University of Debrecen Faculty of Agricultural and Food Sciences and Environmental Management

Animal Husbandry MSc Program

2022

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**DEAN’S WELCOME**

On January 1, 2000, the University of Debrecen was born with the need for international competitiveness, which is now the oldest continuously operating higher education institution in the country. It is one of the excellent universities in Hungary, with its 14 faculties and 24 doctoral schools, offering the widest domestic training. Today, the University of Debrecen carries out its agricultural training, research and development activities in three organizational units: the Faculty of Agriculture, Food Science and Environmental Management (MÉK), the Faculty of Economics (GTK) and the Institutes for Agricultural Research and Educational Farm (AKIT). The Faculty of Agriculture, Food Science and Environmental Management - adapting to today's scientific challenges - formulates both its training and research activities according to the circular bioeconomy model, which is based on the recycling of materials and values, by increasing the added value of the produced product, through services and smart solutions. In the ranking of agricultural and higher education institutions in the world, Debrecen is always in the most prominent place, currently it is among the best between 150-200.

The Faculty of Agriculture, Food Science and Environmental Management of the University of Debrecen currently has nearly 1,400 students, and in addition to our Hungarian-language courses, more and more foreign students attend our courses taught in English. Our undergraduate and master's programs, our talent management colleges, and our doctoral schools all play a decisive role in higher agricultural education and scientific supply. It is especially important for us to maintain a wide-ranging system of professional and economic relations with the enterprises of the region, which, on the one hand, provides the conditions for practical training and, on the other hand, helps to utilize the scientific results created at the University. Following the good example of our predecessors, we try to provide students with up-to-date knowledge and practice-oriented knowledge, so that they can enhance and improve the reputation of our institution and Hungarian agriculture.

Dr. László Stündl

associate professor

dean

**HISTORY OF THE UNIVERSITY**

The University of Debrecen, the oldest institution of higher education in the country operated continuously in the same city, is one of the research universities of national excellence in Hungary offering the widest spectrum of educational programs in 14 faculties and 24 doctoral schools.

The roots of higher education in the city reach all the way back to the 16th century and the foundation of the Reformed College of Debrecen in 1538. The College played a central role in Hungarian education and culture for centuries. This is the date featured on the symbol of the university as well, the *gerundium,* a tool originally used by the students of the Reformed College to put out fires, showing respect for ancestors and traditions.

In 1912 with Act XXXVI, originally submitted as a bill by Count János Zichy, Minister of Religion and Public Education, the Hungarian Parliament decided on the establishment of two universities, one in Pozsony [Bratislava] and the other in Debrecen. Thus the Hungarian Royal University of Debrecen was established in the *cívis* town with five faculties (Faculty of Reformed Theology, Faculty of Law, Faculty of Medicine, Faculty of Arts, Linguistics and History, and the Faculty of Mathematics and Science). However, the university opened only two years later, in 1914 with three faculties. First, students studied in the building of the Reformed College, which soon proved to be too small. The city of Debrecen granted a huge (112 acre) land in the Great Forest for the university, and also provided first 5 then an additional 3 million Golden Koronas for the construction of a new building. In 1918 Charles IV inaugurated the central building of the newly founded Faculty of Medicine. The teaching of mathematics and natural sciences started within the Faculty of Arts from the 1923/24 academic year. The independent Faculty of Sciences was opened only in 1949.

In 1921 the university was named after Count István Tisza, former prime minister and statesman who also studied in the Reformed College and who was assassinated on October 31, 1918. Thus the name of the institution was changed to István Tisza Hungarian Royal University of Debrecen.

The construction of the main building of the university started in the 1920s and it was officially opened in 1932. At the time it was the third largest investment project of the country after the building of the Parliament and the Buda Castel Palace. Construction lasted for four years, even so only one third of the original plans could be realized.

After the Second World War the fragmentation of the university (then already having five faculties) was started in 1949 due to political reasons. In the same year the Faculty of Law was temporarily suspended, in 1950 the Faculty of Theology was separated from the university, and it returned to the College with support from the church. Making medical training independent, the Medical University of Debrecen was organized in 1951. The university bore the name of István Tisza until 1945, then it was named University of Debrecen, then from 1952 it operated under the name of Lajos Kossuth University.

In the 1980s negotiations already started about the reunification of fragmented higher education in Debrecen. Events leading to integration, however, accelerated only after 1996 when an amendment stipulated that after December 31, 1998 universities had to provide educational programs of adequate quality in several disciplines.

Finally, on January 1, 2000 the University of Debrecen was established with the integration of the Agricultural University of Debrecen, the Medical University of Debrecen, Lajos Kossuth University, and the István Wargha Teacher Training College of Hajdúböszörmény. The university having an important role and position in Hungarian higher education started its operation with five university and three college faculties organized into three centers, the Center for Agricultural and Applied Economic Sciences, the Medical and Health Science Center, and the Center of Arts and Sciences.

Section 26 of Act CCIII of 2013 on the amendment of particular acts establishing the central budget of Hungary for 2014 included provisions concerning the organizational structure of the university, thus the centers were no longer used as organizational units as of January 1, 2014.

Today the University of Debrecen is a leading and prominent institution of higher education in Hungary. It is not only at the forefront of Hungarian and international education but also active in the fields of research, innovation and development, and enjoys fruitful links with the business sector. The ever-changing social and economic environment demands continuous renewal from the institution and there is a constant need to adapt to new requirements. The University of Debrecen’s mission is to contribute to the education of future generations in cooperation with Hungarian and international partners, with high-quality interdisciplinary programs, and research built on versatile and practical experience.

Besides education, the institution also provides European-quality patient care with comprehensive services to fulfil its obligations in the city, county, and region and often on the national level as well. As of July 1, 2017, with the merger of the Kenézy Gyula Hospital and Clinic, the University of Debrecen Kenézy Gyula Teaching Hospital was established, expanding the capacities of the institution both in patient care and education.

**HISTORY OF THE FACULTY**

The Great Plain and, more broadly, the Tisza River Basin is the center of Hungary's agri-food economy. That is why it was a logical decision from our predecessors to have a higher education and research center in the region to support the production and processing of raw materials, which helps to create and maintain a competitive agriculture by continuously providing qualified human resources and putting scientific results into practice.

In Eastern Hungary, agricultural higher education started in 1868 with the establishment of the Debrecen National Higher School of Economics. Between 1874 and 1906, the institution operated as the Secondary School of Economics, and until 1944 under the name of the Royal Hungarian Academy of Economics. Between 1945 and 1949, our institution operated under the name of the Debrecen Department of the Hungarian University of Agricultural Sciences, Faculty of Agricultural Sciences. In 1953, training resumed at the Debrecen Agricultural Academy. Between 1962 and 1970, specialist training rose to university level at the College of Agricultural Sciences. Between 1970 and 1999, the institution received the “university rank”, the University of Agricultural Sciences in Debrecen served two rural faculties (Szarvas, initially Hódmezővásárhely, later Mezőtúr).

On January 1, 2000, the University of Debrecen was established with five university faculties, three college faculties and three research institutes. The Faculty of Agricultural Economics and Rural Development was established in 2002 and by 2006 the number of faculties of the University had increased to 15. The Faculty of Agriculture, Food Science and Environmental Management (MÉK) and the Faculty of Economics and Rural Development (GVK), as well as three research institutes, formed the Center for Agricultural and Management Sciences (AGTC) until 2014.

# **ADMINISTRATION UNITS FOR INTERNATIONAL PROGRAMMES**

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The Coordinating Centre for International Education supports the international degree programmes of the University of Debrecen in giving new students information on admission and entrance exam. It has tasks in promoting and is in charge of tasks like enrolment, study contracts, modifying student status or degree programme, activating student status, modifying students’ personal data, requesting and updating student cards, providing certificates for the Immigration Office (for residence permit), issuing student status letters and certificates on credit recognition, concluding health insurance contract and providing Health Insurance Card, helping students with visa process application.

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The International Office has been functioning since 2014 in order to ensure the smooth running of the international degree courses. The office is responsible for student administration (full-time students, full-time transfer students, visiting/Erasmus students), providing certificates for students, considering and accepting requests, solving problems related to course registration, giving information about internship, final exam, thesis, etc.

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[**Institute of Animal Science, Biotechnology and Nature Conservation**](http://www.agr.unideb.hu/etk/xsearch.php?optLang=en&lstDep=22240)

[Department of Animal Husbandry](http://www.agr.unideb.hu/etk/xsearch.php?optLang=en&lstDep=22245)

Agricultural Genomics and Biotechnology Center, Animal Genomics Research Team

Department of Animal Nutrition and Food Biotechnology

[Department of Nature Conservation, Zoology and Game Management](http://www.agr.unideb.hu/etk/xsearch.php?optLang=en&lstDep=22247)

[**Institute of Crop Sciences**](http://www.agr.unideb.hu/etk/xsearch.php?optLang=en&lstDep=22210)

Department of Applied Plant Biology

Department of Crop Production, Applied Ecology and Plant Breeding

[**Institute of Food Science**](http://www.agr.unideb.hu/etk/xsearch.php?optLang=en&lstDep=22209)

**Institute of Food Technology**

[**Institute of Horticulture**](http://www.agr.unideb.hu/etk/xsearch.php?lstDep=22250)

[**Institute for Land Use, Engineering and Precision**](http://www.agr.unideb.hu/etk/xsearch.php?optLang=en&lstDep=22203) **Farming Technology**

Department of Agricultural Engineering and Robotics

Department of Land Use

Department of Precision Technology

**Institute of Nutrition**

[**Institute of Plant Protection**](http://www.agr.unideb.hu/etk/xsearch.php?optLang=en&lstDep=22211)

[**Institute of Water and Environmental Management**](http://www.agr.unideb.hu/etk/xsearch.php?optLang=en&lstDep=22214)

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# **INSTITUTE OF HORTICULTURE**

138, Böszörményi str., Debrecen H-4032, Tel: +36-52-508-444 / 88146

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# [**INSTITUTE FOR LAND USE, ENGINEERING AND PRECISION**](http://www.agr.unideb.hu/etk/xsearch.php?optLang=en&lstDep=22203) **FARMING TECHNOLOGY**

# **Department of Agricultural Engineering and Robotics**

# **Department of Land Use**

# **Department of Precision Technology**

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| Dr Hagymássy Zoltán,  Associate Professor | [hagymassy@agr.unideb.hu](mailto:hagymassy@agr.unideb.hu)  room 5, building E |
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**INSTITUTE OF NUTRITION**

138, Böszörményi str., Debrecen H-4032, Tel: +36-52-508-444 / 88433

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| Dr Péter Sipos  Professor | [siposp@agr.unideb.hu](mailto:siposp@agr.unideb.hu)  room V8, building D |
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# **INSTITUTE OF PLANT PROTECTION**

138, Böszörményi str, Debrecen H-4032, Tel: +36-52-508-444 / 88146

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**AGRICULTURAL LABORATORY CENTRE**

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| Dr Szilvia Kovács  Assistant Research Fellow | [kovacs.szilvia@agr.unideb.hu](mailto:kovacs.szilvia@agr.unideb.hu)  basement, building K-L |

**INSTITUTE OF WATER AND ENVIRONMENTAL MANAGEMENT**

138, Böszörményi str., Debrecen H-4032, Tel: +36-52-508-444 / 88146

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| Nikolett Kiss  Assistant Lecturer | [kiss.nikolett@agr.unideb.hu](mailto:kiss.nikolett@agr.unideb.hu)  room 18, building N |
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**ACADEMIC CALENDAR**

# General structure of the academic year:

|  |  |  |  |
| --- | --- | --- | --- |
| Fall semester | 1st – 2nd week | Registration\* | 2 weeks |
| 1st – 14th week | Study Period  for non-graduating students | 14 weeks |
| 1st – 9th week | Study Period  for graduating students | 9 weeks |
| directly after the study period | Exams for non-graduating students | 7 weeks |
| directly after the study period | Exams for graduating students | 3 weeks |
| Spring semester | 1st – 2nd week | Registration\* | 2 weeks |
| 1st – 14th week | Study Period  for non-graduating students | 14 weeks |
| 1st – 10th week | Study Period  for graduating students | 10 weeks |
| directly after the study period | Exams for non-graduating students | 7 weeks |
| directly after the study period | Exams for graduating students | 5 weeks |

**ACADEMIC CALENDAR OF THE FACULTY OF AGRICULTURAL AND FOOD SCIENCES AND ENVIRONMENTAL MANAGEMENT**

The academic calendar for the given semester can be found on the faculty's website: https://www.edu.unideb.hu/tartalom/downloads/University\_Calendars\_2022\_23/University\_calendar\_2022-2023-Faculty\_of\_Agricultural.pdf?\_ga=2.136620661.41633129.1657530581-1615460094.1657530581

# **THE ANIMAL HUSBANDRY ENGINEERING GRADUATE PROGRAM**

INTRODUCTION OF THE PROGRAM

|  |  |
| --- | --- |
| Name of graduate program: | Animal Husbandry Graduate Program |
| Level: | MSc |
| Qualification: | Animal Husbandry Engineer |
| Mode of attendance: | Full-time |
| Faculty: | Faculty of Agricultural and Food Sciences and Environmental Management |
| Program coordinator: | István Komlósi, professor |
| Program length: | 4 semesters |
| Credits total: | 120 credits |

The MSc in Animal Science is designed to develop your undergraduate knowledge and improve it through application and research. The field of Animal Science is broad and the program reflects this diversity, with emphasis on Physiology, Nutrition and Genetics. Gene Conservation, Functional Food and Molecular Biology are the key research areas of the Institute. Throughout your stay at Debrecen University, which is the second largest university in Hungary, with 30 000 students, as a postgraduate student of Animal Science, you will have a personal academic tutor to guide you through your studies and to meet your individual goals and interests. We also offer you a 4-week field practice in summer.

