi anyagcsere élettana- 10. fejezet. Dr. Szigeti Zoltán: A növényi stressz alapjelenségei. Szerk.: Dr. Fodor Ferenc; Eötvös Lóránt Tudományegyetem, 2013. - Plant Stress Tolerance - Methods and Protocols. Editors: Sunkar, Ramanjulu (Ed.), 2017. 	

COURSE DESCRIPTION

Title:	Equine Nutrition
Neptun code:	PEDIGKAN21
Lectures/Practices:	2
Credit:	6
Program:	<i>PHD</i>
Type:	<i>Full time/Part time</i>
Requirements:	-

Semester:	<i>spring/autumn</i>
Language:	<i>english</i>
Pre-requirements:	-
Institute/Department:	<i>Institute of Animal Physiology and Nutrition</i>
Course leader:	<i>Adam Bartos, PhD</i>
Description: Within the framework of this course, students will gain an understanding of the principles and challenges of modern equine nutrition, nutrition-related disorders and diseases, and their prevention. They will also become familiar with the fundamental principles of feeding breeding horses and sport horses. Based on the knowledge acquired, students will be able to formulate feeding rations for horses of different ages and uses, recognize potential nutritional disorders and diseases, and apply the appropriate preventive and management measures when such conditions occur.	
Aims: Students will gain a comprehensive understanding of the digestive characteristics of horses, the nutritional principles appropriate for different age groups and purposes of use, and the specific features of sport horse nutrition. The course covers the main energy sources and the processes of energy metabolism, the nutritional aspects of performance enhancement, and the most important nutrition-related disorders and diseases. Students will also learn about the prevention and potential management of these conditions.	
Syllabus: Main Topics <ol style="list-style-type: none"> 1. Digestive Characteristics of Horses 2. Digestion of Major Nutrients 3. Nutrition of Broodmares, Foals, and Stallions 4. Principles of Sport Horse Nutrition <ul style="list-style-type: none"> ○ Energy metabolism in the horse ○ Energy sources and their utilization according to workload ○ Stress factors and nutritional strategies for their mitigation 5. Nutritional and Management Approaches to Performance Enhancement 6. Nutrition-Related Disorders and Diseases <ul style="list-style-type: none"> ○ Clinical signs and symptoms ○ Prevention strategies ○ Possible treatment and management approaches 	
Grading: Personal attendance at the course and successful completion of either an oral or an online examination are required.	
References: <ul style="list-style-type: none"> ○ Material covered during lectures. ○ David Frape: Equine nutrition and feeding. Wiley and Blackwell, 2010 	

COURSE DESCRIPTION

Title:	Animal nutrition
Neptun code:	
Lectures/Practices:	2
Credit:	6

Program:	<i>PhD</i>
Type:	<i>full time/part time</i>
Requirements:	-
Semester:	<i>spring/autumn</i>
Language:	<i>English</i>
Pre-requirements:	-
Institute/Department:	<i>Institute of Physiology and Nutrition</i>
Course leader:	<i>Dr. Károly Dublec</i>
Description: In the frame of the course the students get new information on the challenges and recent developments on farm animal nutrition. The content of the course is following the new trends continuously.	
Aims: To give more understandings on the global trends of animal production and on their nutritional aspects.	
Syllabus: <ol style="list-style-type: none"> 1. Food industry as a strategic sector 2. Nutrients of feeds and animal tissues 3. Human nutritional aspects of animal products 4. New feed analytical methods 5. Energy evaluation methods 6. Protein evaluation of feedstuffs 7. Fibre evaluation systems 8. Effects of animal nutrition on the quality of animal products 9. Food safety aspects of animal nutrition 10. New generation of feed additives 11. Environmental and sustainability aspects of animal nutrition 12. Nutritional aspects to use less antibiotics 13. Precision animal nutrition technologies 	
Grading: Students will prepare an essay on one of the topics of the course. The course is closed with exam. The final combined score is determined by the quality of essay and the exam.	
References: <ul style="list-style-type: none"> - The contents of course presentations - Mc'Donald, P., Edwards, R. A., Greenhalgh, J. F D., Morgan, C.A.: Animal nutrition. Pearson Education Limited, Harlow, 2002 - Richards, O., K., Church, D.C.: Livestock feeds and feeding. Pearson Education, 2010 	

COURSE DESCRIPTION

Title:	<i>By-products and environment</i>
Neptun code:	
Lectures/Practices:	2
Credit:	6
Program:	<i>PhD</i>
Type:	<i>full time/part time</i>
Requirements:	<i>exam</i>

Semester:	<i>spring</i>
Language:	<i>English</i>
Pre-requirements:	<i>none</i>
Institute/Department:	<i>MATE Institute of Physiology and Nutrition, Department of Feed Safety</i>
Course leader:	<i>Balláné dr. Erdélyi Márta, PhD</i>
<p>Description: As part of the course students learn about waste materials generated in agriculture and in different industries that can be utilized as by-products in the feeding of farm and companion animals. They will learn about criteria to meet for waste originating from an industrial process to be utilized as a by-product. During the course, special attention will also be paid to the environmental and sustainability aspects of by-product utilization.</p>	
<p>Aims: With the knowledge acquired during the course, students will be able to assess the quality of by-products and their potentials in the nutrition of different livestock species. They will be familiar with the safety risks of by-products and, they can use this knowledge in decision making process related to a given by-product. The aim of the course is to promote rational, environmentally conscious, and sustainable utilisation of by-products in animal nutrition.</p>	
<p>Syllabus:</p> <ol style="list-style-type: none"> 1. Agricultural by-products 2. By-products of the kitchen oil and biodiesel industry 3. By-products of the ethanol industry 4. Milling industry by-products 5. By-products of brewery and distillery 6. By-products of sugar production 7. Other phytogenous by-products and alternative protein sources 8. By-products of the dairy industry 9. By-products from the slaughterhouse 10. Marine by-products 11. Other animal originated alternative protein sources 12. Legal and safety issues of using by-products in animal nutrition 13. Sustainability and by-products 14. 	
<p>Grading: Attendance at the lectures, completion of a project and giving a presentation on it.</p>	
<p>References:</p> <ul style="list-style-type: none"> - lecture material - e-learning documents 	

COURSE DESCRIPTION

Title:	Impacts of animal nutrition on environmental protection
Neptun code:	<i>SDI...</i>
Lectures/Practices:	<i>3 x 4 hours per semester</i>
Credit:	<i>6</i>
Program:	<i>PhD</i>
Type:	<i>full-time and correspondence</i>

Requirements:	<i>attendance of the lectures</i>
Semester:	<i>fall</i>
Language:	<i>english</i>
Pre-requirements:	-
Institute/Department:	<i>MATE Institute of Physiology and Nutrition</i>
Course leader:	<i>Dr. László Pál, PhD</i>
Description: The course is focused on the concepts and practice of sustainable animal nutrition and its role in the management of current environmental problems. The course discusses in detail the trends in animal production, the role of animal nutrition in ecological footprint, nutritional means to reduce the various emissions (N, P, methane, trace elements) of animal production. Special attention will be paid to use of by-products and alternative protein sources in animal feeding as well as feeding strategies to reduce environmental load of a livestock farm.	
Aims: As a result of completing the subject, students should be able to show evidence of a broad understanding of importance and concepts of sustainable nutrition and its relation to environmental problems	
Syllabus: <ul style="list-style-type: none"> • Introduction – trends in animal production, global warming, environmental footprint, sustainability • N- and P-excretion in monogastrics and ruminants • Techniques to measure methane production and nutritional methods for reduction of methane production • The role of ruminant grazing in maintaining natural habitats • Use of by-products in animal feeding • Alternative protein sources 	
Grading: Written exam, with a three-grade evaluation based on the percentage of the result	
References: <ul style="list-style-type: none"> - presentations and other sources of the course which are available on the e-learning system - P. R. Ferket, E. van Heugten, T. A. T. G. van Kempen and R. Angel (2002): Nutritional strategies to reduce environmental emissions from nonruminants. <i>Journal of Animal Science</i> 80:E168-E182. - Tamminga S. (1996): A review on environmental impacts of nutritional strategies in ruminants. <i>Journal of Animal Science</i> (74) 3112-3124 	