**Main subjects** typically include (this list is indicative and subject to change): Applied Genetics, Physiology of Production Traits, Informatics and Computing, Applied Biochemistry, Microbiology, World Animal Husbandry, Aquatic Ecology and Hydrobiology, Livestock Judging, Fodder and Food Chemistry, Reproductive Biology, Biometry, Cytogenetics, Molecular Genetics in Animal Breeding, Animal Nutrition, Feed Preparation, Processing, Mixing and Trading, Ecological Management of Animals, Inland Fisheries Management, Recording and Breeding Programs, Management, Molecular Genetics in Animal Breeding, Application of Biotechnology in Animal Breeding, Feed Analysis, Food Safety, Quality and Auditing, Scientific Writing, Meat and Milk Processing, Nutrition Therapy, Organisation of Breeding, Sectoral Economics and Planning, Management of Local Genetic Resources, Thesis.

Internship, practice: Students should complete a 4-week summer field practice.

Career prospects: Postgraduates may progress to a PhD or find employment in animal science research, lecturing, consultancy or other science-based sectors of the animal science industry.

**COURSE DESCRIPTIONS FOR ANIMAL HUSBANDRY ENGINEERING MSC**

The order of subjects in alphabetical order.

|  |
| --- |
| [Academic Language Skills, MTMAL7NY1](file:///\\193.6.128.21\sites\default\files\upload_documents\mtm7ny1a_1.docx) |
| Advanced Molecular Genetics, MTMAL7030A |
| [Animal Farm Technologies, MTMAL7012A](file:///\\193.6.128.21\sites\default\files\upload_documents\animal_farm_technologies.docx) |
| [Animal Genetics, MTMAL7001A](file:///\\193.6.128.21\sites\default\files\upload_documents\animal_genetics.docx) |
| [Animal Husbandry, MTMAL7009A](file:///\\193.6.128.21\sites\default\files\upload_documents\animal_husbandry.docx) |
| Animal Nutrition, MTMAL7007A |
| [Animal Reproduction, MTMAL7005A](file:///\\193.6.128.21\sites\default\files\upload_documents\animal_reproduction.docx) |
| [Animal Welfare and Administration, MTMAL7021A](file:///\\193.6.128.21\sites\default\files\upload_documents\animal_welfare_and_administration.docx) |
| [Applied Chemistry, MTMAL7003A](file:///\\193.6.128.21\sites\default\files\upload_documents\applied-chemistry.docx) |
| [Aquaculture, MTMAL7024A](file:///\\193.6.128.21\sites\default\files\upload_documents\aquaculture.docx) |
| [Beekeeping, MTMAL7019A](file:///\\193.6.128.21\sites\default\files\upload_documents\beekeeping.docx) |
| [Disease Control, MTMAL7020A](file:///\\193.6.128.21\sites\default\files\upload_documents\disease_control.docx) |
| [Ecological Management of Farm Animals, MTMAL7026A](file:///\\193.6.128.21\sites\default\files\upload_documents\ecological_management_farm_animals.docx) |
| [Economy of Livestock Enterprises, MTMAL7022A](file:///\\193.6.128.21\sites\default\files\upload_documents\economy_of_livestock_enterprises.docx) |
| [Feeds and Feed Processing, MTMAL 7029A](file:///\\193.6.128.21\sites\default\files\upload_documents\feeds_and_feed_processing.docx) |
| [Fish Breeding, MTMAL7016A](file:///\\193.6.128.21\sites\default\files\upload_documents\fish_breeding.docx) |
| [Fodder Plant Production, MTMAL 7006A](file:///\\193.6.128.21\sites\default\files\upload_documents\fodder_plant_production.docx) |
| [Food Marketing, MTMAL7017A](file:///\\193.6.128.21\sites\default\files\upload_documents\food-marketing.docx) |
| [Food Quality and Food Chain Safety, MTMAL7011A](file:///\\193.6.128.21\sites\default\files\upload_documents\food_quality_and_food_chain_safety.docx) |
| Management of Livestock Farms, MTMAL 7023A |
| [Milk and Meat Processing, MTMAL7013A](file:///\\193.6.128.21\sites\default\files\upload_documents\milk_and_meat_processing.docx) |
| [Molecular Genetics and Proteomics, MTMAL7014A](file:///\\193.6.128.21\sites\default\files\upload_documents\molecular_genetics_and_proteomics.docx) |
| [Nutrition and Product Quality, MTMAL7031A](file:///\\193.6.128.21\sites\default\files\upload_documents\nutrition_and_product_quality.docx) |
| [Organization of Breeding, MTMAL7010A](file:///\\193.6.128.21\sites\default\files\upload_documents\organisation_breeding.docx) |
| [Pasture Management and Grazing, MTMAL7008A](file:///\\193.6.128.21\sites\default\files\upload_documents\pasture_management_and_grazing.docx) |
| [Physiology of Production Traits, MTMAL7002A](file:///\\193.6.128.21\sites\default\files\upload_documents\physiology_of_production_traits.docx) |
| [Planning of Animal Farms, MTMAL7015A](file:///\\193.6.128.21\sites\default\files\upload_documents\planing_of_animal_farms.docx) |
| [Professional Language Skills, MTM7NY2A](file:///\\193.6.128.21\sites\default\files\upload_documents\mtm7ny2a_1.docx) |
| [Research methods, Biometry, MTMAL7004A](file:///\\193.6.128.21\sites\default\files\upload_documents\resarch_methods_biometry.docx) |
| [World Animal Husbandry, MTMAL7018A](file:///\\193.6.128.21\sites\default\files\upload_documents\world_animal_husbandry.docx) |

**Academic Language Skills, MTM7NY1A**

ECTS Credit Points: 3

0 hour(s) lecture and 28 hour(s) seminar per semester

Type of exam: practical course mark

Requirements:

- for signature: Absence as regards class attendance (3 allowed absences per semester).

- for a grade: Continuous tests orally and written. A term mark to be given at the end of the semester.

**Summary of content - theory**:

To provide students with the knowledge and the skills with which they can confidently and effectively complete their courses. The students get to know the basic grammatical and stylistic requirements and peculiarities of the written genres in higher education, as well as acquire the essential structural and linguistic formulas of debate and sharing of opinions.

**lectures:**

|  |
| --- |
| Effective source handling (information filtering and evaluation) |
| The purpose, audience, and structure of the writing assignment |
| The most important form requirements of writing assignments (report, thesis, academic article) |
| Punctuation usage |
| Structure, paragraphs, and conjunctions |
| The abstract and the introduction |
| Midterm exam |
| Clear, logically constructed expression of opinion |
| Constructive debate, reasoning (support of the argument), counter-arguments |
| Brief problem-solving exercises in the foreign language to improve debate skills |
| Complex case studies Part 1 |
| Complex case studies Part 2 |
| Sources and possibilities of independent study |
| End term, Evaluation |

**practices:**

|  |
| --- |
| Academic writing, speaking, reading comprehension and listening comprehension |
| Academic vocabulary building, writing, speaking listening and reading comprehension |
| Presentation skills, reading comprehension and listening comprehension, academic writing |
| Developing academic literacy, speaking, reading and listening comprehension, |
| Speaking and presenting,, reading comprehension and listening comprehension tasks, and academic writing. |
| The situational dialogues, reading comprehension and listening comprehension tasks, and writing a formal letter regarding a given topic |
| A survey of the skills and knowledge acquired thus far |
| Poster and presentation, reading comprehension and listening comprehension tasks, and academic writing. |
| Effective presentation, reading comprehension and listening comprehension tasks, and academic writing |
| Time management, critical thinking, reading comprehension and listening comprehension tasks, and writing essays. |
| Presentation, reading comprehension and listening comprehension tasks, and academic writing |
| Speaking and presentation, reading comprehension and listening comprehension tasks, and academic writing |
| Essay writing, speaking, reading comprehension and listening comprehension |
| A survey of the skills and knowledge acquired throughout the semester |

**Literature**

[Martin Hewings](http://www.cambridge.org/gb/cambridgeenglish/authors/martin-hewings): Cambridge Academic Skills B2 Upper Intermediate. CUP, 2012. ISBN 97 80521165204

REID, Joy M. *The Process of Composition.* 3rd Edition. Longman: White Plains, NY., 2000. ISBN: 0-13-021317-9.

WIWCZAROSKI, Troy B. *Writing and Professional Communication*. Debrecen, 2007.

**Advanced Molecular Genetics, MTMAL7030A**

ECTS Credit Points: 3

28 hour(s) lecture and 14 hour(s) seminar per semester

Type of exam: written exam

Requirements:

- for 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.

- for a grade: written exam

**lectures:**

1. Introduction to animal husbandry
2. DNA, RNA
3. Rules of heritage
4. Genomes
5. Main genome projects
6. Genes
7. Genetic markers-methods I.
8. Genetic markers-methods II.
9. Genetic markers-methods III.
10. Genetic markers-methods VI.
11. Genetic markers-methods V.
12. Genetic markers-methods VI.
13. Genetic markers-methods VII.
14. General use of bioinformatic tools

**Literature**

Genetics and analysis of quantitative traits/ Lynch, Michael; Walsh, Bruce. 1998: Sinauer Associates, Inc.

Falconer, D.S.: Introduction to quantitative genetics. Prentice Hall, New York, 1996.

Geoff Simm: Genetic Improvement of Cattle and Sheep, CABI Publishing. 2002

Laurie Piper, Anatoly Ruvinsky. The Genetics of Sheep, CABI Publishing. 1997.

**Animal Farm Technologies MTMAL7012A**

ECTS Credit Points: 3

28 hour(s) lecture and 14 hour(s) seminar per semester

Type of exam: written exam

Requirements:

- for 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. The farm visits will be on a pre-agreed time with the farm managers, the students will be informed in advance about the timing. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Active participation is evaluated by the teacher. If a student’s behavior or conduct doesn’t meet the requirements of active participation, the teacher may evaluate his/her participation as an absence because of the lack of active participation in class.

Completing assignments / exercises, submitting essay.

- for a grade: The minimum requirement for the end-term tests is 40%. Based on the score of the tests separately, the grade for the tests is given according to the following table:

Score Grade

0-39 % : fail (1)

40-52 %: pass (2)

52-63%: satisfactory (3)

64-71%: good (4)

72-80%: excellent (5)

If the score of the sum of the test is below 40, the student once can take a retake test of the whole semester material.

**Summary of content - theory**

To provide students with the knowledge and the skills with which they can confidently and effectively complete their courses. The students get to know the basic grammatical and stylistic requirements and peculiarities of the written genres in higher education, as well as acquire the essential structural and linguistic formulas of debate and sharing of opinions.

**lectures:**

1.: Agriculture sustainability and intensive production practice

*2.-3.:* The control of homeostasis: endocrine system.

4.: The stress: interaction of the farm animal and the environment of production

5.-6..: Dairy cattle farming technology

7.-8.: Beef farming technology

9-10.: Pig farming technology

11.-12.: Sheep farming technology

13.: Poultry farming technology

14.: Horse farming technology

**practices:**

Skills to be learnt:

1-2: Farm visit – Horse farm

3-5: Farm visit- Dairy cattle farm

6-9: Farm visit: Duck farm

10-12: Farm visit: Beef cattle farm

13-14: Farm visit: Sheep farm

**Literature**

Aland A.- Madec F. (2017): Sustainable animal production. Wageningen Academic Publishers. ISBN:978-90-8686-099-9

Gordon I. (2017): Reproductive technologies in farm animals. 2.nd edition CABI.ISBN: 978-1-78064-603-9

O.Reece W. (1997): Physiology of Domestic Animals. Second edition. Lippincott Williams and Wilkins. ISBN:0-683-07240-4

David Tilman et.al: Agricultural sustainability and intensive production practices NATURE | Vol 418 | 8 August 2002 | [www.nature.com/nature](http://www.nature.com/nature)

FAO (2018): The state of food and agriculture ISBN 978-92-5-130568-3 <http://www.fao.org/3/I9549EN/i9549en.pdf>

**Animal Genetics MTMAL7001A**

ECTS Credit Points: 4

28 hour(s) lecture and 14 hour(s) seminar per semester

Type of exam: practical course mark

Requirements:

- for signature: Completing assignments / exercises, the presence on 2/3-rd of the classes, active participation in group discussion.

- for a grade: Monitoring the progress, mid-term paper, final practical mark.

**Summary of content – theory**

The course is built on the Mendelian and population/quantitative genetic knowledge of the students. During this course students extend their knowledge in quantitative genetics of livestock populations bearing in mind that we work with biological organism but approach them from a mathematical point of view. The student will know how to define the breeding goal and find individuals in the population to fulfil that goal, how to mate them and predict the selection response.