COURSE DESCRIPTION

Title:	Physiology and Anatomy of Poultry
Neptun code:	<i>SDI...</i>
Lectures/Practices:	<i>5 x 4 hours per semester</i>
Credit:	<i>6</i>
Program:	<i>PhD</i>
Type:	<i>full-time and correspondence</i>
Requirements:	<i>attendance of the lectures</i>

Semester:	<i>fall</i>
Language:	<i>English</i>
Pre-requirements:	-
Institute/Department:	<i>MATE Institute of Physiology and Nutrition</i>
Course leader:	<i>Dr. László Pál, PhD</i>
Description: The course introduces the anatomical and physiological characteristics of poultry. It highlights those areas in which the vital functions of birds are special and differ from those of mammals. Accordingly, it provides basic knowledge of the physiological issues of poultry product production (eggs, meat, liver), highlighting the main relationships determining the quality of the products.	
Aims: The aim of the subject is to familiarize students with the scientific knowledge of the anatomy and physiology of poultry, providing foundations and assistance for understanding the processes of modern and environmentally conscious production and conducting related research.	
Syllabus: <ul style="list-style-type: none"> • Structure of the skeletal and muscular systems of birds • Blood and lymphatic circulation in birds • Respiration and excretion of poultry • Neurohormonal regulation in birds • Structure of the digestive system and digestion in poultry species • Carbohydrate, protein and fat metabolism of poultry • Transport of minerals and vitamins in poultry • Physiology of egg production • Physiology of poultry meat and liver production • Physiological processes determining the quality of poultry products 	
Grading: Written exam, with a three-grade evaluation based on the percentage of the result	
References: <ul style="list-style-type: none"> - presentations and other sources of the course which are available on the e-learning system - Nickel, R. A., Schummer, E., Seiferle, E.: <i>Anatomy of Domestic Birds</i>, P. Parey Verlag, Berlin, 1986. - Causey Whittow, G. (szerk.): <i>Sturkie,s Avian Physiology</i>, Academic Press, California, 2000. 	

COURSE DESCRIPTION

Title:	<i>Poultry nutrition</i>
Neptun code:	
Lectures/Practices:	2
Credit:	6
Program:	<i>PhD</i>
Type:	<i>full time/part time</i>
Requirements:	-
Semester:	<i>spring/autumn</i>
Language:	<i>English</i>
Pre-requirements:	-

Institute/Department:	<i>Institute of Physiology and Nutrition</i>
Course leader:	<i>Dr. Veronika Halas, Dr. Károly Dublec</i>
Description: In the frame of the course the students get new information on the challenges and recent developments on poultry nutrition. The content of the course is following the new trends continuously.	
Aims: To give more understandings on the global trends of poultry production and on their nutritional aspects.	
Syllabus: <ol style="list-style-type: none"> 14. Global trends of poultry production 15. Human nutritional aspects of poultry meat and egg 16. Energy evaluation of poultry feeds 17. Protein and amino acid evaluation of poultry feeds 18. New fibre evaluation systems 19. Effects of nutrition on the quality of poultry products 20. New generation additives in poultry feeds 21. Environmental and sustainability aspects of poultry nutrition 22. Interactions between nutrition and gut bacteria 23. Precision poultry nutritional technologies 	
Grading: Students will prepare an essay on one of the topics of the course. The course is closed with exam. The final combined score is determined by the quality of essay and the exam.	
References: <ul style="list-style-type: none"> - The contents of course presentations - Larbier; M. and B. Leclercq (1994): Nutrition and feeding of poultry. Nottingham University Press. Loughborough, Leicestershire, UK. - Leeson, S. and J.D. Summers (2001): Scott's nutrition of the chicken. University Books, Guelph, Ontario, Canada - Cole D.J.A. and W. Haresign (1989): Recent developments in poultry nutrition. Butterworths, London - Gransworthy, P.C. and J. Wiseman (1999): Recent developments in poultry nutrition II. Nottingham University Press. Loughborough, Leicestershire, UK. - Leeson, S. and J.D. Summers (1997): Commercial poultry nutrition. University Books, Guelph, Ontario, Canada - Kleyn, R. (2013): Chicken nutrition. A guide for nutritionists and poultry professionals, Context Products Ltd. Ashby de la Zouch, Leicestershire, UK 	