**lectures:**

1. Genetic disorders, major genes, application of major genes in selection programs
2. Genetic imprinting
3. Genotype-environment interaction
4. Breeding objectives and performance testing
5. Resemblance between relatives, inbreeding
6. Genetic parameters
7. Selection index I.
8. Selection index II.
9. Best Linear Unbased Prediction. I
10. Best Linear Unbased Prediction. II.
11. Selecting for threshold traits
12. Selection response
13. Crossing systems
14. Conservation genetics, rare breeds

**Summary of content - practice:**

The students will acquire the practical application skills in dealing with large and small livestock population. They will apply standard computer programs to detect similarities and dissimilarities between individuals and populations. The teacher first demonstrate the solutions then individual and group tasks will be given to improve the student’s computational and communications skills. Simulation programs and real examples will be presented. Students will understand the modern genetic knowledge that is needed to design animal breeding programs; Familiar with the modern animal breeding technologies; become committed to objective approach of animal science; Able to choose the relevant breeding strategies. Able to find literature in the topic and critically analyse it.

**practices:**

# 1. Genetic disorders, major genes, application of major genes in selection programs

# 2. Genetic imprinting, epigenetics

# 3. Genotype-environment interaction (GxE)

# 4. Breeding objectives and performance testing

# 5. Resemblance between relatives, inbreeding

6. Genetic parameters

# 7.-8. Selection Index

9-10. Best Linear Unbiased Prediction

11. Selecting for threshold trait

12. Selection response

13. Crossing systems

14. Conservation genetics, rare breeds

**Literature:**

Falconer, D.S. 2017. Introduction to Quantitative Genetics. 4th ed. Longman Scientific and Technical. ISBN-13: 978-0582243026

Mrode, R.A. 2005. Linear Models for the Prediction of Animal Breeding Experiments. CAB International. ISBN 0851990002

Lynch, M., Walsh, B. 1998.Genetics and Analysis of Quantitative Traits. Sinauer Associates. ISBN 978-0878934812

Kaps, M., Lamberson, W. ( 2009) Biostatistics for Animal Science. An introductory text. 2nd ed. CABI. ISBN 978-1-84593-540 5

**Animal Husbandry, MTMAL7009A**

ECTS Credit Points: 4

28 hour(s) lecture and 14 hour(s) seminar per semester

Type of exam: written exam

Requirements:

- for 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.

- for a grade: Completing exercises, giving presentation. Written exam.

**Summary of content – theory**

The aim of the subject is to teach the genetics and applied technologies of animal production. The large-scale production systems with livestock species is in the focus. Cattle, sheep, swine and poultry housing, feeding, breeding will be discussed during the lectures. Animal performance, factors influencing product quantity and quality are included in the studies of each species.

**lectures:**

1. Importance of livestock production
2. Characteristics of animal products, animal growth
3. Factors influencing meat production
4. Factors influencing milk production
5. Dairy cattle: breeds, nutrition
6. Dairy cattle: housing, reproduction, milking
7. Beef cattle: breeds
8. Beef cattle: housing, nutrition, production
9. Sheep: breeds
10. Sheep: grazing, feeding, reproduction
11. Swine: housing, feeding, breeds
12. Swine: reproduction, fattening and product
13. Poultry: egg production with layers
14. Poultry: meat production with broilers

**Summary of content - practice:**

Students will see animal feeding, housing, breed selection and management of different livestock farms. Several breeds will be shown to students at livestock exhibition.

**practices:**

1. Beef cattle farm – housing, nutrition, selection for breeding
2. Beef cattle farm – housing, nutrition, selection for breeding
3. Beef cattle farm – housing, nutrition, selection for breeding
4. Beef cattle farm – housing, nutrition, selection for breeding
5. Dairy farm – housing, feeding, milking parlour
6. Dairy farm – housing, feeding, milking parlour
7. Dairy farm – housing, feeding, milking parlour
8. Livestock exhibition
9. Livestock exhibition
10. Livestock exhibition
11. Livestock exhibition
12. Livestock exhibition
13. Livestock exhibition
14. Livestock exhibition

**Literature, handbooks**

R. E. Taylor eds. (2014): Scientific Farm Animal Production. 10th Edition. Pearson Education Limited, England. 1-647.

A. Aland, T. Banhazi eds. (2013): Livestock housing. Modern management to ensure optimal health and welfare of farm animals. Wageningen academic Publishers. 1-491.

**Animal Nutrition, MTMAL7007A**

ECTS Credit Points: 4

28 hour(s) lecture and 14 hour(s) seminar per semester

Type of exam: written exam

Requirements:

- for signature: The presence on 2/3-rd of the classes (in both cases: theoretical lesson and practice), In practice: accepted two self-made diet formulations .

- for a grade: Written exam: 10 comprehensive questions to be answered.

**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.

The aim of the course is to present the latest animal nutrition knowledge based on the scientific findings of the above mentioned associated sciences.

**lectures:**

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**:

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.

**practices:**

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**

Moughan, P.J., Verstegen, M.W.A., Visser-Reyneveld, M.I. (Eds) 2000. Feed Evaluation: Principles and Practice. Wageningen Pers, Wageningen, the Netherlands.

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.

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.

Babinszky, L., Bársony. P. 2013. Animal Nutrition. University Lecture Note.

University of Debrecen, Hungary.

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.

**Animal reproduction MTMAL7005A**

ECTS Credit Points: 3

28 hour(s) lecture and 0 hour(s) seminar per semester

Type of exam: Oral exam

Requirements:

- for signature: Presence at seminars. Students can be absent twice.

- for a grade: Oral exam

**lectures:**

1. Introduction of animal reproduction in mammals
2. Introduction of domestic animal reproduction
3. Attainment of puberty in females, ovarian development
4. Cyclic reproductive function of domestic mammals
5. Reproductive function of males, development and structure of sperm cells
6. Process of in vivo fertilization
7. Early and late embryonic development
8. Reproduction of cattle
9. Reproduction of small ruminants
10. Reproduction of the pig
11. Biotechnology in reproductive management
12. Necessary reproductive performance for profitable farm management

**practices:**

1. Introduction of on farm reproductive management
2. Introduction of different on farm mating methods
3. General introduction of artificial insemination
4. Rearing of breeding animals (gilts, heifers...)
5. Heating detection
6. Stimulation and synchronization of estrous
7. Basics of artificial insemination in cattle
8. Basics of artificial insemination in small ruminants
9. Basics of artificial insemination in pig
10. Control of pregnancy
11. Control of parturition
12. Neonatal problems and management

**Literature:**

Philip Senger: Pathways to Pregnancy and Parturition (2017)

Ronal H.F. Hunter: Reproduction of Farm Animals (1982)

D.J.A. Cole & G.R. Foxcroft: Control of Pig Reproduction (2013)

**Animal Welfare and Administration, MTMAL 7021A**

ECTS Credit Points: 3

28 hour(s) lecture and 0 hour(s) seminar per semester

Type of exam: written or oral exam

Requirements:

- for signature: Taking part in at least 70% of the lectures, PPT presentation

- for a grade: Oral exam

**Summary of content – theory**

The aim of the subject is to teach students about the most important information on farm and companion animals’ welfare, the assessment of well-being and its impact on production. The administration system of animal health, the most important legislation details and organizations are essential to protect animal and human health in the food chain.

**lectures:**

1. Aim of animal welfare, ethical status and rights of animals.
2. History and trends of animal welfare
3. Animal protection acts in Hungary and in the European Union
4. Hungarian and international animal welfare organizations
5. Assessment of animal well-being.
6. Animal welfare’s relationship with other disciplines.
7. Actual questions of animal welfare
8. Organization of animal health administration system.
9. Legislation in animal health and welfare in Hungary
10. Legislation in animal health and welfare in the EU
11. Legislation in animal health and welfare in the world
12. PPT presentations
13. PPT presentations
14. Consultation

**Literature:**

Presentations

EU laws and decrees

**Applied Chemistry, MTMAL7003A**

ECTS Credit Points: 4

28 hour(s) lecture and 28 hour(s) seminar per semester

Type of exam: Oral and/or written

Requirements:

- for signature: Attendance at lectures is not compulsory, but highly recommended! Participation at practice is compulsory. Attendance both at lectures and practice classes will be recorded by the teacher. Being late is counted as an absence. Tolerable maximal absence rate is 30 %. In case of further absences, a medical certificate needs to be presented.

In the frame of practice, as an individual activity, all of the students have to complete and present to the other students two power point presentations. The theme of it will be jointly decided by the student and the lecturer. Form and content of presentations will be discussed by the group members, and will be accepted or denied. The denied presentation must be repeated. Requirement to get signature is, two accepted .ppt-presentations.

- for a grade: Oral (preferred) and/or written

**Summary of content - theory:**

Main goal is to deepen chemical knowledge such as groups of bio-macromolecules and their roles, detailed mechanisms of reactions in animal and human organisms. Strengthen the basics of physiological processes. The main differences between biomolecules and inorganic compounds, the role of bio-catalysers (enzymes), vitamins and hormones will be discussed. Main chemical processes of fixing electromagnetic radiations by plants, as the basics of the life, groups of energy collecting and storing compounds, biosynthesis and decomposition of polysaccharides, lipids and proteins, Szent-Györgyi – Krebs cycle, Krebs–Henseleit-cycle, glyoxylic cycle and their energy balance will be introduced. Understanding signal- and regulation mechanisms of living organisms at an advanced level will be part of the course.

**lectures:**

1st week: Object of applied chemistry, the relationship of biochemistry with other sciences. Major features components and structures of living organisms. Role of water and inorganic ions in biological systems. Molecular organization of the living cells, comparison of biomolecules with the molecules of lifeless nature

2nd week: Main organic compounds and their monomers I.: Carbohydrates. Mono-, di- and oligosaccharides. Reducing and non-reducing disaccharides. Lactose intolerance: reason, symptoms and healing

3rd week: Main organic compounds and their monomers II. Proteins. Alfa-amino acids, their structure and functional groups. Chirality of amino acids. Essential, conditionally essential and non-essential amino acids

4th week: Main organic compounds and their monomers IV.: Nucleic acids. Nucleobases, nucleotides. Deoxyribonucleic acid (DNA). Ribonucleic acids (RNA) and their role – messenger ribonucleic acids (mRNA), transfer ribonucleic acids (tRNA), ribosomal ribonucleic acids (rRNA). Nucleoside triphosphates (ATP, UTP, GTP)

5th week: Vitamins – Reference Daily Intake (RDI). Hypervitaminosis, hypovitaminosis and avitaminosis. Sources of vitamins. Antivitamins – avidin in the row eggs.

6th week: Hormones of the pancreas. Hormones of the ovary. Hormones of the testes. Tissue hormones: Gastrointestinal hormones. Plant growth stimulating and retarding hormones (phytohormones)

7th week: Metabolic processes. The connection of the living beings and their environment. The connection of the photosynthesising- and the heterotrophic living beings, the biological cycles of C, H, O and N. Carbohydrate metabolism. The biosynthesis of carbohydrate of the photosynthesising organisms

8th week: The „direct oxidation” of the glucose (The pentose phosphate pathway). Fermentation processes, the pathways of fermentation. Alcoholic fermentation, lactic acid fermentation. The processes taking place in the stomach of ruminants

9th week: Glycogen metabolism (synthesis, breakdown). Cori-cycle (Lactic acid cycle). The biosynthesis of fatty acids. The synthesis of the glycerol. The synthesis of triglycerides. The biosynthesis of phosphor-glycerides. The biosynthesis of carotenoids and steroid skeleton lipids

10th week: Ketogenesis. The catabolism of steroids. The cholesterol, bile acids. Carbohydrate synthesis from lipids: glyoxylate cycle

11th week: The biosynthesis of protein. The transcription processes. The translation (initiation, elongation, termination). Biosynthesis of essential amino acids. The biosynthesis of threonine and methionine

12th week: The fate of proteins put on by diet in the heterotrophic living beings. The nutritional quality of protein. Biological value (BV), Chemical score, Net protein utilization (NPU), Protein efficiency ratio (PER), Protein digestibility

13th week: Protein turnover. Nitrogen secretion of mammals. Synthesis of urea (carbamide). Krebs–Henseleit-cycle. Nitrogen secretion of birds and reptiles. Synthesis of uric acid. Disturbances of amino acid metabolism, phenylketonuria (PKU). Some hereditary amino acid metabolisms disturbance. Disorders of nucleic acid metabolism. The biochemical bases of the function of skeletal muscle

14th week: Fermentation. The application of the fermentation in the food industry. The biochemical processes of the germination of cereals. The steps of the germination. Cellular respiration. The respiration of fruits and vegetables. The ripening of the fruits

**Summary of content - practice:**

Deepening theoretical knowledge by solving some practical exercises, discussing the lectures’ material. Basic practical knowledge on the really wide range of possibilities of the Applied Chemistry.

**practices:**

1st week: Molecular organization of the living cells, classification of the living beings according to a metabolism type

2nd week: Structure, shape, digestibility and main physiological role of polysaccharides: starch, cellulose and glycogen

3rd week: Main organic compounds III.: Lipids. Essential and conditionally essential fatty acids, omega-3 fatty acids. Structure and role of vaxes, triglycerides, phospholipids, sphingolipids and glycolipids. Steroid compounds

4th week: Bioactive compounds I.: Vitamins. Lipid-soluble vitamins (vitamins A, D, E, K). Water soluble vitamins (vitamins B1, B2, B3, B5, B6, B9, B12, H, C)

5th week: Bioactive compounds II.: Hormones. Role of hormones. Hormones of hypophyzis. Hormone of pineal gland: Melatonin. Hormones of thyroid gland. Parathyroid hormone. Hormones of the adrenal gland. Hormones of the adrenal cortex. Hormones of the adrenal medulla

6th week: Bioactive compounds III.: Bio-catalysers. Role and structure of enzymes. Factors influencing enzyme activity: activators, inhibitors and destructors, temperature, pH-values, enzyme and substrate concentrations

7th week: The light-dependent reactions (Hill-reaction). The dark reactions (Calvin-cycle). Catabolic processes, Carbohydrate catabolism. The breakdown stages of glycose

8th week: The fate of absorbed volatile fatty acids. Gluconeogenesis. The backward pathway of the glycolysis

9th week: The breakdown of lipids. The ß-oxidation of saturated fatty acids. Pathway for catabolism of odd-numbered fatty acid carbon chain. Energy yield from fatty acid oxidation

10th week: The metabolism of protein. The nitrogen uptake by plants. Biological nitrogen fixation. Nitrate reduction in the plant. Incorporation of ammonium ion. The origin of the carbon backbones of the amino acids. Transamination

11th week: The biosynthesis of lysine, arginine, leucine, isoleucine, valine, phenylalanine tryptophan and histidine

12th week: The balance of proteins. Lack of protein in nutrition. The digestion of proteins. What is the function of protease? The common features of amino acid degradation pathways. Biogenic amines and their functions

13th week: Factors influencing the quantity and quality of urine. Ion exchange in the tubules of kidneys. The gastric juice and separation. The mechanism of the hydrochloric acid production of the stomach. The essence of Davenport theory of gastric acid production

14th week: Non enzymatic browning (NEB). Enzymatic browning (EB). The biochemistry of meat ripening. The influence of the ripening processes of the meat. The processes in the muscular tissue after slaughtering. The influence of the ripening processes of the meat. Changes of colour through the meat processing

**Literature, handbooks in English**

*Compulsory literature:*

Klaus Urich (1994): Comparative Animal Biochemistry. Springer Verlag, Berlin, Heidelberg. ISBN-13: 978-3-642-08181-1. doi.org/10.1007/978-3-662-06303-3

*Optional literature:*

Klaus Urich (1990): Vergleichende Biochemie der Tiere. Gustav Fischer Verlag, Jena. ISBN-13: 978-3437204401

**Aquaculture, MTMAL7024A**

ECTS Credit Points: 3

28 hour(s) lecture and 14 hour(s) seminar per semester

Type of exam: Oral or written exam

Requirements:

- for signature: Completion of the assignments / exercises and submission of essays on practical topics.

- for a grade: Oral or written exam

**Summary of content**

Course objectives: to provide theoretic information on semi-intensive, intensive and integrated aquaculture systems and technologies including key species, fish biology, technologies, feeding, and economics.

**lectures:**

1. Current status and tendencies in aquaculture
2. Aquatic resources
3. Fish species of aquaculture
4. Water management in aquaculture
5. Hydrobiology and plankton management
6. Fish biology propagation and larvae management
7. Pond management
8. Feeding and nutrition
9. Cage aquaculture
10. Recirculating aquaculture
11. Integrated multitrophic aquaculture
12. Multifunctional aquaculture
13. Aquaculture economics
14. Business planning in aquaculture

**Summary of content - practice:**

information will be provided for the practical application of theoretic skills. The essays, calculations, plans to be submitted are closely related to the topics below.

**practices:**

1. Basics of construction design and calculations for a pond farm
2. Plankton sampling, evaluation and calculations of plankton yield
3. Propagation and larvae rearing of selected freshwater fish species
4. Feed design and formulation
5. Design plan of a cage aquaculture farm
6. Design plan of a recirculating aquaculture farm
7. Design plan of an integrated multitrophic aquaculture farm
8. Management plan of a pond farm
9. Management plan of an intensive aquaculture system
10. Business plan of a conventional aquaculture enterprise (pond farm or intensive system)
11. Business plan of a multifunctional aquaculture enterprise
12. Business plan of an integrated aquaculture enterprise

**Literature, handbooks**

FAO (2016): The State of World Fisheries and Aquaculture 2016. Contributing to food security and nutrition for all. Rome. 200 pp.

Boyd, C.E., Lim, C., Queiroz, J., Salie, K., de Wet L., McNevin, A. (2012): Best Management Practices for Responsible Aquaculture. Aquaculture Collaborative Research Support Program [ACRSP]

Burke, D., Goetze, B., Clair D., Egna H. (1996): Pond Dynamics/Aquaculture. Collaborative Research Support Program. Office of International Research and Development Oregon State University, USA

Allan, G., Heasman H., Ferrar P. (2006): Aquaculture Nutrition: Report on the Aquaculture Nutrition Master Class held at Asian Institute of Technology, Bangkok Thailand 7-19 August 2006 ISBN 0 7347 1771 7

**Beekeeping, MTMAL7019A**

ECTS Credit Points: 3

The lessons are in blocks, 4 times/semester

Type of exam: oral exam

Requirements:

- for signature: Regular visits to lectures (maximum: 2 absences) and compulsory participation in exercises (visit to beekeeping and honey manufacture). 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 two 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. Missed practices should be made up for at a later date, being discussed with the lecturer. Active participation is evaluated by the teacher.

- for a grade: Writing an essay or report (student can decide which one to choose) Giving presentation (beekeeping practice where he/she came from). Oral exam and writing the report on practice (field program: honey manufacture, apiary visiting)

**lectures:**

1. The importance of pillinisation by honeybees (ecological services)
2. The biology of *Apis mellifera*, the social behaviour of european honeybees
3. Honey production in the world, in the European Union and in Hungary
4. The typical bee pasture in Hungary (oilseed rape – *Brassica napus* L., black locust – *Robinia pseudoacacia* L., sunflower *– Helainthus annuus* L. and other wild bee pasture)
5. The basic beekeeping equipment park (harvesting honey, equipment for the treatment of honeybees, protective clothing, types of beehives and frames)
6. Bee products: types of honey, royal jelly, pollen, bee wax, bee venom)
7. The disease of the European honeybees I. *Varroa destructor*
8. The disease of the European honeybees II. *Nosema apis.*
9. The disease of the European honeybees III. *Paenibacillus larvae*.
10. 12 months of beekeeping
11. The methods of honey harvesting.
12. The methods of stimulation feeding of honeybees.
13. Changing of bee pasture: moving with beehves.
14. Legal requirements and legal bases for beekeeping
15. Mandatory annual controlling (veterinarian and honeybee-health responsible person)

**practices:**

1. The importance of pillinisation by honeybees (ecological services)
2. The biology of *Apis mellifera*, the social behaviour of european honeybees
3. Honey production in the world, in the European Union and in Hungary
4. The typical bee pasture in Hungary (oilseed rape – *Brassica napus* L., black locust – *Robinia pseudoacacia* L., sunflower *– Helainthus annuus* L. and other wild bee pasture)
5. The basic beekeeping equipment park (harvesting honey, equipment for the treatment of honeybees, protective clothing, types of beehives and frames)
6. The bee procuct: types of honey, royal jelly, pollen, bee wax, bee venom)
7. The disease of European honeybees I. *Varroa destructor*
8. The disease of European honeybees II. *Nosema apis.*
9. The disease of European honeybees III. *Paenibacillus larvae.*
10. 12 months of beekeeping
11. The methods of honey harvesting.
12. The methods of stimulation feeding of honeybees.
13. Changing of bee pasture: moving with beehives.
14. Legal requirements and legal bases for beekeeping
15. Mandatory annual controlling (veterinarian and honeybee-health responsible person)

**Literature, handbooks**

Diana Sammataro, Alphonse Avitabile: The beekeeping handbook. Fourth edition. 2011. ISBN: 0801476945.

Jamie Stebens: Beekeeping for beginners. A starter guide book on the basics to keeping bees and harvesting honey. 2014.

Joachim Petterson: Beekeeping: on bees, beekeeping and bee products. 2016. ISBN: 1681881543

**Disease control, MTMAL 7020A**

ECTS Credit Points: 3

28 hour(s) lecture and 0 hour(s) seminar per semester

Type of exam: oral exam

Requirements:

- for signature: attendance of at least 70% of the lectures, presenting a PPT presentation

- for a grade: oral exam

**Summary of content – theory**

Course objectives: the subject deals with the prevention and control of farm and wild animal diseases. Programs for the control of communicable diseases between animals and humans (zoonoses) has a great part in the subject. During the farm visit of the Research Farm of University of Debrecen, the students has a chance to see these theories in the practical area.

**lectures:**

1. General epidemiology I.
2. General epidemiology II.
3. Development and proceedings of infectious diseases
4. Factors affecting the spreading of infectious diseases
5. Signaling of infectious diseases.
6. Prevention of infectious diseases in animal health
7. Prospects of preventing infectious diseases
8. Animal health and epidemiology administration system in the European Union
9. Epidemiology formulae and conventions in animal health.
10. Epidemiology of the most important viral diseases
11. Epidemiology of the most important bacterial diseases.
12. Epidemiology of the most important prion caused diseases.
13. Zoonotic diseases.
14. Consultation, farm visit.

**Literature, handbooks**

Keeping livestock healthy 4th edition (N. Bruce Haynes). 2001. Storey Publishing LLC.ISBN-13: 978-0882668840 ISBN-10: 0882668846

Relevant laws and regulations of the European Union.

**Ecological Management of Farm Animals, MTMAL7026A**

ECTS Credit Points: 3

28 hour(s) lecture and 14 hour(s) seminar per semester

Type of exam: written exam

Requirements:

- for 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. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the teacher. If a student’s behaviour or conduct doesn’t meet the requirements of active participation, the teacher may evaluate his/her participation as an absence because of the lack of active participation in class.

Case study and farm plan assignment have to be handed on time (deadline has been decided on the first lecture) in the expected form and content.

- for a grade: Completing assignments (sectoral plan), written exam, giving presentation (sectoral plan). To pass this course, you need all the exams and assignment to have a grade of at least 60%. The final grade consists of: 40% final written exam/ 30% sectoral plan assignment / 30% case study performance (presentation)

**Summary of content – theory**

Course objectives: During the semester students will know the specificity of ecological animal production systems, livestock farming, regulations and importance of organic production. The impact of ecological production on environment is a main issue. Production efficiency, animal breeds, housing, feeding, technologies of conventional and organic production will be compared.

**lectures:**

1. Introduction to ecological animal production
2. Definitions and principles of ecological production. Organic livestock farming.
3. Regulations, restrictions of ecological production
4. Regulations, restrictions of ecological production
5. Importance of organic animal production in the world
6. The role and importance of grassland management and grazing in the world
7. Possibilities and methods of livestock grazing, animal production on grassland
8. Grazing and ecological footprint
9. Organic pig production
10. Organic egg production
11. Organic broiler production
12. Organic waterfowl production
13. Organic dairy production
14. Organic beef production

**Summary of content - practice:**

Students visit livestock farms to see how an animal production systems operate. Animal feeding, housing, rearing/fattening of different ages will be studied. Grazing technologies in ecological production is an essential part of the practice.

**practices:**

1. Farm visit: sheep farm (meat type, grazing)
2. Farm visit: sheep farm (meat type, grazing)
3. Farm visit: sheep farm (meat type, grazing)
4. Farm visit: sheep farm (meat type, grazing)
5. Farm visit: sheep farm (meat type, grazing)
6. Farm visit: goose farm (meat type)
7. Farm visit: goose farm (meat type)
8. Farm visit: goose farm (meat type)
9. Farm visit: goose farm (meat type)
10. Farm visit: dairy or beef cattle farm
11. Farm visit: dairy or beef cattle farm
12. Farm visit: dairy or beef cattle farm
13. Farm visit: dairy or beef cattle farm
14. Farm visit: dairy or beef cattle farm

**Literature, handbooks**

Hodgson, J. (1998): The Ecology and Management of Grazing Systems. Oxford University Press

Bootroyd, J (2008): Animals and the Environment. Lerners Publishing Group

Chaerika, N. et al. (2003): Know to move, move to know. Ecological knowledge and herd management strategies. FAO.

Bohlen, P, J. Staff (2008): Sustainable Agroecosystem management. Integrating: ecology, Economics and Society. CRC Press LLC. .

**Economy of Livestock Enterprises, MTMAL7022A**

ECTS Credit Points: 4

28 hour(s) lecture and 28 hour(s) seminar per semester

Type of exam: written or oral exam

Requirements:

- for signature: Participation in practices and presentation

- for a grade: Exam

**Summary of content – theory**

The aim of the course is to enhance student’s knowledge and skills in different kinds of agricultural sector’s economics situation and tendencies. The course mainly concentrates on livestock sectors like: dairy-, beef-, pig-, poultry (broiler, egg, turkey)-, fish-, sheep-, goat and feed production sector. During the lectures students get an overview of the main European and World livestock sector tendencies. During the practical seminars a complete sector planning method is introduced, thus after this course the students will be able to independently perform an annual sector plan for a certain firm. The main leaning outcomes of this course is that at the end the students can understand and interpret the economics tendencies of livestock sectors and relations in deferent countries and will be able to prepare an annual sectorial plan.