COURSE DESCRIPTION

Title:	Swine nutrition
Neptun code:	
Lectures/Practices:	2
Credit:	6
Program:	<i>PhD</i>
Type:	
Requirements:	<i>non</i>
Semester:	<i>fall/spring</i>
Language:	<i>English</i>
Pre-requirements:	<i>non</i>
Institute/Department:	<i>MATE Institute of Physiology and Nutrition</i>

Course leader:	<i>Dr. Veronika Halas PhD</i>
Description: In the course, students will gain comprehensive knowledge of energy and protein evaluation systems used in swine nutrition, as well as the principles of feeding different physiological state animal groups. The environmental and specifically the dietary factors will be discussed in details that influence the feed intake of animals and the feed utilization. Typical and alternative feed ingredients as well as additives used in compound feed production for different age groups, their impact on pork quality and the ecological footprint of pig farming will be overviewed.	
Aims: This course aims to equip students with the theoretical foundations of pig nutrition, fostering a comprehensive understanding of the biological and nutritional principles underlying feeding-related challenges. In addition, it provides current scientific knowledge and insights into present and future feeding practices designed to promote efficient, sustainable, and safe pork production.	
Syllabus: <ul style="list-style-type: none"> ☐ Energy and protein evaluation systems used in pig nutrition; digestibility and metabolic studies. ☐ Factors influencing feed intake and feed efficiency, and the interactions between environment and nutrition in pigs with different physiological states and genetic potentials. ☐ Nutritional strategies for improving the sustainability of pork production and reducing its environmental impact. ☐ Principles and applications of precision feeding systems in modern swine production. 	
Grading: attendance is requested, assessment is based on a written paper on a topic chosen by the doctorate in consultation with the course leader, and participation in a consultation discussing the submitted work.	
References: <ul style="list-style-type: none"> - handout of the course - Swine nutrition, 2000, Eds: Austin J. Lewis, L. Lee Southern, CRC Press, ISBN 9780849306969 	

COURSE DESCRIPTION

Title:	The relationship between microelements and animal metabolism
Neptun code:	SDI...
Lectures/Practices:	2
Credit:	6
Program:	<i>PhD</i>
Type:	<i>full-time</i>
Requirements:	<i>none</i>
Semester:	<i>autumn/spring</i>
Language:	<i>English</i>
Pre-requirements:	<i>none</i>
Institute/Department:	<i>MATE Institute of Physiology and Nutrition / Department of Feed Safety</i>
Course leader:	<i>Dr. Krisztián Milán BALOGH PhD</i>
Description:	

The course provides for the PhD students with an overview of the different minerals, the microelements, which play a key role in animal metabolism but are present in small amounts in the feed of farm animals. Their role in the activity of various enzymes, in hormonal regulation, in antioxidant defence and in immune system will be reviewed. Deficiency and toxicity symptoms associated with microelement intakes below or significantly above animal requirements will be described.

Aims:

Doctoral students will gain a comprehensive understanding of various trace elements, their roles in animal organisms, ways to ensure optimal intake, as well as the deficiency and toxic symptoms that arise when trace element levels fall short of or significantly exceed the animals' requirements.

Syllabus:

1. The importance of trace elements, their classification based on their physiological roles and functions in the animals
2. Trace element deficiencies and the role of trace element supplementation
3. Iron (Fe)
4. Zinc (Zn)
5. Copper (Cu)
6. Manganese (Mn)
7. Iodine (I)
8. Selenium (Se)
9. Molybdenum (Mo)
10. Boron (B)
11. Fluorine (F) and cobalt (Co)
12. Chromium (Cr), nickel (Ni), tin (Sn), lithium (Li), and titanium (Ti)
13. Toxic trace elements

Grading:

Attendance in class and completion of the term paper (essay) assigned during the semester.

References:

- Electronic course materials based on the lectures
- Szabó, S., Györi, D., and Régiusné Möcsényi, Á. (eds.): Mikroelemek a mezőgazdaságban [Micronutrients in Agriculture] I-II-III. Akadémiai Kiadó

COURSE DESCRIPTION

Course title / Neptun code: Biochemistry and Physiology of Animal Product Production	Number of credits: 8
Course coordinator (name, position, academic degree): Prof. Melinda Kovács, MHAS	
Instructor(s) involved in teaching the course, if applicable (name, position, academic degree): Academic staff holding doctoral degrees from universities and research institutes are involved in teaching as guest lecturers. They are internationally recognized experts in their respective fields.	