**practices:**

1. The different resources in agriculture and its specialities.
2. Noncurrent (fixed) assets in animal husbandry.
3. Coping with risk in agriculture (risk and uncertainty, sources of risk, managing risk in animal production).
4. The production value in animal husbandry (definitions, calculation, how to increase it, examples).
5. Income (profit or loss) in animal husbandry (definitions, calculation, how to increase it, examples).
6. The role of the current assets in agriculture (definition, examples, circle of current assets).
7. The economics of milk production (economic importance, livestock, trade, consumption, income, production value and costs).
8. The structure of technological planning in animal husbandry (production value, livestock, production cost, assets, indicators).
9. Term and measurement of efficiency in agriculture
10. The production cost in animal husbandry
11. The goals, the structure and the steps of the sectoral agricultural production planning.
12. The economic aspects of sheep production
13. The economic aspects of poultry production
14. The economic aspects of beef production

**Literature, handbooks**

Compulsory:

Lectures presentations and the additional articles on the lecture

Research Institute od Agricultural Economics Market reports, https://www.aki.gov.hu/publikaciok/menu/a:303/Data+and+information/Market+report

Recommended:

The state of food and agricultural 2010-2011 FAO, http://www.fao.org/docrep/013/i2050e/i2050e00.htm

The Hungarian Agriculture and food industry in Figures http://www.fvm.gov.hu/doc/upload/201001/english\_2009.pdf

The state of World fisheries and aquaculture 2010, FAO http://www.fao.org/docrep/013/i1820e/i1820e00.htm

OECD-FAO Agricultural Outlook 2010-2019, Highlights <http://www.agri-outlook.org/dataoecd/13/13/45438527.pdf>

Farm Business Management: The Fundamentals of Good Practice by Peter L. Nuthall ISBN-13: 978-1780646565, ISBN-10: 1780646569

Fundamentals of Farm Business Management by S.S. Johl – T.R. Kapoor Kalyani Publishers (2003) ISBN-10: 8176631809

The business of farming: a guide to farm business management in the Tropics by Johnson, David T. London: Macmillan, 1990. ISBN 0333499212

**Feeds and feed processing MTMAL7029A**

ECTS Credit Points: 3

28 hour(s) lecture and 14 hour(s) seminar per semester

Type of exam: colloquium

Requirements:

- for signature: Not more than 3 absence from class.

- for a grade: Completing assignments / exercises, submitting essay, giving presentation, diet formulation.

**Summary of content – theory**

The production potential of the farm animals increased significantly during the past decades. This had been followed by the development of compound feed production technology. The production of the compound feeds needed by high genetic potential animals not only means the mixing of the components. The aim of the subject is to review the most common feedstuffs, present the modern compound feed production technology, the machines and innovative techniques used as opposed to the effect on animal productivity.

**lectures:**

1. Green forages
2. Silages and hays
3. Cereals
4. Legume seeds
5. Industrial co-products
6. Feed supplements
7. Feed storage and handling
8. Grinding
9. Feed mixing
10. Pelleting
11. Post pellet treatments
12. Companion feed production technology
13. Regulation of feed production
14. Consultation

**Summary of content - practice:**

To introduce the diet formulation methodology.

**practices:**

1. Energy evaluation systems
2. Diet formulation for fattening pigs
3. Diet formulation for piglets
4. Diet formulation for sows
5. Diet formulation for laying hens
6. Diet formulation for broiler chicken
7. Diet formulation for turkey
8. Diet formulation for dairy cattle
9. Diet formulation for beef cattle
10. Diet formulation for sheep
11. Diet formulation for horses
12. Diet formulation for rabbits
13. Consultation

**Literature, handbooks**

Moughan and Hendriks (2018) Feed evaluation science. Wageningen Academic Publishers

**Fish Breeding, MTMAL7016A**

ECTS Credit Points: 3

28 hour(s) lecture and 0 hour(s) seminar per semester

Type of exam: Oral or written exam

Requirements:

- for signature: Completion of the assignments / exercises and submission of essays on practical topics

- for a grade: Oral or written exam

**Summary of content – theory**

Course objectives: to provide information on the theory of fish genetics and breeding including the broodstock management, induced and natural reproduction, fry and larvae management. The knowledge acquired will enable to participate / cooperate in practical breeding programmes.

**lectures:**

1. Introduction to fish breeding
2. Fish biology (Diversity, physiology, anatomy – reproduction organs)
3. Fish reproduction: natural spawning
4. Induced spawning
5. Larval development & rearing
6. Genetics
7. Breeding programmes (Mass, selective, etc.)
8. Breeding techniques
9. Biotechnology in fish breeding
10. Breeding in practice (preparation & propagation)
11. Breeding in practice (hatching & larvae management)
12. Breeding of carps
13. Breeding of percids
14. Breeding of catfishes

**Literature, handbooks**

FAO (2016): The State of World Fisheries and Aquaculture 2016. Contributing to food security and nutrition for all. Rome. 200 pp.

Boyd, C.E., Lim, C., Queiroz, J., Salie, K., de Wet L., McNevin, A. (2012): Best Management Practices for Responsible Aquaculture. Aquaculture Collaborative Research Support Program [ACRSP]

Gomelsky. B. (2011): Fish Genetics: Theory and Practice March 2011 Publisher: VDM Verlag Dr. Müller ISBN: 9783639328059,

Ponzoni, R.W., B.O. Acosta and A.G. Ponniah. (eds). 2006. Development of aquatic animal genetic improvement and dissemination programs: current status and action plans, WorldFish Center Conference Proceedings 73, 120p.

**Fodder Plant Production MTMAL7006A**

ECTS Credit Points: 3

28 hour(s) lecture and 0 hour(s) seminar per semester

Type of exam: oral exam

Requirements:

- for signature: Attendance at lectures is compulsory. Students may not miss more than three times during the semester.

- for a grade: Completing assignments, giving a short presentation, oral exam.

**Summary of content – theory**

Fodder Plant Production subject deals with the agroecological, biological-genetic and agrotechnical factors of crop production. General and special elements in fodder crops production. Ecological, biological and agrotechnical circumstances of crop management. Production of feeds in crop production. General knowledge of fodder crops. Alfalfa and other fodder crops management. General knowledge of cereals. Maize production. Other cereals production.

**lectures:**

1. Main targets, tasks of crop production. The role of crop production factors
2. Climate and weather conditions in Hungary. Their effect on the crop production.
3. Main soil types and their characteristics.
4. Biological basis of crop production (genotype, seeds). GM plants.
5. Crop rotation, forecrop’s value.
6. Nutrient supply of plants.
7. Soil cultivation and sowing technology.
8. Integrated Plant protection.
9. Irrigation methods. Harvesting time and methods.
10. Groups of feeds or feedstuffs
11. General overview of cereal production. Wheat cultivation.
12. Production of spring cereals. Oat cultivation.
13. Maize and maize for silage production.
14. Fodder crops in Fabaceae family. Alfalfa cultivation.

**Literature, handbooks**

Martin, John H., Leonard, Warren H., Stamp. David L., Waldren, Richard: Principles of Field Crop Production. 2005. ISBN: 0130259675

Pratley, Jim: Principles of Field Crop Production. 2006. ISBN: 0195515552

Acquaah, G. 2001: Principles of crop production. Theory, Techniques and Technology. Pearson Prentice Hall. ISBN 0-13-114556-8

Jolánkai M.: Crop Production. Akaprint. Budapest. 2002.

**Food Marketing MTMAL7017A**

ECTS Credit Points: 3

28 hour(s) lecture and 14 hour(s) seminar per semester

Type of exam: colloquium

Requirements:

- for signature: Practice visits are compulsory. Missing is possible up to 30% of the seminars. Students must process a case study in the field of food marketing by the end of the semester with an oral presentation.

- for a grade: Students must *process a case study in the field of food marketing* by the end of the semester with an oral presentation. Students must complete a written exam at the end of the semester.

The presentation and the written exam will be evaluated together.

Students can earn 100 points during the semester. The presentation is 50% (50 points), with 50% (50 points) for written exam. Students must also meet the minimum level for presentation and written exam, so they need to reach 51% of the total points. During the semester students can earn extra points through active participation in the lessons.

*Presentation (50% of the final 100 points):* During the oral presentation, students should give a ten-minute lecture, which will be presented on one of the last lessons.

*Written exam (50% of the final 100 points):* The written exam consists of five sections (multiple choices (10 points), true or false (10 points) and three short essays (3\*10 points). Students will write the exam during the exam period or pre-exam with the appropriate progress of the semester.

**Summary of content – theory**

The goal of the subject is to make the student understand the basic contexts of food marketing especially segmentation, targeting and positioning. The subject emphasizes the role of the marketing mix in the food markets, therefore, we study the product, the price, the place and promotion tools in detail. Community marketing tools and strategies are also part of the subject.

**lectures:**

1. Coordination of the requirements
2. Evolution of food marketing system – part 1.
3. Evolution of food marketing system – part 2.
4. Segmentation and new product development (from concept to shop), STP, product, price, place and promotion – part 1.
5. Segmentation and new product development (from concept to shop), STP, product, price, place and promotion – part 2.
6. Food consumption trends – part 1.
7. Food consumption trends – part 2.
8. Regional food systems – part 1.
9. Regional food systems – part 2.
10. Retailers strategies in fresh produce (case study: Short supply chains) – part 1.
11. Retailers strategies in fresh produce (case study: Short supply chains) – part 2.
12. Overview of a specific products' market (free from products) – part 1.
13. Overview of a specific products' market (free from products) – part 1.
14. Final presentation / semester summary

**practices:**

1. Coordination of the requirements
2. Evolution of marketing systems – Coca-Cola, the prime example of marketing – Case study analysis
3. Evolution of marketing systems – Coca-Cola, the prime example of marketing – Case study presentation
4. Segmentation and new product development – Red Bull, the brand getting wings – Case study analysis
5. Segmentation and new product development – Red Bull, the brand getting wings – Case study presentation
6. Food consumption trends – The characteristic of digital food consumer – Case study analysis
7. Food consumption trends – The characteristic of digital food consumer – Case study presentation
8. Regional food systems –Gedeon Totth – International practice of community agricultural marketing – Case study analysis
9. Regional food systems –Gedeon Totth – International practice of community agricultural marketing – Case study presentation
10. Retailer’s strategies in fresh produce – Tesco, the world-class customer contact builder – Case study analysis
11. Retailer’s strategies in fresh produce – Tesco, the world-class customer contact builder – Case study presentation
12. Overview of specific products’ market –The story of delicious gluten free bread: the branding of Glulu – Case study analysis
13. Overview of specific products’ market –The story of delicious gluten free bread: the branding of Glulu – Case study presentation
14. The student presents the final presentation.

**Literature, handbooks**

Rachel E. Helwig (2015): Transparent Food Marketing: A Clear Understanding of Food Marketing Terminology. CreateSpace Independent Publishing Platform; First edition. pp. 1-112 ISBN: 9781514869864

Stephen F. Hall (2015): Sell Your Specialty Food: Market, Distribute, and Profit from Your Kitchen Creation. Stephen F. Hall; 6th edition. pp. 1-210. ISBN: 9780692572078

Gordon W. Fuller (2011): New Food Product Development: From Concept to Marketplace, Third Edition. CRC Press; 3 edition. pp. 1-508. ISBN: 9781439818640

**Food quality and food chain safety MTMAL7011A**

ECTS Credit Points: 4

28 hour(s) lecture and 28 hour(s) seminar per semester

Type of exam: written exam

Requirements:

- for signature: Participation in practices and presentation.

- for a grade: Exercises, giving presentation, exam.

**Summary of content – theory**

The main aim of the lectures is to know the physical, chemical and biological/microbiological hazards which have important effects on food safety and food quality. In this semester, students will know the methodology of risk analysis (mainly the risk assessment) and the methodology of the determination of tolerable intakes and other toxicological values. Student will know the methodology of hazard analysis in relation to animal origin food production.

**lectures:**

1. Food quality and influencing factors of food quality
2. Influencing factors of food safety
3. Regulations, directives, standards relation to animal origin foods
4. Introduction to toxicology
5. Chemical hazards
6. Microbiological hazards
7. Foodborne diseases
8. Introduction to risk analysis
9. Methodology of HACCP plan preparation
10. Preliminary risk management activities
11. Risk management and risk communication
12. Chemical risk assessment
13. Microbiological risk assessment
14. Hazards of genetically modified plants and foods

**Summary of content - practice:**

The main aim of the practices is to expand the lecture’s knowledge with example tasks and case studies. Therefore, the students explore case-studies and make exercises which help them to develop their abilities for the assessment of risks and hazards and for exposure assessment.

**practices:**

1. Food labelling, trademarks, geographical indicators
2. Hazards in animal husbandry
3. RASFF system
4. Trade of animal origin foods
5. Veterinary drugs
6. Ingestion and inhalation exposure assessment
7. Safe human dose
8. Dose-response relationship
9. Hazard analysis of dairy product production
10. Hazards in slaughterhouse
11. Hazards analysis of meat product production
12. Hazard analysis of egg product production
13. Chemical risk assessment 1.
14. Chemical risk assessment 2.

**Literature, handbooks**

IPCS (2010): WHO human health risk assessment toolkit: chemical hazards. ISBN: 978-92-4-154807-6

2016/C 278/01 EU Commission notice on the implementation of food safety management systems covering prerequisite programs (PRPs) and procedures based on the HACCP principles, including the facilitation/flexibility of the implementation in certain food businesses

Codex Alimentarius Commission: Food hygiene. Basic texts. (http://www.fao.org/docrep/012/a1552e/a1552e00.pdf)

Regulations, directives, standards

**Management of Livestock Farms MTMAL7023A**

ECTS Credit Points: 3

28 hour(s) lecture and 28 hour(s) seminar per semester

Type of exam: written exam

Requirements:

- for signature: Completing assignments / exercises, the presence on 2/3-rd of the classes.

Active participation in group discussion

- for a grade: Monitoring the progress, mid-term paper, final exam mark.

**Summary of content – theory**

The course is built on the best practices applied on livestock in different species covering the traditional, ecological and modern farm environment. During this course the student synthetises their breeding, physiological, nutritional, animal welfare, human resource knowledge into a coherent management practice. The learn how to combine these elements in a farm to be socially, economically and environmentally viable. Having fulfilled the course, students will be able to apply good farm management practices and critically choose between available technologies, management practices.

**lectures:**

1. Preparation of cows for calving, transition phase: feeding, health, equipment, building, human resources. Best practices
2. Calving management (beef and dairy)
3. Calf management. Best practices
4. Management of heifers after weaning till calving
5. Management of cows during the lactation
6. Principles of lean farming
7. Management of sows and boars
8. Management of piglets and fattening pigs
9. Management of ewes and rams (meat and dairy)
10. Management of lambs before and after weaning
11. Hatching management
12. Management of egg production
13. Management of broiler production
14. Management of water birds

**Summary of content - practice:**

The students will acquire the practical application skills in dealing with large and small livestock farms. They can apply best practices in designing and operating a farm. Understand the different aspects and problems arising from farm management in the dominant species. They will understand the difference arising from the management of a traditional farm and modern farm. The students will be able to choose the relevant management strategies and also they will be able to find literature in the topic and critically analyse it.

**practices:**

# 1-2. Visit dairy farms

# 3-4. Visit beef farms

# 5-6. Visit pig farms

# 7. Visit broiler farms

8. Visit sheep farms

# 9-10. Visit egg layer farms

11-12. Visit turkey farms

# 13-14. Visit duck and geese farms

**Literature, handbooks**

J. Hocken, M. Hocken (2019): The Lean Dairy Farm: Eliminate Waste, Save Time, Cut Costs   
Creating a More Productive, Profitable and Higher Quality Farm. John Wiley and Sons   
Australia LtD. ISBN-10: 0730368416.

B. Hartman (2015): The Lean Farm. Chelsea Green Publishing. ISBN 978-1-60358-592-7

G. Caldwell (2014): The Small-Scale Dairy: The Complete Guide to Milk Production for the   
Home and Market. Chelsea Green Publishing. ISBN-10: 1603585001

T. G. Field, R. W. Taylor: (2020) Beef Production Management and Decisions. Pearson. ISBN-13: 978-0131198388

J. Court, S. Hides, J. Webb-Ware (2010): Sheep farming meat and wool. CSIRO Publishing. ISBN: 9780643092945

Honnapagol, Suresh, H (2014): Broiler farming and management. JAYPEE. ISBN-13: 978- 9351521686

**Milk and Meat Processing MTMAL7013A**

ECTS Credit Points: 3

14 hour(s) lecture and 28 hour(s) seminar per semester

Type of exam: exam

Requirements:

- for 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.

- for a grade: Giving a presentation, colloquium

**lectures:**

1. Economic aspects of milk and milk products. Raw milk certification system. Factors affecting milk quality.

2. The composition, properties and dietary physiological role of milk. Controlling milk microbes

3. Primary treatment of milk. Major operations of milk processing. Production of consumer milk and aromatized milk products.

4. Manufacture of sour products. Cottage cheese production.

5. Butter production. Cheese production.

6. The bulk cheese production. Milk powder production.

7. Utilization of dairy by-products. Cleaning and sterilization in dairy farms.

8. Trends in Meat Consumption.

9. Production and processing of large slaughter animals (pigs, cattle) Classification of slaughter animals.

10. Production and processing of poultry.

11. Factors influencing the quality of meat.

12. The chemical composition, nutritional and physiological significance of meat.

13. The tissue composition of meat. The physiology of slaughter and the processes in the meat.

14. Production of meat-based products. Packaging of meat and meat products

**practices:**

1. Economic aspects of milk and milk products. Raw milk certification system. Factors affecting milk quality.

2. The composition, properties and dietary physiological role of milk. Controlling milk microbes

3. Primary treatment of milk. Major operations of milk processing. Production of consumer milk and aromatized milk products.

4. Manufacture of sour products. Cottage cheese production.

5. Butter production. Cheese production.

6. The bulk cheese production. Milk powder production.

7. Utilization of dairy by-products. Cleaning and sterilization in dairy farms.

8. Trends in Meat Consumption.

9. Production and processing of large slaughter animals (pigs, cattle) Classification of slaughter animals.

10. Production and processing of poultry.

11. Factors influencing the quality of meat.

12. The chemical composition, nutritional and physiological significance of meat.

13. The tissue composition of meat. The physiology of slaughter and the processes in the meat.

14. Production of meat-based products. Packaging of meat and meat products

**Literature, handbooks**

Meat Science: An Introductory Text 2 nd edition ISBN 9780851994246

Muscle Development of Livestock Animals: Physiology, Genetics and Meat Quality, [Marinus Te Pas](https://www.amazon.co.uk/s/ref=dp_byline_sr_book_1?ie=UTF8&text=Marinus+Te+Pas&search-alias=books-uk&field-author=Marinus+Te+Pas&sort=relevancerank) [Henk Haagsman](https://www.amazon.co.uk/s/ref=dp_byline_sr_book_2?ie=UTF8&text=Henk+Haagsman&search-alias=books-uk&field-author=Henk+Haagsman&sort=relevancerank) [Maria Everts](https://www.amazon.co.uk/s/ref=dp_byline_sr_book_3?ie=UTF8&text=Maria+Everts&search-alias=books-uk&field-author=Maria+Everts&sort=relevancerank), CABI Publishing, , ISBN-10: 9780851998114

Dairy Science and Technology: P. Walstra;Pieter Walstra;Jan T. M. Wouters;Tom J. Geurts, CRC Press, ISBN 08247-2763-0

Meat products handbookPractical science and technology, G. Feiner, , **eBook ISBN:** 9781845691721, Woodhead Publishing, 2006.

**Molecular Genetics and Proteomics, MTMAL7014A**

ECTS Credit Points: 3

14 hour(s) lecture and 28 hour(s) seminar per semester

Type of exam: written exam

Requirements:

- for 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.

- for a grade: Completing exercises, giving presentation, written exam

**Summary of content – theory**

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.

**lectures:**

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:**

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.

**practices:**

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**

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.

**Nutrition and product quality MTMAL7031A**

ECTS Credit Points: 3

28 hour(s) lecture and 14 hour(s) seminar per semester

Type of exam: practical course mark

Requirements:

- for signature: Not more than 3 absence from class.

- for a grade: Completing assignments / exercises, submitting essay, giving presentation, essay questions.

**Summary of content – theory**

Nutrition can both improve and deteriorate the quality of animal products. In this subject we will review the biological mechanisms which result in the altered quality, and provide research evidence regarding the effect of nutrition. It is obvious that we will discuss meat, milk and egg production. But as an extra we will touch also wool, work (equine) and honey, as these are also the products of animals (bees).

**lectures:**

1. Introduction
2. Nutrition and carcass quality
3. Nutrition and meat quality
4. Lipids in the feed and in the body
5. Nutrition and lipid quality
6. Milk synthesis
7. Nutrition and milk quality
8. Nutrition and wool quality
9. Nutrition and honey quality
10. Nutrition and the capability of work
11. Hazardous materials in the food chain: mycotoxins
12. Hazardous materials in the food chain: dioxins, GMO
13. Other factors affecting product quality
14. Consultation

**practices.**

1. Assessment of meat quality
2. Assessment of meat quality
3. Assessment of meat quality
4. Assessment of meat quality
5. Assessment of milk quality
6. Assessment of milk quality
7. Assessment of milk quality
8. Assessment of milk quality
9. Assessment of egg quality
10. Assessment of egg quality
11. Assessment of wool quality
12. Assessment of wool quality
13. Assessment of workload
14. Assessment of honey quality

**Literature, handbooks**

Guoyao (2018) Principles of animal nutrition, CRC Press

**Organisation of Breeding, MTMAL7010A**

ECTS Credit Points: 3

28 hour(s) lecture and 0 hour(s) seminar per semester

Type of exam: exam

Requirements:

- for signature: Completing the independent tasks and present the project

- for a grade: Monitoring the progress, mid-term paper, final examination.

**Summary of content - theory:**

The students will acquire the application skills in dealing with breeding organisations, setting up breeding programs for different species, calculating economic weights, organising shows, exhibitions, communicating with farmers and government officials. Having fulfilled the course, students will be able to apply the breeding program in different situations and participate in the work of breeding organisations.

**lectures:**

1. Breeding objectives in ruminant animals, economic and management circumstances
2. Breeding objectives in monogastric animals, economic and management circumstances
3. Calculation of economic values
4. Breeding pyramid
5. Rules, Laws and Registrations related to animal breeding
6. Animal breeding organisations
7. Conformation assessment
8. Databases of breeding organisations
9. Communication of animal breeding organisations (webpages, newsletters, exhibitions, open days)
10. Breeding Programs of horse associations
11. Breeding programs of companion animal associations
12. Breeding programs of ruminant animal associations
13. Breeding programs of monogastric animal associations
14. Project presentation

**Literature, handbooks**

FAO: Breeding Strategies for Sustainable Management of Animal Genetic   
Resources. ISBN10-9251063915

FAO: Developing Sustainable Value Chains for Small-Scale Livestock Producers:   
FAO Animal Production and Health Guidelines No. 21. ISBN-10: 9251317186

V. Porter, L. Anderson (2016): Mason’s World Encyclopedia of Livestock Breeds and Breeding. CABI Publishing. ISBN-10: 1845934660

4. B. Kinghorn, J. van der Werf, M. Ryan (2014): Animal breeding. Use of New Technologies.   
The Post-Graduate Foundation in Veterinarian Science of the University of Sydney. ISBN 0 646 387138

**Pasture Management and Grazing, MTMAL7008A**

ECTS Credit Points: 4

28 hour(s) lecture and 28 hour(s) seminar per semester

Type of exam: oral exam

Requirements:

- for signature: Attendance at **lectures** is recommended, but not compulsory.

- for a grade: To perform the individual student work during semester.

**lectures:**

1. Definitions for grassland ecosystems;

2. Products and services from grasslands;

3. Effects of ecological conditions on grassland production;

4. Plants associations of grasslands;

5. plants on grasslands,

6. Grassland fertilization;

7. Irrigation on grasslands;

8. Grassland establishment;

9. Grassland improvement and renovation;

10. Cultivation of permanent grasslands;

11. Grassland production,

12. Grass and grassland quality;

13. Grazing of grasslands;

14. Ensiling and hay making from grass.

**practices:**

1. Basic terminology of grasslands
2. The importance of grasslands in human life
3. Understanding the effects of natural conditions
4. Diversity and values of grassland composition
5. Means to produce more on national grasslands
6. Solutions to improve grassland quality
7. To select optimal works for maximum grassland benefits
8. Conditions determining the outputs from grasslands
9. Conditions determining the quality of herbage from grasslands
10. Effects of grazing on the animals
11. Effects of grazing animals on grasslands
12. Factors influencing grazing methods selected
13. Key elements of high quality hay from grass
14. Key elements of high quality silage from grass

**Literature, handbooks**

GRASS Its production and utilization (Edited by W. Holmes), Published for British Grassland Society by Blackwell Scientific Publications, Oxford, 1998, 306. p. ISBN 0-632-02461-5

GRASSLAND Quietness and Stregth for a New American Agriculture (Editors: Walter F. Wedin and Steven L. Fales), American Society of Agronomy Inc. etc., 2009, 256. p. ISBN 978-0-89118-171-2

Country Pasture Profiles (Detailed description of pastere and forage resources by country) FAO CD Publication, Rome 2005.

Grassland species profiles (Detailed descriptions and photos of more than 600 grassland species) FAO CD Publication, Rome 2005.

**Physiology of production traits MTMAL7002A**

ECTS Credit Points: 3

28 hour(s) lecture and 14 hour(s) seminar per semester

Type of exam: oral exam

Requirements:

- for signature: Taking part in at least 70% of the practices and lectures, PPT presentation of a chosen topic.