Course type: compulsory/ <u>elective</u>
Type of class: lecture/seminar / practical / consultation, and total number of contact hours in the semester: 46 contact hours
Teaching methods and specific educational tools used for knowledge transfer (e.g. case presentations, case-study analyses, project-based learning, other methods): presentations, case-study analyses, project-based learning
Requirements for successful completion: exam
Assessment methods applied for evaluating learning outcomes: Grading on a scale of 1 to 5.
Recommended semester: 2 nd or 4 th
Prerequisites (if any): none
<p>Course Description</p> <p>Objectives of the course and a concise yet informative description of the knowledge and skills to be acquired.</p> <p>The course provides specialized and integrated knowledge of the physiology of animal product production, with particular emphasis on the metabolism of nutrients and bioactive compounds, productive lifespan, the physiological effects of environmental factors and their interactions, and the physiological changes associated with adaptation. Particular attention is given to the physiological mechanisms underlying high productivity, superior product quality, and the maintenance of animal health. The course incorporates the synthesis and application of the latest research findings, following the One Health approach.</p>
<p>Course Topics / Semester Schedule:</p> <p>Lipid Peroxidation and Antioxidant Defense</p> <p>Stress and Physiological Adaptation</p> <p>Physiological and Biochemical Effects of Fatty Acids</p> <p>Molecular Genetic Research in Animal Production</p> <p>The Role of One Health in Animal Production</p> <p>Interactions Between Nutrition, Gut Microbiota, and Immune Responses</p> <p>Regulation of Intermediary Metabolism</p> <p>Physiology of Muscle Force Generation</p> <p>The Role of Animal-Derived Foods in Human Nutrition</p> <p>Effects of Nutrition on Animal Production in Cattle</p> <p>Precision Feeding and Its Role in Sustainable Production of Animal-Derived Food Raw Materials</p> <p>Application of Assisted Reproductive Technologies in Animal Breeding</p> <p>Relationships Between Nutrition and Reproductive Performance in Farm Mammals</p> <p>Effects of Nutrition on Meat Quality in Pigs</p> <p>Advances in Poultry Reproductive Biology Research for Breeding Applications</p> <p>Food Safety Risks Associated with Mycotoxins</p>
List of the 2–5 Most Important Required Literature (textbooks, lecture notes, or other study materials)

Provide complete bibliographic information: author(s), title, publication details, page numbers (if applicable), and ISBN.
PowerPoint presentations of the lectures and scientific articles recommended by the lecturers.
<p>List of the 2–5 Most Important Recommended Literature (textbooks, lecture notes, or other study materials)</p> <p>Provide complete bibliographic information: author(s), title, publication details, page numbers (if applicable), and ISBN.</p>
<p>Toldrá, F. (ed.) (2023): Lawrie's Meat Science. 9th ed. Woodhead Publishing.</p> <p>Mukherjee, J. et al. (2026): Veterinary Lactation Physiology. Springer.</p> <p>Sjaastad, Ø. V., Sand, O. & Hove, K. (2016): Physiology of Domestic Animals. 3rd ed. Scandinavian Veterinary Press.</p>
<p>Professional Competences Developed by the Course</p> <p>Please specify the professional competences, competence elements and skills to which the course substantially contributes, including: Knowledge, Skills, Attitudes, Autonomy and Responsibility</p>
<p>Knowledge: Possesses in-depth, systematic knowledge of the physiological, biochemical, molecular, and endocrine regulation of animal product production (meat, milk, and egg production), the factors influencing these processes, and modern research methodologies and analytical techniques used to investigate the underlying physiological mechanisms.</p> <p>Skills: Is capable of independently conducting critical and integrated analyses of complex physiological processes, as well as identifying and scientifically interpreting the relationships between production performance, product quality, and the physiological status of animals.</p> <p>Attitude: Is open to innovative, interdisciplinary approaches to understanding the physiological basis of animal product production, incorporating the One Health perspective.</p> <p>Autonomy and Responsibility: Independently identifies and formulates scientific problems and research questions related to the physiology of animal product production. Critically and responsibly evaluates the applicability and potential implications of research findings.</p>