- for a grade: oral exam

**Summary of content - theory:**

The main target of the subject is to teach the interaction of farm animals’ production and the role of the environment. Students are going to learn the function of the digestive system; process of feed-digestion; the intermediary metabolism; characteristic of ruminant digestion, physiology of muscle system, biology of meat production. Other topics are the followings: the endocrine system. Physiology of reproduction. Physiology of milk production. Specialties and dysfunctions in metabolism of high-yield milk cows. Energy turnover and thermoregulation. Microclimate of the stall. The reproduction physiology of the hen. Production of other animal products for human consumption (e.g. rabbit meat, honey).

**lectures:**

1. Endocrionology 1.
2. Endocrinology 2.
3. Endocrinology 3.
4. Stress in animal breeding.
5. Physiology of digestion.
6. Digestion of the monogastric animals.
7. Digestion of the ruminants.
8. Metabolic disorders in farm animals.
9. Physiology of the muscle system. Meat production.
10. Physiology of milk production. Specialties and dysfunctions in metabolism of high-yield milk cows
11. Reproduction 1.
12. Reproduction 2.
13. Physiology and disorders of egg production.
14. Consultation

**Summary of content - practice:**

After learning the basics, in practices we are going to teach the interaction of farm animals’ production and the role of the environment in practice. The Research Farm of the University is going to be visited and students will be able to develop a practical knowledge through these.

**practices:**

1. Heat stress.
2. Effect of stress on animal production.
3. Farm visit
4. Farm visit
5. Anatomy of the female reproductive tract
6. Anatomy of the male reproductive tract
7. Assisted reproductive techniques
8. Anatomy of the digestive system of a monogastric animal
9. Anatomy of the digestive system of a ruminant
10. Anatomy of a bird.
11. Normal meat quality and meat disorders.
12. Normal milk (SCC measurement) quality characteristics and mastitis.
13. Egg lamping
14. Consultation

**Literature, handbooks**

Biotechnology in Animal Husbandry (I.) - Beograd: Institute for Animal Husbandry, 2007

Biotechnology in Animal Husbandry (II.) - Beograd: Institute for Animal Husbandry, 2007

Pathways to Pregnancy and Parturition / P. L. Senger - : Current Conceptions, Inc., 2003

Ruminant Physiology / Cronjé, P. B. - Wallingford: CABI Publishing, 2004

The ethology of domestic animals an introductory text / Jensen, Per. - Wallingford: CABI Publishing, 2007

The science of animal husbandry / Blakely, J. - Reston: Reston Publishing Comp., 1989

**Planning of animal farms, MTMAL 7015A**

ECTS Credit Points: 3

28 hour(s) lecture and 0 hour(s) seminar per semester

Type of exam: colloquium

Requirements:

- for signature: Giving presentation .

- for a grade: Completing assignments / exercises, submitting essay, giving presentation.

**Summary of content – theory**

The aim of the course is to learn the construction and structural elements of the building used in animal husbandry, to describe the equipment’s of animal husbandry. At the end of the course students will be able to control the operation of the machines and control workflow in animal husbandry.

**lectures:**

1. Types of agricultural buildings
2. Building constructions.
3. Building materials.
4. Building Services. Water supply system.
5. Equipment for preparation of feed
6. Buildings and equipment’s for cattle keeping.
7. Feeding and drinking equipment for cattle keeping
8. Milking machines and their equipment’s.
9. The milking unit and milk handling unit.
10. Buildings and equipment’s of pig keeping.
11. Feeding and drinking equipment for pig keeping.
12. Building and equipment’s of poultry farming.
13. Feeding and drinking equipment’s of poultry farming.
14. Building and equipment’s of sheep keeping.

**Literature, handbooks**

Brian Bell: Farm Machinery ISBN 1903366682

S Böttinger: Grundlagen der Landtechnik

John Carrol: Tractors and Farm Machinery ISBN-13: 978-0754826583

**Professional Language Skills, MTMK7NY2A**

ECTS Credit Points: 3

28 hour(s) lecture and 0 hour(s) seminar per semester

Type of exam: exam mark

Requirements:

- for signature: Absence as regards class attendance (3 allowed absences per semester)

- for a grade: Completing assignments / exercises. Continuous tests orally and written. A term mark to be given at the end of the semester

**Summary of content - theory**:

The main goal of the classes is to acquire the essence of oral communication, its general connection system, as well as the components of communication, and to get introduced to the professional and human communication. Students will get acquainted with the rhetorical and the negotiation technique methods, and based on these, with practice through profession related situations.

**lectures:**

|  |
| --- |
| 1. Presentation techniques I (definitions, layers, types) |
| 1. Presentation techniques II (professional presentation methods) |
| 1. The logical construction of presentation, the effective approach of a target group |
| 1. The SPAM method, 1st Student Presentation practice |
| 1. Workshop-training |
| 1. Practice for professional writing |
| 1. Midterm exam |
| 1. Strategies for reading profession related texts |
| 1. The use of the logical matrix and the SWAT analysis in the presentation technique |
| 1. Exercises to improve debate skills |
| 1. Profession related listening exercises |
| 1. Profession related listening exercises |
| 1. Sources and possibilities of independent study |
| 1. End term, Evaluation |

**practices:**

|  |
| --- |
| 1. Profession-related writing, speaking, reading comprehension and listening comprehension |
| 1. Profession-related vocabulary building, writing, speaking listening and reading comprehension |
| 1. Presentation skills, reading comprehension and listening comprehension, profession-related writing |
| 1. Developing profession-related literacy, speaking, reading and listening comprehension, |
| 1. Speaking and presenting,, reading comprehension and listening comprehension tasks, and profession-related writing. |
| 1. The situational dialogues, reading comprehension and listening comprehension tasks, and writing formal letters on a given topic |
| 1. A survey of the skills and knowledge acquired thus far |
| 1. Presentation, reading comprehension and listening comprehension tasks, and profession-related writing. |
| 1. Profession-related conversation, reading comprehension and listening comprehension tasks, and profession-related writing |
| 1. Profession-related conversation, critical thinking, reading comprehension and listening comprehension tasks, and writing essays. |
| 1. Presentation, reading comprehension and listening comprehension tasks, and profession-related conversation writing |
| 1. Speaking and presentation, reading comprehension and listening comprehension tasks, and profession-related conversation writing |
| 1. Essay writing, speaking, reading comprehension and listening comprehension |
| 1. A survey of the skills and knowledge acquired throughout the semester |

**Literature:**

ANDREWS, P. H. & BAIRD, J. E. (2000): Communication for Business and the Professions 8th Edition. Waveland Press, Long Grove, IL. ISBN-13: 978-1577663799, 720 old.

COOPMANN, S. J. & LULL, J. (2015): Public Speaking: The Evolving Art, 3rd Edition. Boston, MA. ISBN-10: 1285432827, 416 old.

HOSTETLER, M. & KAHL, M. (2012): Advanced Public Speaking: A Leader's Guide. Routledge: N.Y. ISBN-10: 0205740014, 240 old.

WIWCZAROSKI, T.B. (2007): Writing and Professional Communication. Debrecen, 97 old.

ZAREFSKY, D. (2011). Public speaking: strategies for success. Boston, Allyn & Bacon. ISBN-13: 978-0205857265, 528 old.

**Research methods, Biometry, MTMAL7004A**

ECTS Credit Points: 4

28 hour(s) lecture and 28 hour(s) seminar per semester

Type of exam: practical course mark

Requirements:

- for signature: Active attendance in the practical lectures during the semester.

- for a grade: Practical test.

**Summary of content – theory**

The general aim of the course is to make students familiar with basic statistical methods used in animal breeding.

**lectures:**

1. Design experiments, experimental units, treatments. Sampling, description of sample. Experimental designs.
2. Numerical description of data - Calculation of central and variance indicators.
3. Distribution and density functions - Rules for normal distribution.
4. Statistical description of populations. Standardization, confidence interval.
5. The logical process of the statistical decision - Acquiring the logical process of the hypothesis testing.
6. Comparison of means - Learn how to perform the t-test and the z-test.
7. Acquisition of variance testing - χ2 and F test.
8. One-way analysis of variance - Calculation of variance analysis, significant difference.
9. Multi-factor variance analysis - Calculation of variance analysis, significant difference.
10. Correlation and regression analysis.
11. Non-linear and multivariate regression analysis.
12. Practical applications of regression analysis.
13. Non-parametric tests - Fitting, Homogeneity, and Independence Test with χ2.
14. Principal component analysis.

**Summary of content - practice:**

The main aim of the practical lectures is to make students familiar with the practical implementation of statistical methods using “R”-software environment.

**practices:**

1. Numerical description of data - Calculation of central and variance indicators
2. The logical process of the statistical decision - Acquiring the logical process of the hypothesis testing.
3. Comparison of means - Learn how to perform the t-test and the z-test.
4. Comparison of means - Learn how to perform the t-test and the z-test.
5. Acquisition of variance testing - χ2 and F test.
6. One-way analysis of variance - Calculation of variance analysis, significant difference.
7. One-way analysis of variance - Calculation of variance analysis, significant difference.
8. Multi-factor variance analysis - Calculation of variance analysis, significant difference.
9. Multi-factor variance analysis - Calculation of variance analysis, significant difference.
10. Correlation and regression analysis.
11. Non-linear and multivariate regression analysis.
12. Non-parametric tests - Fitting, Homogeneity, and Independence Test with χ2.
13. Non-parametric tests - Fitting, Homogeneity, and Independence Test with χ2.
14. Principal component analysis

**Literature, handbooks**

Kuhnert, P. –Venables, B.: An Introduction to R: Software for Statistical Modelling & Computing. CSIRO, Australia, 2005.

Seefeld, L: Statistics Using R with Biological Examples, 2007.

**World animal breeding MTMAL7018A**

ECTS Credit Points: 3

28 hour(s) lecture and 14 hour(s) seminar per semester

Type of exam: written exam

Requirements:

- for 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.

- for a grade: Submitting an essay

Summary of content – theory

Definition and areas of animal breeding policy; relationship between agricultural policy and animal breeding policy. Estate structure of animal husbandry, concentration of livestock. Animal husbandry activities of farmers, planning. Funding of animal husbandry. Safeguarding and harmonization of interests in animal husbandry. Species discussed: rabbit, sheep, cattle, llama, goat, pig, poultries, horse, buffaloe, fish, camel, alpacca, mollusks, crustaceans

**lectures:**

1. Economic impact of the livestock industry in different regions
2. Sustainable animal husbandry (safe, humane and sustainable ways).
3. Systems of production. Management, housing and equipment
4. Main diseases. Maintenance of health
5. Main products and product quality
6. Ratio of species and its regulation in animal husbandry, determination of the production, profitability
7. Methods and tools of the qualitative development of animal husbandry.
8. International co-operation. Special tasks of animal husbandry (nature conservation, environmental protection)
9. Environmental impact of animal husbandry. Animal husbandry policy of farmers.
10. Directions, tools, results of developing animal breeding

**practices:**

1. Economic impact of the livestock industry in different regions
2. Sustainable animal husbandry (safe, humane and sustainable ways).
3. Systems of production. Management, housing and equipment
4. Main diseases. Maintenance of health
5. Main products and product quality
6. Ratio of species and its regulation in animal husbandry, determination of the production, profitability
7. Methods and tools of the qualitative development of animal husbandry.
8. International co-operation. Special tasks of animal husbandry (nature conservation, environmental protection)
9. Environmental impact of animal husbandry. Animal husbandry policy of farmers.
10. Directions, tools, results of developing animal breeding

**Literature, handbooks**

WJA Payne and RT Wilson (1999): Introduction to Animal Husbandry in the Tropics. Blacwell Publishing.

[Acker, Duane](http://www.books.co.uk/books_by_acker-duane.html) & [Tour, Mickey La](http://www.books.co.uk/books_by_tour-mickey-la.html) & [Cunningham, Merl](http://www.books.co.uk/books_by_cunningham-merl.html) (2004): Animal Science and Industry. 7th ed. Pearson Education Limited.

[James Blakely](http://www.bestwebbuys.com/James_Blakely-author.html?isrc=b-compare-author), [David H. Bade](http://www.bestwebbuys.com/David_H_Bade-author.html?isrc=b-compare-author) (1994): Science of Animal Husbandry. 6th ed. Reston Publishing Company, Inc. Reston, Virginia

**Internship requirements**

The internship is an internship lasting at least four weeks as defined in the training curriculum. The internship course must be signed up for previously via the NEPTUN study registration system in the fall semester (3rd semester). The placement has to be approved by the course leader before the commencement of the internship.

# **Thesis**

A Thesis is the creative elaboration of a professional task in written form. By solving the task, the student relies on his/her studies using national and international literature under the guidance of an internal and external supervisor (referee). By solving the task, the food safety and quality engineering student certifies that he/she is capable to apply the acquired knowledge in practice and to summarize the completed work and its results in a professional way, to solve the tasks related to his/her topic creatively and to complete individual professional work. By preparing and defending thesis students who complete the graduate program prove that they are capable of the practical applications of the acquired skills, summarizing the work done and its results in a professional way, creatively solving the tasks related to the topic and doing individual professional work. The faculty academic calendar sets the thesis submission deadline.

A student in the master program has to prepare a thesis as a prerequisite of the final exam. The requirements of the thesis content, the general aspects of evaluation and the number of credits assigned to the thesis are determined by the requirements of the program. In the program the credits assigned to the thesis is 25.

The thesis topics are announced by the departments for the students. A thesis topic can be suggested by the student as well and the head of department assigned shall decides on its acceptance.

Thesis is evaluated by the referee, and it is evaluated and qualified individually by the department. The Head of the Department makes suggestion on its qualification to the Final Exam Board.

If thesis is evaluated with a fail mark by the referee, and the student is not allowed to take the final exam and is supposed to prepare a new or modified thesis. The student has to be informed about it. Conditions on resubmitting the thesis are defined by the program coordinator.

# **Final examination (Final Exam)**

Students having obtained the pre-degree certificate will finish their studies by taking the final exam. Final exam can be taken in active student status in the forthcoming exam period after gaining the pre-degree certificate then after termination of student status in any exam period within two years according to the valid education requirements. After the fifth year of the termination of student status the candidate is not allowed to take the final exam. Only students who do not have outstanding charges are allowed to take the final exam. (E.g.: Students who obtained a pre-degree certificate until 1 September 2020 can take the final exam until 1 September 2022.)

A student having obtained the pre-degree certificate (absolutorium) will finish his/her studies training by taking the final exam. A final exam is the evaluation and control of the knowledge and skills acquired in tertiary education during which the candidate has to certify that he/she is able to apply the obtained knowledge in practice.

A final exam can be taken in the forthcoming exam period after obtaining the pre-degree certificate. The Department announces two final exam dates in a year, one at the beginning of January and one at the end of June. A final exam has to be taken in front of the Committee on the fixed date. If a candidate does not pass his/her final exam by the termination of his/her student status, he/she can take his/her final exam after the termination of the student status on any of the final exam days of the relevant academic year according to existing requirements on the rules of the final exam.

The Final exam consists of two parts according to the curriculum.

1. Written and oral exam on the given topics.
2. Thesis Defence (a presentation of the thesis, answering questions, comments then answering questions based on the knowledge related to the thesis topic)

A final exam can be started if the candidate can be submitted to the final exam on the basis of definite opinion of the referees. The two parts must be held on the same day.

The parts of the final exam are evaluated on a five-point scale by members with voting rights in the Final Exam Board. The final grade for the final exam will be decided on by voting in a closed sitting after the final exam, then. In case of equal votes, the committee chair will make the decision. Final exam results will be announced by the committee chair. Results of the final exam and thesis defence will be announced at the end of the given exam day (when all candidates finished final exam and thesis defence on the given day). A note of the final exam will be taken.

*Improving failed final exam*

If a thesis is evaluated with a fail mark by the Final Exam Board a final exam has to be retaken with a new or modified thesis.

If any of part if the final exam is a fail it must be retaken according to the existing rules of the university. Final exam can be retaken twice. The ensuing final exam period is the soonest that the re-sit is allowed.

*Final exam board*

Committee chair and members of the committee are called upon and mandated by the dean with the consent of the Faculty Council. They are selected from the acknowledged internal and external experts of the professional field. Traditionally, it is the chair and in case of his/her absence or indisposition the vice-chair who will be called upon, as well. The committee consists of – besides the chair – at least one member (a professor, an associate professor or college professor) and at least two questioners (instructors) and the examiner. In controversial cases the chair makes the decision. The mandate of a Final Examination Board lasts for three years. The division of the candidates to the mandatory final exam board is announced by the Registry Office.

# **DIPLOMA**

Within 30 days of the successful final exam the diploma is issued and given out by the Faculty at the graduate’s special request. Otherwise, the diploma will be awarded to him/her at the graduation ceremony of the Faculty.

The diploma is an official document decorated with the coat of arms of Hungary which verifies the successful completion of studies in the graduate program. The diploma contains the following data: name of HEI (higher education institution); institutional identification number; serial number of diploma; name of diploma holder; date and place of his/her birth; level of qualification; training program; specialization; mode of attendance; place, day, month and year issued. Furthermore, it has to contain the dean’s (or vice-dean’s) original signature and the seal of HEI. It has to contain the dean’s (in case of being prevented from attending the vice- dean for educational affairs) original signature and the imprint of the official stamp of the tertiary institute.

At the graduate’s special request a certificate on the completion of studies is issued. The document does not contain any reference to qualification, it merely proves that the candidate has taken a successful final exam. The Faculty keeps a record of the certificates issued.

Calculation of a diploma grade according to this formula:

The qualification of the diploma is the simple arithmetic average results of the weighted academic average of all semesters of the given training, the result of the oral complex final exam, and the thesis.

Grade=(A+B+C)/3, where  
A: Weighted academic average of all semesters of the given training

B: Grade of the oral complex final exam  
C: Grade awarded for defending the thesis

On the basis of the calculated average grade the classification of the award: Outstanding 4,81 – 5,00

Excellent 4,51 – 4,80

Good 3,51 – 4,50

Satisfactory 2,51 – 3,50

Pass 2,00 – 2,50

Award with Honour

An Award with Honour is permitted where a student obtained grade 5 in all subjects of the final exam. The average of thesis grade, his/her exam grades and mid-semester grades during his/her studies is at least 4.00. Moreover, he/she is not permitted to have a grade worse than grade 3 during his/her studies.

**MODEL CURRICULUM OF ANIMAL HUSBANDRY ENGINEERING MSC**

The curriculum of the program is available in excel format on the webpage of the Faculty of Agricultural and Food Sciences and Environmental Management:

(https://mek.unideb.hu/en/animal-husbandry-engineering).

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| *Coordinator:Dr. Komlósi István professor* | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **2021. március 24.** |
| **Code** | **Subject name** | | | | **I. semester** | | | | **II. semester** | | | | **III. semester** | | | | **IV. semester** | | | |  |
| 14 | | | | 14 | | | | 14 | | | | 14 | | | | **Lecturer** |
| lec | prac | type | credit | lec | prac | type | credit | lec | prac | type | credit | lec | prac | type | credit |  |
|  | ***Foundation Primary Courses*** | | | | | | | | | | | | | | | | | | | |  |
| MTMAL7001A | Animal Genetics | | | | 2 | 1 | E | 4 |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Komlósi István |
| MTMAL7002A | Physiology of Production Traits | | | | 2 | 1 | E | 3 |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Pálfyné Dr. Vass Nóra |
| MTMAL7003A | Applied Chemistry | | | | 2 | 2 | E | 4 |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Vágó Imre |
| MTMAL7004A | Resarch methods, Biometry | | | | 2 | 2 | E | 4 |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Posta János |
|  | ***Number of hours:*** | | | | ***8*** | ***6*** | ***15*** | |  |  |  | |  |  |  | |  |  |  | |  |
|  | ***Prime Courses*** | | | | | | | | | | | | | | | | | | | |  |
| MTMAL7005A | Animal Reproduction | |  |  | 2 | 1 | E | 3 |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Rátky József |
| MTMAL7006A | Fodder Plant Production | | | | 2 | 0 | P | 3 |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Kutasy Erika |
| MTMAL7007A | Animal Nutrition | | | |  |  |  |  | 2 | 1 | E | 4 |  |  |  |  |  |  |  |  | Dr. Bársony Péter |
| MTMAL7008A | Pasture Management and Grazing | | | |  |  |  |  | 2 | 2 | E | 4 |  |  |  |  |  |  |  |  | Dr. Nagy Géza |
| MTMAL7009A | Animal Husbandry | |  |  |  |  |  |  | 2 | 1 | E | 4 |  |  |  |  |  |  |  |  | Dr. Czeglédi Levente |
| MTMAL7010A | Organisation of Breeding | | | |  |  |  |  | 2 | 0 | E | 3 |  |  |  |  |  |  |  |  | Dr. Komlósi István |
| MTMAL7011A | Food Quality and Food Chain Safety | | | |  |  |  |  | 2 | 2 | E | 4 |  |  |  |  |  |  |  |  | Dr. Czipa Nikolett |
| MTMAL7012A | Animal Farm Technologies | | | |  |  |  |  |  |  |  |  | 2 | 1 | E | 3 |  |  |  |  | Novotniné Dr. Dankó Gabriella |
| MTMAL7013A | Milk and Meat Processing | | | |  |  |  |  |  |  |  |  | 1 | 2 | E | 3 |  |  |  |  | Dr. Rózsáné Dr. Várszegi Zsófia |
| MTMAL7014A | Molecular Genetics and Proteomics . | | | |  |  |  |  |  |  |  |  | 1 | 2 | E | 3 |  |  |  |  | Dr. Czeglédi Levente |
| MTMAL7015A | Planning of Animal Farms | | |  |  |  |  |  |  |  |  |  | 2 | 0 | E | 3 |  |  |  |  | Dr. Hagymássy Zoltán |
| MTMAL7016A | Fish Breeding | | | |  |  |  |  |  |  |  |  | 2 | 0 | P | 3 |  |  |  |  | Dr. Stündl László |
| MTMAL7017A | Food Marketing | | | |  |  |  |  |  |  |  |  | 2 | 0 | E | 3 |  |  |  |  | Dr. Fehér András |
| MTMAL7018A | World Animal Husbandry | | | |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 1 | E | 3 | Dr. Rózsáné Dr. Várszegi Zsófia |
| MTMAL7019A | Beekeeping | | | |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 2 | P | 3 | Dr. Oláh János |
| MTMAL7020A | Disease Control | | | |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 0 | E | 3 | Dr. Pálfyné Dr. Vass Nóra |
| MTMAL7021A | Animal Welfare and Administration | | | |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 0 | E | 3 | Dr. Knop Renáta |
| MTMAL7022A | Economy of Livestock Enterprises | | | |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 2 | E | 4 | Dr. Szűcs István |
| MTMAL7023A | Management of Livestock Farms | | | |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 2 | E | 4 | Dr. Komlósi István |
|  | ***Number of hours:*** | | | | ***4*** | ***1*** | ***6*** | | ***10*** | ***6*** | ***19*** | | ***10*** | ***5*** | ***18*** | | ***11*** | ***7*** | ***20*** | |  |
|  | ***Subjects of free choice*** | | | | | | | | | | | | | | | | | | | |  |
| MTMAL7024A | Aquaculture | | | | 2 | 1 | P | 3 |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Stündl László |
| MTMAL7026A | Ecological Management of Farm Animals | | | |  |  |  |  | 2 | 1 | P | 3 |  |  |  |  |  |  |  |  | Dr. Czeglédi Levente |
| MTMAL7031A | Nutrition and Product Quality | | | |  |  |  |  | 2 | 1 | P | 3 |  |  |  |  |  |  |  |  | Dr. Szabó Csaba |
| MTMAL7030A | Advanced Molecular Genetics | | | |  |  |  |  |  |  |  |  | 2 | 1 | P | 3 |  |  |  |  | Dr. Kusza Szilvia |
| MTMAL7029A | Feeds and Feed Processing | | | |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 1 | P | 3 | Dr. Szabó Csaba |
|  | ***Number of hours:*** | | | | ***2*** | ***1*** | ***3*** | | ***4*** | ***2*** | ***6*** | | ***2*** | ***1*** | ***3*** | | ***2*** | ***1*** | ***3*** | |  |
|  |  | | | |  | | | | | | | |  |  |  |  |  |  |  |  |  |
|  | ***Compulsory subjects*** | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MTMAL7GYA | Farm Practice (160 hours) | | |  |  | 160 | A | 5 |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Komlósi István |
| MTMAL7D1A | Thesis Preparation I. | | | | 0 | 2 | G | 5 |  |  |  |  |  |  |  |  |  |  |  |  | Lecturer |
| MTMAL7D2A | Thesis Preparation II. | | | |  |  |  |  | 0 | 3 | G | 8 |  |  |  |  |  |  |  |  | Lecturer |
| MTMAL7D3A | Thesis Preparation III. | | | |  |  |  |  |  |  |  |  | 0 | 3 | G | 8 |  |  |  |  | Lecturer |
| MTMAL7D4A | Thesis Preparation IV. | | | |  |  |  |  |  |  |  |  |  |  |  |  | 0 | 1 | G | 4 | Lecturer |
| MTM7NY1A | Academic language skills | | | |  |  |  |  | 2 | 0 | G | 3 |  |  |  |  |  |  |  |  |  |
| MTM7NY2A | Professional language skills | | | |  |  |  |  |  |  |  |  | 2 | 0 | G | 3 |  |  |  |  |  |
| SI-001 | Physical Activity | | | | 0 | 2 | A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | ***Óraszám összesen:*** | | | | ***0*** | ***4*** | ***10*** | | ***2*** | ***3*** | ***11*** | | ***2*** | ***3*** | ***11*** | | ***0*** | ***1*** | ***4*** | |  |
|  | *Total number of credits for compulsory subjects* | | | | *31* | | | | *30* | | | | *29* | | | | *24* | | | | **114** |
|  | *Total number of credits for free choice subjects* | | | | *3* | | | | *6* | | | | *3* | | | | *3* | | | | **6** |
|  | **Total credits:** | | | | **31** | | | | **30** | | | | **29** | | | | **24** | | | | **+6 credit for free choice subjects** |
|  | **Total number of lectures** | | | | 14+12 | | | | 16+9 | | | | 14+9 | | | | 13+9 | | | | **57+199+free choice 6+3** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Final exam: Animal breeding and economics | | | | E Exam, P Practice | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |