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

Agricultural Engineering BSc Program

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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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**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**

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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**

# <https://edu.unideb.hu/p/university-calendars>

# **THE AGRICULTURAL ENGINEERING BSc PROGRAM**

INTRODUCTION OF THE PROGRAM

|  |  |
| --- | --- |
| Name of graduate program: | Agricultural Engineer’s Program |
| Level | Undergraduate |
| Qualification | Agricultural Engineer |
| Mode of attendance | Full-time |
| Faculty | Faculty of Agricultural, Food Sciences and Environmental Mangement |
| Institute | Institute of Crop Sciences |
| Program coordinator | Dr. József Csajbók, Associate Professor |
| Program length | 7 semesters |

**About the course:**

In the agricultural engineering undergraduate course , students learn about different areas of the agricultural sector, gain insight into crop production, animal husbandry, and also gain unique agrotechnical knowledge (e.g., horticultural, fish farming, forestry, environmental, and game management knowledge). Students also acquire knowledge of science, technology, agriculture, and economics, which makes them agricultural professionals with general skills in agricultural production, processing, and farming.

What does the degree offer me?

* principles of sustainable agriculture
* extensive knowledge of science, production technology and economics
* skills in precision farming and biotechnology
* practical experience
* profeesional study tours and farm economics practices

**Internship, practice:** Students should complete a 12-week professional practice in the last semester.

**Areas of Study:**

Zoology, Agricultural chemistry, Agricultural botany, Animal physiology, Organic and biochemistry, Agricultural and food industrial microbiology, Plant physiology, Soil science, Water management, Environmental management, Land use and regional development, Agricultural machinery, Economic sciences, Crop production, Agrochemistry, Agroecology, Feeding for animals, Animal husbandry, Horticulture, Plant genetics and plant breeding, Animals health, Food technologies, Quality management, Farm business management, Forest and game management, Grassland management, Integrated plant protection

**Careers:**

Undergraduates may find employment in agricultural enterprises, even in management positions, in the field of agricultural advisory and administration, in research institutes, in own farms, in advocacy organisations.

**COURSE DESCRIPTIONS FOR AGRICULTURAL ENEERING BSC**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MTB7003A | Zoology |  |  |  |
| MTB7004A | Agricultural history |  |  |  |
| MTB7005A | Mathematics |  |  |  |
| MTB7006A | General and inorganic chemistry | | | |
| MTB7007A | Agricultural botany |  |  |  |
| MTB7008A | Informatics |  |  |  |
| MTBM7001A | Agricultural fundamentals I |  |  |  |
| MTBM7002A | Animal physiology | |  |  |
| MTB7009A | Organic and biochemistry | | |  |
| MTB7010A | Basics of mechanical engineering | | | |
| MTB7011A | Soil science | | | |
| MTB7012A | Water management | | | |
| MTB7013A | Agricultural and food industrial microbiology | | | |
| MTBM7003A | Agricultural fundamentals II | | |  |
| MTB7014A | Basic of plant physiology |  |  |  |
| MTB7015A | Environmental management | | |  |
| MTB7016BA | Crop production I |  |  |  |
| MTB7017A | Land use and regional development | | | |
| MTB7018A | Agricultural machinery | | |  |
| MTB7019A | Animal nutrition | |  |  |
| MTB7020\_AA | Economic sciences I (macro and micro economics) | | | |
| MTB7020\_BA | Economic sciences I (EU agricultural policy, agricultural economics) | | | |
| MTB7021A | Genetics and biotechnology | | | |
| MTB7022A | Agricultural chemistry | | |  |
| MTB7023A | Animal husbandry I | |  |  |
| MTBM7004BA | Agroecology | |  |  |
| MTBM7005A | Horticulture I | |  |  |
| MTBM7006A | Crop production II | |  |  |
| MTBM7007A | Animal husbandry II | |  |  |
| MTB7024\_AA | Economic sciences II (business studies) | | | |
| MTB7024\_BA | Economic sciences II (financial knowledge and accounting) | | | |
| MTB7025A | Plant protection I (plant pathology) | | | |
| MTBM7014A | Animal husbandry III | | | |
| MTBM7008A | Horticulture II | | | |
| MTB7026\_AA | Economic sciences III. (communication, management and organisational skills) | | | |
| MTB7026\_BA | Economic sciences III (extension services) | | | |
| MTB7027A | Plant protection II (entomology) | | | |
| MTBM7009A | Crop production III | |  |  |
| MTB7028A | Statistics | | | |
| MTBM7010A | Forest management | |  |  |
| MTB7029A | Regulation and administration of agriculture | | | |
| MTBM7011A | Animal health and hygiene | | | |
| MTBM7012A | Food technologies, food safety | | | |
| MTBM7013A | Economy of agricultural sectors | | | |
| MTBM7015A | Grassland management | | | |
| MTB7030A | Plant protection III (weed control and integrated plant protection) | | | |
| MTBM7NG1A | Internship I\* | | | |
| MTBM7NG2A | Internship II\*\* | | | |
| MTB7GYAKBSCA | Internship program (12 weeks long practice) | | | |

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| MTBM7017A | Feed knowledge, feed production | | | |
| MTBM7018A | Livestock genetics | |  |  |
| MTBM7019A | Etology |  |  |  |
| MTBM7020A | Lake economical husbandry technologies | | | |
| MTBM7021A | Qualification of animal products |  |  |  |
| MTBM7022A | Reproduction biology | | |  |
| MTBM7023A | Pigeon and rabbit farming | | |  |
| MTBM7025A | Soil ecology | | |  |  |
| MTBM7026A | Irrigated farming | | |  |  |
| MTBM7027A | Plant nutrition management | | |  |
| MTBM7028A | Seed production and variety use | | |
| MTBM7029A | Medicinal plants and spice crops production | | |
| MTB7001A | Basics of applied plant biology | | |  |
| MTB7002A | Basics of the applied chemistry | | |  |
| MTBM7030A | Game management | | |  |  |
| MTBM7031A | Environment technology | | |  |
| MTBM7032A | Precision farming | | |  |  |
| MTBM7033A | Quality management system | | |  |

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| --- | --- | --- | --- |
| MTB7NY1A | Professional language skills I | | |
| MTB7NY2A | Professional language skills II | | |
| SI-001 | Physical education | | |
| SI-001 | Physical education | | |
| MTBM7H1A | Agricultural practice I | | |
| MTBM7H2A | Agricultural practice II | | |
| MTBM7H3A | Agricultural practice III | | |
| MTBM7H4A | Agricultural practice IV | | |
| MTB7D1A | Final dissertation I |  |  |
| MTB7D2A | Final dissertation II | | |

**Professional language skills I. (English)**

ECTS Credit Points: **3**

0 hour(s) lecture and 54 hour(s) seminar per semester (0+4/week)

Type of exam: practical

Requirements:

- for signature: 3 allowed absences per semester.

- for a grade: Completing assignments / exercises.

**Summary of content - practice**:

The aim of the course is to prepare students for academic studies in the field of agriculture. The focus is specifically on the skills which students of agribusiness and agriculture need, that include written and oral communication, technical vocabulary. During the course we intend to cover key facts and concepts from the discipline of agriculture.

1. Orientation, needs analysis
2. Agriculture and business (Listening, speaking activities)
3. The origins of agribusiness
4. Foundations of modern agriculture (reading, writing activities)
5. Agricultural advances through the ages
6. Soil, land and environment (Listening, speaking activities)
7. Food security
8. Midterm exam. Organic farming methods
9. Technology and agribusiness (reading, writing activities)
10. Using IT for research .
11. Agribusiness marketing (Listening, speaking activities)
12. Products and strategies, marketing mix (reading, writing activities)
13. Revision
14. End term, Evaluation

**Literature**

ROBIN MATHESON (2014): Agribusiness and Agriculture in Higher Education Studies. Garnet publishing Ltd. ISBN 978-1-859664-450-0

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.

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

Michael McCarthy, Felicity O’Dell: Academic Vocabulary in Use

**Zoology**

ECTS Credit Points: 5

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

Type of exam: Colloquium

Requirements:

- for signature: successful seminar tests

- for a grade: successful colloquium

**Summary of content - theory**:

The target of the course is to ensure the general knowledge of students in zoology, to introduce the structure and functioning of the animal cell, the types of animal tissues, their basic structure, significance, the general definitions of reproduction and ontogenesis. Introducing the main taxonomic units, and to teach to recognize invertebrate and vertebrate species in practice. Evaluating animal species considering their nature conservation and possible economic values and to evaluate the human effects on the world of animals.

**lectures:**

1. The anatomy of animal cells and tissues
2. Animal taxonomy
3. Anatomy and taxonomy of molluscs
4. Anatomy and taxonomy of arthropods
5. Anatomy and taxonomy of insect
6. Taxonomy of insects
7. Anatomy and taxonomy of vertebrates
8. Anatomy and taxonomy of fishes
9. Anatomy and taxonomy of amphibians
10. Anatomy and taxonomy of reptiles
11. Anatomy and taxonomy of birds
12. Anatomy and taxonomy of mammals
13. Ecology, biogeography
14. Conservation biology

**practices:**

1. The basics of animal taxonomy
2. Phylum: Platyhelminthes - flatworms , Nematoda – roundworms
3. Phylum: Annelida - segmented worms
4. Phylum: Mollusca - snails, shellfish, cephalopods, Echinodermata - starfish, sea urchins
5. Phylum: Arthropoda – crustacea, crabs, arachnids, insects
6. Class of Insects 1
7. Class of Insects 1
8. Test
9. Phylum: Chordata – Fishes,
10. Class of Amphibians
11. Class of Reptiles
12. Class of Birds
13. Class of Mammals
14. Test

**Literature**

HICKMAN, C. P., ROBERTS, L. S., & LARSON, A. (1997). Integrated principles of zoology. Boston, Mass, WCB/McGraw-Hill. ISBN 10 0072909617

MILLER, S. 2019 Zoology, McGraw-Hill Higher Education, Print ISBN: 9781259880025

**Agricultural history**

ECTS Credit Points: 3

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

Type of exam: colloquium

Requirements:

- for signature: participation in the lectures

- for a grade: successful completion of the written exam test

**Summary of content - theory**:

The aim of the course is to introduce the history of the development of agriculture and agricultural economy in Hungary and in the world from the beginnings to the present. It also aims to deepen the specific and general knowledge of the profession, with particular emphasis on the history of the development of European and Hungarian agriculture. The curriculum will include a general description of the historical past, the present and the near future, and their development.

**lectures:**

1. Subject requirements, topics. Basic concepts.
2. The development of agriculture, its ancient forms in the world and in early Hungarian society, Greek and Roman slave agriculture
3. Feudal socio-economic conditions and the development of agriculture in Europe in the Middle Ages and the late Middle Ages (6th - 15th centuries).
4. Feudal socio-economic conditions and the development of agriculture in Hungary in the Middle and Late Middle Ages (X-XVII centuries)
5. The history of the development of capitalist economy and agriculture in the 15th and 19th centuries
6. The economy and agricultural economy of Hungary in the transition from classical feudalism to capitalism (1711-1867)
7. The emerging and the advanced capitalist economy and agriculture in dualist Hungary (1849-1914)
8. Main features and development of the world economy between the two world wars (1920-1945)
9. History of the development of Hungarian agriculture between the two world wars (1918-1939)
10. Main trends in the economy and agricultural development of developed countries after the Second World War
11. The development of Hungarian agriculture after 1945
12. General characteristics and trends in the transformation of Hungarian agriculture after the 1989/90 regime change
13. Short history of the development of the European Union
14. Regions and regionalism in the European Union

**Literature**

1. Peter Gunst: Agrarian development and social change in Eastern Europe, 14th-19th centuries, ISBN 9780860785989, Published August 22, 1996 by Routledge, 336 Pages
2. János Banaji: Agrarian change in late antiquity : gold, labour, and aristocratic dominance, Oxford, [U.K.] ; New York : Oxford University Press, 2002, ISBN 0199244405
3. Gábor Demeter: Agrarian transformations in Southeastern Europe : from the late 18th century to World War II, Institute of History, Bulgarian Academy of Sciences, Szófia. ISBN 978-954-2903-31-4
4. László Makkai: Agrarian landscapes of historical Hungary in feudal times, Studia historica Academiae Scientiarum Hungaricae, Akadémiai Kiadó, Budapest 1980, ISBN 963 05 2553 4
5. Political economy of agrarian reform in Central and Eastern Europe / ed. by Johan F. M. Swinnen, Aldershot ; Brookfield etc. : Ashgate, [1997], ISBN 1859725600
6. Agriculture in Economic Development. Edited by Carl Eicher and Lawrence Witt, New York : McGraw-Hill, cop. 1964
7. Vera Zimányi: Economy and society in sixteenth and seventeenth century Hungary : 1526-1650, Studia historica / Academiae Scientiarum Hungaricae, Akadémiai Kiadó, Budapest, 1987, ISBN 963 05 4404 0
8. Economic integration and interdependence in Central and Eastern Europe / edited by Zoltán Felméry, Dialóg Campus, Budapest 2020, ISBN 978-963-531-210-8

**Mathematics, MTB7005A**

ECTS Credit Points: 4

2 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: practical

Requirements:

- for signature: The attendance on every lecture and practice is compulsory for the students as the different topics are built upon one another. A catalogue is being made during the lectures for statistical purposes and students should not miss more than five lectures. The semester will be closed by giving each student a grade which will be offered according to the results of the midterm or the final tests. In order to fulfill the subject every student should receive a signature which has a condition. There should not be more than four uncertified absences from the practices and five uncertified absences from the lectures or 25% should be obtained from the total score of the six midterm tests

- for a grade: Evaluation will be made according to the results of the midterm (in the 3rd, 5th, 7th, 9th, 11th, 14th week) or the final (in the examination period) tests. Each student gets a recommended grade in case the final score from the tests reaches at least 58% of the obtainable total. Every student must receive a signature too. Those students who were not able to obtain signature or grade during the learning period, will be given 3 extra chances during the examining period.

The current score limits are as follows:

Before the examination period

Six tests.

Not compulsory to accept (the students can refuse).

70-79 points: pass (2).

80-89 points: satisfactory (3).

90-99 points: good (4).

100-120 points: excellent (5).

Examination

In writing.

0%-49%: fail (1).

50%-62%: pass (2).

63%-74%: satisfactory (3).

75%-86%: good (4).

87%-100%: excellent (5).

**Summary of content - theory**:

Course objectives: The main goal of the subject is that the students could be introduced to the basic methods and terminology or definitions in mathematics which can be used in our subjects. The differential calculus of one-variable functions and its practical application is in the center of interest as well as the extreme value and elasticity calculation of one-variable functions. During the course of practical lessons students should gain experience in problem solving from the various topics of the subject.

**lectures:**

1. Review of Algebra. Operations. Exponents and Radicals. Algebraic Expressions. Equations. Inequality. Summation Notation.
2. Sets. Set Operations. Sets of Numbers. Cardinality.
3. Functions I. Cartesian Coordinate Systems. Lines. Linear Functions. Applications in Life Sciences.
4. Functions II. Properties of Functions. Quadratic Functions. Polinomial and Rational Functions. Translation and Reflection. Applications in Life Sciences.
5. Functions III. Exponential, Logarithmic and Trigonometric Functions. Applications in Life Sciences.
6. Functions, Limits and Continuity.
7. Differentiation I. Differential Calculus Rules. Higher Order Derivatives.
8. Differentiation II. Curve Sketching.
9. Differentiation III. Optimization, Elasticity and Other Applications.
10. Matrix Algebra I. Matrix Operations.
11. Matrix Algebra II. Gauss-Jordan Elimination.
12. Matrix Algebra III. Eigenvalues and Eigenvectors.
13. Mathematics of Finance. Compound Interest. Present Value. Annuities. Present Value of Annuity. Future Value of Annuity. Amortization of Loans.
14. Summary. Evaluation, Practice for the Examination.

**practices:**

1. Review of Algebra. Operations. Exponents and Radicals. Algebraic Expressions. Equations. Inequality. Summation Notation
2. Sets. Set Operations. Sets of Numbers. Cardinality.
3. Functions I. Cartesian Coordinate Systems. Lines. Linear Functions. Applications in Life Sciences.
4. Functions II. Properties of Functions. Quadratic Functions. Polinomial and Rational Functions. Translation and Reflection. Applications in Life Sciences.
5. Functions III. Exponential, Logarithmic and Trigonometric Functions. Applications in Life Sciences.
6. Functions, Limits and Continuity.
7. Differentiation I. Differential Calculus Rules. Higher Order Derivatives.
8. Differentiation II. Curve Sketching.
9. Differentiation III. Optimization, Elasticity and Other Applications.
10. Matrix Algebra I. Matrix Operations.
11. Matrix Algebra II. Gauss-Jordan Elimination.
12. Matrix Algebra III. Eigenvalues and Eigenvectors.
13. Mathematics of Finance. Compound Interest. Present Value. Annuities. Present Value of Annuity. Future Value of Annuity. Amortization of Loans.
14. Summary. Evaluation, Practice for the Examination.

**Literature**

1. Greenwell, Raymond N.; Ritchey, Nathan P.; Lial, Margaret: Calculus for the Life Sciences: Global Edition, Pearson Education, 2014, ISBN-13: 9781292062334

2. E. Haeussler – R. Paul – P. Wood (2014): Introductory Mathematical Analysis for Business, Economics, and the Life and Social Sciences, 13th Edition, PEARSON, UK, ISBN:978-1-29202-114-0

3. R.J. Harschbarger – J. J. Reynolds (2015): Mathematical application for Management, Life and Social Sciences, Brooks/Cole, USA, Belmont, CA, ISBN: 978-1305108042, 1111 pages

4. S. T. Tan (2013): Applied Mathematics for Managerial, Life and Social Sciences, Sixth Edition, Brooks/Cole, Belmont, CA, USA, ISBN:1-133-10894-6, Pages 955

5. K. Sydastaer – P. Hammond (2008): Essential Mathematics for Economic Analysis, Prentice Hall, London, UK, ISBN: 978-0-273-71324-1

**General and Inorganic Chemistry**

ECTS Credit Points 4

2 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: Colloquium

Requirements:

- for signature: There are “General and Inorganic laboratory practices” in every second week (2 hrs). Every practice there will be written test on the previous lesson or homework. There are 8 parts of the 6 tests. The semester can be accepted if the student done 7 parts of 8. The attendance is compulsory; no more than two missing can be accepted during the semester (the missed tests can be repeated at the end of the semester). The bi-weekly tests of the practice will be accepted if the exercises are solved at a minimum level of 60 percentage.

- for a grade: Oral and/or written exam(only if the practice is signed)

**Summary of content - theory**:

Course objectives:

Acquisition of the chemical bases of the processes that determine the production and quality assurance agricultural goods, their scientific foundation, and the understanding of the chemical bases. Developing skills to accommodate new knowledge.

Education of selected general and inorganic chemical knowledge, grounding of chemical studies, and the foundation of related primer and subject areas (plant and animal physiology, plant nutrition and animal feeding, soil science, etc.).

* 1st week: The subject of chemistry. Material and structure. Material and appearance forms, their quantitative relationships. The financial systems and their grouping possibilities. Elemental particles forming the atom. Structure of the nucleus. Atomic models. The basics of spectroscopy. X-radiation.
* 2nd week: Quantum numbers, track energy, order of filling of the atomic orbitals, Pauli principle and Hund rule. Periodic Table. Atomic body, valence shell. Ionization energy, electron affinity, electronegativity. The size of atoms, ions, and their change in the periodic system.
* 3rd week: Structure of molecules. Primary chemical bond types, binding energy and binding distance. Secondary chemical binding forces and their significance.
* 4th week: Geometry and polarity of molecules. Compound ions, binding order. Dative binding. Complexes, chelates: their stability and significance in food sciences. Clathrates and their use in the agriculture.
* 5th week: Solid state. Crystal grid types and errors. Solutions, solubility. Hydration heat, dissolving heat. Liquid state, surface tension, critical parameters, liquid crystals. Vapour tension. Gaseous state, ideal and realistic gases, gas laws.
* 6th week: Multi-component material systems. Mixtures, solutions, solubility, electrolytes. Methods of expressing the concentration of solutions. Dilute solutions and their properties: colligative properties and their relationships.
* 7th week: Reaction kinetics. The direction, time course of the chemical processes, factors affecting the speed of the reactions. Catalysis, catalysts, biocatalysts. Catalyst inhibitors, negative catalysis.
* 8th week: Protolytic processes. Major acid-base theories. Reversible reactions, Law of mass effect. Le Chatelier-Braun principle. Dissociation of weak acids and bases. Degree of dissociation, dissociation constant and their quantitative correlations.
* 9th week: Auto-protolytic process of water, definition and interpretation of pH value. Importance of pH value in biological organisms. Hydrolysis of salts, food and environmental significance. Acid-base indicators, buffers.
* 10th week: Electrochemistry. Oxidation number and its calculation. Electrolysis, Faraday's laws. Electrode, normal and standard potential. Hydrogen electrode. Galvanic elements, batteries. Redox systems, redox potential and their role in foods. Local elements and their use in corrosion protection.
* 11th week: Colloidal systems, the specific surface of colloids. Production and grouping of colloids, properties of colloidal solutions. Natural colloids. Absorption phenomena. Stability of colloids. Gels and their biological and food industry significance.
* 12th week: Distribution of chemical elements by frequency and property. Non-metallic elements: Hydrogen. Halogen elements and their compounds. Elements of the oxygen group. Oxygen and its compounds. Sulphur and its compounds, their significance in the agricultural production.
* 13th week: Elements of a nitrogen group. Nitrogen and its compounds. Phosphorus and its compounds. Elements of carbon group. Allotropy phenomenon. Carbon and its inorganic compounds.
* 14th week: Silicates and their significance in the soils. Boron and its compounds. Metallic elements: alkali metals, alkaline earth metals and their compounds. Water hardness, elimination of water hardness, their importance in the production and quality of food. Natural waters.

**Summary of content – practice**

Skills to be learnt:

To learn how to work in a chemistry laboratory, knowing the basic equipment’s handling. Deeping the theoretical knowledge by solving some practical exercises. To get adequate skills of concentration calculation. Basic knowledge on the acid-base titrations and the calculation of their results.

* 1st week: Safety regulations in the chemistry laboratory. Basic laboratory techniques. Chemical formula of ionic compounds.
* 2nd week: Chemical and physical properties of some common and in the agricultural production important inorganic compounds
* 3rd week: Concentration units used for describing of the solutions. Calculations of chemical concentrations, part 1.
* 4th week: Calculations of chemical concentrations, part 2.
* 5th week: Deeping and better understanding of pH value and its importance in the living organisms. Measurement and calculation of pH values of different test solutions. Demonstration of salt hydrolysis.
* 6th week: Acid-base titrations and the calculation of their results.
* 7th week: Summarising of practices, and writing the final test.

Compulsory literature:

Ebbing, Darrell D. – Gammon, Steven D. (2016): General Chemistry. 11th Edition, Cengage learning. Boston, MA. ISBN 978-1-305-58034-3

Beran, J. A. (2009): Laboratory Manual for General Chemistry. 8th Edition, University of Missouri, ISBN 13: 978-047042196-3

Optional literature:

Chang, R. (2014): General Chemistry. 7th Edition, McGraw-Hill Publishing, New York, NY. ISBN: 978-0-07-340275-8

Riedel, E. – Meyer, H.-J. (2018): Allgemeine und anorganische Chemie. 12. überarbeitete Auflage. Walter de Gruyter, Berlin. ISBN 978-3-11-058394-6

Responsible lecturer:

Assoc. Professor Dr. habil. Imre Vágó, CSc, deputy head of Institute

**Informatics**

ECTS Credit Points 3

0 hour(s) lecture and 2 hour(s) seminar per semester

Type of exam: Practice

Requirements:

- for signature: Active participation in the practice

- for a grade: For the completion of the semester students have to pass 2 practical task during the semester. To get 50 points from Excel practical exam, and 50 points from Database practical exam

**Summary of content - theory**:

The course is designed to reach a basic level of Informatics knowledge. These knowledge will help them in the following courses and as well as in the practice. They have to learn how to collect data from the internet, and they have to solve complex exercises with the use of Office program family. The course is mainly application and practice oriented.

**practices:**

1. The use of spreadsheet: basic, formatting, data format
2. The use of spreadsheet: links, (SUM, COUNT, MIN, MAX, AVERAGE)
3. The use of spreadsheet: logical operators (IF, AND, OR); Search functions (VLOOOUP, INDEX, MATCH)
4. The use of spreadsheet: Matrix functions
5. The use of spreadsheet: Pivot tables
6. Practical exam from Excel
7. Database: Creation of tables
8. Database: Creation of relation tables, the role of keys
9. Database Creation, sheet, form creation
10. Database Queries (QBE, SQL)
11. Database Action oriented queries (refreshing, deletim, modification tables)
12. Database Report creation
13. Independent practical problem solving
14. Practical exam from Access

**Literature**

**Compulsory readings:**

Department teaching materials: Business informatics, electronic booklet 2017.

**Recommended readings:**

R. Elmasri: Fundamentals of Database Systems, Pearson, 2016, ISBN: 9781292097619, pp. 1272

Date, J. C.: An Introduction to Database Systems, Pearson, 2003, ISBN13 (EAN): 9780321197849, pp. 1024.

**Agricultural fundamentals I**

ECTS Credit Points: 3

0 hour(s) lecture and 2 hour(s) seminar per semester

Type of exam: written

Requirements:

- for signature: take part on 70% of lecture

- for a grade: successful written exam

**Summary of content - theory**:

Within the framework of the course, we give students an insight into the work processes and certain operations of agriculture, including crop production and animal husbandry. The students acquire knowledge about the practical technical and technological components of the sectors, the different work processes of crop production and animal husbandry. The aim of this subject is to provide basic knowledge for later studies of plant breeding and animal husbandry, and to acquaint the student with the practice of plant breeding and animal breeding at the basic level.

**practices:**

1. The nature and specifics of agricultural production, their practical connections
2. Practical evaluation of cultivation factors and their most important connections in crop production
3. Practical specifics of ecological factors in crop production I.
4. Practical specifics of ecological factors in crop production II.
5. The practical connections of the cultivation branches, the place of crop production in the structure of Hungarian agriculture
6. Aspects of the practical choice of biological bases in crop production, variety use in practice I.
7. Aspects of the practical choice of biological bases in crop production, variety use in practice II.
8. Basic concepts of animal husbandry.
9. Domestication. Hungary's livestock today
10. Digestive characteristics of ruminants, bases of feeding
11. Basics of cattle breeding I .: Keeping and feeding dairy cows.
12. Basics of cattle breeding II .: Beef cattle husbandry technology
13. Basics of Sheep Breeding I: Keeping Technology
14. Basics of sheep farming II: Feeding

**Literature**

1. George Acquaah (2001): Principles of Crop Production. Theory, Techniques, and Technology. Pearson Prentice Hall, Upper Saddle River, New Jersey 07458. ISBN 0-13-114556-8
2. John H. Martin – Richard P. Waldren – David L. Stamp (2006): Principles of Field Crop Production. Pearson Prentice Hall, Upper Saddle River, New Jersey Columbus, Ohio. ISBN 0-13-025967-5
3. Gurbir S. Bhullar - Navreet K. Bhullar (2013): Agricultural Sustainability. Elsevier Inc. 292 p. ISBN: 978-0-12-404560-6

**Professional language skills II. (English)**

ECTS Credit Points: **3**

0 hour(s) lecture and 54 hour(s) seminar per semester (0+4/week)

Type of exam: practical

Requirements:

- for signature: 3 allowed absences per semester.

- for a grade: Completing assignments / exercises.

**Summary of content - practice**:

The aim of the course is to prepare students for academic studies in the field of agriculture. The focus is specifically on the skills which students of agribusiness and agriculture need, that include written and oral communication, technical vocabulary. During the course we intend to cover key facts and concepts from the discipline of agriculture.

1. Orientation, revision
2. The effective production manager (Listening, speaking activities)
3. The qualities needed by a production manager
4. Rural economies and financial management (reading, writing activities)
5. The concepts in agri-economics (reading, writing activities)
6. Managing financial accounts Listening, speaking activities)
7. Documentation, profit and loss account and balance sheets
8. Revision and Midterm exam.
9. Food safety (reading, writing activities)
10. Case study: a proactive approach to food safety
11. The future of farming (Listening, speaking activities)
12. EU agricultural policy
13. The good agribusiness
14. End term, Evaluation

**Literature**

ROBIN MATHESON (2014): Agribusiness and Agriculture in Higher Education Studies. Garnet publishing Ltd. ISBN 978-1-859664-450-0

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.

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

Michael McCarthy, Felicity O’Dell: Academic Vocabulary in Use

**Animal Physiology**

ECTS Credit Points: 3

2 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: oral examination

Requirements:

- for signature: attendance and report

- for a grade: exam

**Summary of content - theory**:

The aim of the Animal Physiology is to provide information on the anatomy and function of the animal body especially those affecting the quality of raw materials of animal origin. Understanding how organisms, organ systems, organs, cells, and bio-molecules carry out the chemical or physical functions that exist in a living system is crucial for understanding and evaluating underlying biological processes, behavioral states and animal response to different biological, social and environmental stimuli.

**lectures:**

1. Current trends in meat consumption. Actualities in production, problems, solutions.
2. Main parts of the animal body and their function
3. Tissues of the animal body and their function and homeostasis
4. Animal digestive system and its function
5. Movement and locomotion
6. Animal endocrine system and its function
7. Animal respiratory system and its function
8. Animal circulatory system and its function
9. Animal reproduction
10. Lactation physiology
11. Physiology of egg production
12. Physiology of meat production
13. Hygiene in animal production
14. Animal welfare issues.

**practices:**

1. Antibiotic resistance and reform. African swine pest.
2. Cavities of the body, body planes, bones, main organs.
3. Homeostasis – way of function, examples.
4. Digestive systems of different animal species. Farm visit.
5. Muscle types, way of function. Microscopic presentation.
6. Hormone types, way of function of the endocrine system.
7. Respiration physiology. Organ dissection.
8. Blood cell types, microscopic presentation.
9. Reproductive system – hormones, organs, function.
10. Milk production – farm visit.
11. Egg production, egg physiology.
12. Meat production – meat types, categories.
13. HACCP, biosecurity.
14. Understanding welfare, welfare in laboratory animals, experiments.

**Literature**

Animal Physiology (2017) - Richard W. Hill, Gordon A. Wyse, Margaret Anderson

Introduction to Animal and Veterinary Anatomy and Physiology (2019) - Aspinall, Victoria (Formerly Hartpury College, Gloucester, UK), Melanie Cappello

**Organic and Biochemistry**

Lecturer and Lab teacher: Erdeiné Dr. Kremper Rita Assistant Professor, PhD

ECTS Credit Points: …4..

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

Type of exam: written

Requirements:

- for signature: participation in lab practises (max two missing is possible) and reach min 35% of the overall test points

- for a grade: to reach min. 50% of the overall test points or write a written exam

**Summary of content - theory**:

to introduce the organic compounds present in plants, discussing their biological function, describing their formation and degradation in the intermediate metabolism

**lectures:**

1. week: Functional groups, intermolecular forces and physical properties of organic compounds
2. week: A brief characterization of alkanes, alkenes, dienes, polyenes (terpenes), : Aromatic compounds: benzene, phenols and quinones.
3. week Heterocyclic compounds alcohols and aliphatic oxo compounds. (Physical-chemical properties. Their most important representatives.): Physical and chemical properties of carboxylic acids, their derivatives ( esters )
4. week: Carbohydrates. Properties of mono-, di and polysaccharides. Relationship between structure and biological function.
5. week. Amino acids, dipeptides, polypeptides. Structure and grouping of proteins. Biological functions of proteins. Protein classification. Structure of cell membranes.
6. week. Lipids (Classification, structure, biological function.)
7. week: Pyridine, pyrimidine, purine, pyrrole,. Porphine backbone compounds and their biological functions.
8. week: Structure of nucleotides. Structure of NAD +, NADP +, FAD, ATP, their biological role. Primary structure and secondary structure of nucleic acids. Biological function of nucleic acids.
9. Week . Protein synthesis. Hydrolysis of proteins
10. week: The enzymes. Classification of enzymes. Regulation of enzyme function. Common features of vitamins and their mechanism of action.
11. week: Photosynthesis. The light and dark phase of photosynthesis. Synthesis of sucrose and starch. C3 - C4 - plants.
12. week: Degradation of carbohydrates. Reaction sequence and energy balance of glycolysis, citric acid cycle and terminal oxidation.
13. week: Fermentation processes. Lipid metobilsm
14. week: Summary of metabolic processes

**practices:**

1. Practise to write structural formula and bond line drawing, The study the physical properties and alkalinity of organic chemicals
2. Test + Separation of leaf pigments with thin layer chromatography
3. Test + Test tube experiments with carbohydrates
4. Test + Experiments with amino acids and proteins
5. Test + The study of enzyme activity versus substrate concentration
6. Test + Determination of C-vitamin content (iodometric titration)
7. Final test

**Literature**

Frederick A. Bettelheim, Mary K. Campbell, Shawn O. Farrell, William H. Brow (2014) Introduction to General, Organic and Biochemistry ISBN-13-9780495110699

Cox, M. M., & Nelson, D. L. (2008). Lehninger principles of biochemistry (Vol. 5). New York: Wh Freeman.

**Basics of mechanical engineering**

ECTS Credit Points: 3

2 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: practical mark

Requirements:

- for signature: The condition for signing is participation in the exercises.

- for a grade: The condition of the practice is the successful completion of the dissertation

**Summary of content - theory**:

The aim of the course is to introduce tractors, tillage machines, seeders, fertilizer spreaders, irrigation machines and sprayers. Another goal is to skill in how to operate, set up, use, and maintain the tractors and the machines of the crop production.

**lectures:**

1. Introduction; Internal combustion engines I. Engine types
2. Internal combustion engines II. Diesel engines
3. Tractors I. - Transmission system: clutch, gearbox, differential
4. Tractors II. - Types, tractor-implement connection elements, cab, maintenance
5. Tillage machines I.
6. Tillage machines II.
7. Sowing machines I.
8. Sowing machines II.
9. Nutrient management machines I.
10. Nutrient management machines II.
11. Irrigation machines
12. Plant protection machines I.
13. Plant protection machines II.
14. Precision crop machinery

**practices:**

1. Internal combustion engines. Otto and Diesel engines
2. Internal combustion engines. Otto and Diesel engines
3. Tractors: Transmission system, clutch, gearbox, differential. tractor-implement connection elements
4. Tractors: Transmission system, clutch, gearbox, differential. tractor-implement connection elements
5. Tillage machines
6. Tillage machines
7. Sowing machines
8. Sowing machines
9. Nutrient management machines
10. Nutrient management machines
11. Irrigation machines
12. Irrigation machines
13. Plant protection machines
14. Plant protection machines

**Literature**

Brian Bell: Farm Machinery ISBN 1903366682

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

**Soil Science**

ECTS Credit Points: 4.

14.hour(s) lecture and 7 hour(s) seminar per semester

Type of exam: colloquium

Requirements:

- for signature: Active participation in exercises and a thesis at the end of the semester.

- for a grade: The exam will be evaluated according to the following grading schedule:

0-49% not accepted (1)

50-62% (2)

63-75% (3)

76-87% (4)

87-100% (5)

**Summary of content - theory**:

To get to know and understand the environmental role of the soil, the processes taking place in the soil. To get to know the impact of agricultural activity on the soil-water-environment system. Can apply the principles of sustainable agricultural activity.

**lectures:**

1. Soil formation
2. Functions of soils
3. Rocks and minerals
4. Weathering of rocks
5. Soil formation factors and processes
6. Soil physical properties, Soil texture, Textural classes, Particle size analysis, Soil structure
7. Soil moisture constants, Methods of determination of soil moisture
8. Thermal properties of soils
9. Soil colloids
10. Layer silicate clays as sources of surface charges
11. Adsorption of ions, Ion exchange
12. Soil organic matter
13. Humus and role of humus in soil
14. Soil types to know for sustainable crop production.

**practices: 7\*2 hours practice**

1. Soil profile description, field tests in the soil. Study of soil genetic levels, colour and structure analysis, compaction, pH, CaCO3 and Na2Ca3 and phenolphthalein alkalinity test
2. Examination the soil texture and examination of water lifting capacity of soil.
3. Soil physical properties. Study of soil density, bulk density, and pore conditions in soils with laboratories methods.
4. Soil water management. Calculation of soil moisture content, water capacity of soils. Irrigation water calculation
5. Soil chemical properties. Measure of the pH of soils. Study of soil acidity forms.
6. Measuring the humus content and humus quality.
7. Quantitative measuring of CaCO3 and Na2CO3 content in soils.

**Literature**

- G. W. Leeper, N.C. Uren (1993): Soil Science an introduction (Fifth Edition) 300. p.

Introduction in Soil Science (2016): Development of E-Courses for B.Sc. (Agriculture) Degree Program https://agrimoon.com/wp-content/uploads/Introduction-to-Soil-Science.pdf.

- David L. Lindbo, Deb A. Kozlowski, C. Robinson (2012): *Know Soil, Know Life.* ISBN-13: 978-0891189541; ISBN-10: 0891189548

**Water management**

ECTS Credit Points: 4

2 hours lecture and 1 hour seminar per semester

Type of exam: C

Requirements:

- for signature: attending seminars, and compiling the report for practice

- for a grade: having signature

**Summary of content - theory**:

Proper management of land and water is essential for achieving sufficient and sustainable food production and food security worldwide. The course aims at the understanding of the role of water management. Review of technological practices, activities of water management concerning agriculture and environmental management. Review of theoretical knowledge and exercises in practice.

**lectures:**

* 1. The importance of water and the European Water Charta
  2. Fundamentals of hydrology, natural water cycle, water management studies
  3. elements of water cycle
  4. Surface and groundwater forms
  5. Basics of hydraulics
  6. The importance of water management
  7. Water quality protection
  8. Flood protection water damage prevention
  9. Soil protection and water management in hilly areas
  10. The concept, components and complexity of land melioration
  11. Basic concepts of irrigation, irrigation development opportunities in Hungary
  12. Irrigation methods
  13. The Water Framework Directive

1. Water management, environmental impacts of water management

**practices:**

1. precipitation curve calculations,
2. precipitation probability,
3. evaporation and transpiration calculations,
4. Reference crop evapotranspiration
5. runoff estimation,
6. infiltration estimation,
7. accumulation modelling I.
8. accumulation modelling I.
9. inland water flow calculation,
10. inland water and drainage modelling task
11. channel sizing tasks I,
12. channel sizing tasks II.
13. water shortage calculation.
14. water requirement calculations

**Literature**

OECD (2014): Climate Change, Water and Agriculture: Towards resilient systems, OECD Studies on Water, OECD Publishing. 111 p. (ISBN: 978-926-420-912-1.)

Sharma, P. (2013): Agricultural Water Management. Genetech, 302 p. (ISBN: 978-818-972-923-3)

van Wijk, L., Wesseling J. (1986): Agricultural Water Management. CRC Press 335 p. (ISBN: 978-906-191-639-0)

Wheatley, K. (2015): Agricultural Water Management: Insights and Challenges. Callisto Reference. (ISBN: 978-163-239-127-8)

**Agricultural and food industrial microbiology**

ECTS Credit Points: 4

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

Type of exam: written

Requirements:

- for signature: practice exam

- for a grade: exam

**Summary of content - theory**:

The aim of the subject is to provide basic knowledge about microbiology for the “microbiological aspects of food safety and quality” and “Microbiological rapid methods” and “Food toxicology” subjects. Students will be introduced into the cell structure, metabolism and genetics of the microorganisms. We will discuss the most important phylogenetic groups and characteristics of prokaryotes and eukaryotes and viruses, and the intrinsic and extrinsic parameters of foods that affect microbial growth. Metabolism and culture of microbes.

**Lectures:**

1. Introduction and major themes of microbiology, history of microbiology
2. Cell chemistry
3. Microbial metabolism, laboratory culture of microorganisms
4. Basic microbial genetics.
5. Microbial evolution and systematics
6. Structure of prokaryotic cells. Diversity of Bacteria and Archea
7. Organelles and phylogeny of microbial eukaryotes. Protists
8. Fungal physiology, structure and symbiosis
9. Fungal systematics and important fungal taxons
10. Methods of microbial taxonomy.
11. Most important prokaryotic taxons and their characteristics.
12. Microbial interactions with humans. Immunity and host defence.
13. Metabolic diversity of microorganisms.
14. Nutrient cycles. Bioremediation

**Practices:**

Skills to be learnt: Students will learn basic microbial laboratory practices including antiseptic work conditions, safe handling of microbial samples, staining microbial cells, using microscopes.

1 - 2. Tools and equipment used in the microbiological laboratory and the sterilization of them

3 – 4. Different media and cultivation methods

5 – 6. Preparation of plate count agar (PCA) media

7 – 8. Enumeration of total plate count of soil sample with plate count method

9 – 10. Preparation of pure culture with streak plate method

11 – 12. Morphological examination of microorganisms (Gram stain)

13 – 14. Practical exam

**Literature**

Madigan, M. T, Martinko, J. M., Bender K., Buckley, D., Stahl, D (2015): Brock Biology of Microorganisms, Benjamin Cumming, 14th edition 1030 pp, ISBN 978-1-292-01831-7

Jay, J. M., Loessner, M. J., Golden, D. A. (2005): Modern Food Microbiology. ISBN 978-0-387-23413-7

Adams, M. R., Moss M. O. (2008): Food Microbiology. The Royal Society of Chemistry. ISBN 978-0-85404-284-5

Karaffa E., Peles F (2014): Microbiological Aspects of Food Quality and Safety. Debreceni Egyetem, Debrecen.

**Agricultural fundamentals II.**

ECTS Credit Points: 3

0 hour(s) lecture and 2 hour(s) seminar per semester

Type of exam: P

Requirements:

- for signature: participation in the seminars is compulsory (70%)

- for a grade: practical grade

**Summary of content - theory**:

The aim of the course is to familiarise students with the basic concepts of animal husbandry and plant production, as well as the biological and production characteristics of the most important animal and plant species. One half of the semester (7 weeks) is devoted to livestock production, the other half (7 weeks) to crop production.

**Practices:**

1. The importance of agricultural production and livestock farming
2. Basic animal husbandry concepts
3. Categorisation of breeding procedures, aims of conformation judging
4. Basics of cattle breeding: housing and feeding technology of dairy cattle
5. Basics of cattle breeding: housing and feeding technology of beef cattle
6. Basics of aquaculture: fish species and technologies
7. Basics of sheep production and husbandry
8. Basics of pig production: keeping of sows and rearing of piglets
9. Basics of pig production: fattening
10. Basics of horse breeding and husbandry
11. Basics of poultry production and husbandry: egg production
12. Basics of poultry production and husbandry: broiler rearing
13. Basics of reproductive biology, possibilities to increase reproduction rates
14. Animal welfare and hygiene

**Literature**

G.C. Banerjee: A textbook of Animal Husbandry 8/ED. Oxford and IBH Publishers. 2018.

**Basics of Plant Physiology**

ECTS Credit Points: 3

2 hour(s) lecture and1hour(s) seminar per semester

Type of exam: in situ/online; written/oral

Requirements:

- for signature: General and inorganic chemistry, Agricultural botany

- for a grade: General and inorganic chemistry, Agricultural botany

**Summary of content - theory**:

The lecture with practise is designed to provide comprehensive exposure to the subject of plant physiology. The student will learn about function of plants throughout their development from seeds through reproduction. Considerable experience in chemistry and botany is assumed. Lectures and laboratory practises are cover from the biochemical level through the organismal level. The laboratory exercises will complement the lectures. The study of plants as producers realy important because of their position at the energy and elemental intake portion of the energy pyramid and the food net.

**Content of the subject**

|  |  |  |
| --- | --- | --- |
| week | Lecture | Laboratory |
| 1 | Basics in plant physiology, structure and funtion | Investigation of basic characteristics of enzyme |
| 2 | Leaves, light absorption in photosyntheis | Photosynthetic pigments |
| 3 | Carbon acquisition and fixation | CO2 fixation |
| 4 | Respiration (photo-, and dark) | Intensity of respiration |
| 5 | Plant water relations: stomata, transpiration and plants in water-limited environments | Plant water relations |
| 6 | Functions of nutrients in plant I. | Mineral nutrition and plant growth |
| 7 | Functions of nutrients in plant II. | Mineral nutrition and plant growth |
| 8. | Symbiotic relationships for nutrient capture, Nitrogen assimilation | Mineral nutrition and plant growth |
| 9. | Plant hormones – regulation of development and Plant hormones – environmental acclimation I. | Plant hormones |
| 10. | Plant hormones – regulation of development and Plant hormones – environmental acclimation II. | Plant hormones |
| 11. | Flowering | Plant hormones |
| 12. | Fruit and seeds | Plant storage products |
| 13. | Seed germination/dormancy | Germination and shooting |
| 14. | Senescence | *In vivo* physiological measurements |

**Literature**

Taiz, L., Zeiger, E. (2007) Plant Physiology. 4th ed. Sinauer Associates, Inc. ISBN 0-87893-823-0 or online version

Buchanan, B. B., Gruissem, W., Jones, R. L. (2015) Biochemistry and Molecular Biology of Plants. John Wiley & Sons, Inc. ISBN: 978-0-470-71421-8

Lambers, H., Chapin, F. S. and Pons, T. L. (2011) Plant Physiological Ecology. Springer, New York. ISBN 0-387-98326-0

**Environmental management**

ECTS Credit Points: 3 credits

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

Type of exam: Exam

Requirements:

- for signature: Completing exercises

- for a grade: exam

**Summary of content - theory**:

The aim of the course is to introduce the theoretical concepts and applications of environmental management and environmental management in agriculture. Completing the subject, students get to know the main steps of development of environmental management, the connection between environmental management and agriculture, international and national environmental management programs, the regulation of environmental management, the practice of sustainable agriculture, and the applied procedures. After accomplishing the course, students will keep and follow the regulations of environmental protection, and apply the principles of agricultural production.

**lectures:**

1. Recent social and economic processes as the original factors forming the condition of environment. Global environmental issues. Introduction into Environmental Management. Environmental management in EU. Green Deal in EU.
2. Global Organisations in the field of Environmental Management Characterization of the relationships between agriculture and environment: Environmental issues in agriculture. Environmental aspects of crop production. Environmental effects of different tillage systems.
3. Evaluation and environmental aspects of nutrition management.
4. Evaluation and environmental aspects of pest control. Integrated Pest Control Management.
5. Characterization of the relationships between agriculture and environment: Environmental aspects of animal husbandry. Case study.
6. Environmentally aspects of livestock farm establishment. Composting technologies in practice.
7. Natura 2000 Program. Agriculture in protected and vulnerable natural regions.
8. The environmental aspects of climate change. Agriculture and climate change.
9. Organic farming.
10. Agro ecology
11. Circular economical solutions in agriculture
12. Environmental, management aspects of animal wellbeing, animal protection, animal health and safety in agriculture.
13. Legal and administrative regulation in connection to environmental management in agriculture. Greening in EU. Land identification systems.
14. Enterprises, companies and Environmental Management. Environmental Management Systems.

**Literature**

Manoj Kumar Jhariya, Arnab Banerjee, Ram Swaroop Meena, Dhiraj Kumar Yadav (2019): Sustainable Agriculture, Forest and Environmental Management. Springer Singapore. DOI

https://doi.org/10.1007/978-981-13-6830-1

KPMG International (2022): Green Deal policy guide. Link: <https://assets.kpmg/content/dam/kpmg/xx/pdf/2022/01/green-deal-policy-guide-web-2022.pdf>

ISO 14 001 Standard

Lampkin N , Stolze M , Meredith S , de Porras M , Haller L , Mészáros D (2020): USING ECO-SCHEMES IN THE NEW CAP. IFOAM EU. 76.p. Link: <https://www.organicseurope.bio/content/uploads/2020/06/ifoam-eco-schemes-web_compressed-1.pdf?dd>

EU Strategy on Adaptation to Climate Change

**Crop Production I**

ECTS Credit Points: 4

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

Type of exam: colloquium

Requirements:

- for signature: active work in the lectures and practical lessons

- for a grade: exam

**Summary of content - theory**:

Introduction into crop production. Elements of environmental friendly agrotechnics. Most important field crop technologies. New methods and future challenges.

**lectures:**

1. Importance of crop production, history and new challenges
2. Agrotechnical elements I
3. Agrotechnical elements II
4. Agrotechnical elements III
5. Future possibilities in crop production I
6. Future possibilities in crop production II
7. Wheat production I.
8. Wheat production II.
9. Wheat production III.
10. Maize production I.
11. Maize production II.
12. Maize production III.
13. Sunflower production I.
14. Sunflower production I.

**practices:**

1. Importance of crop production, history and new challenges
2. Agrotechnical elements I
3. Agrotechnical elements II
4. Agrotechnical elements III
5. Future possibilities in crop production I
6. Future possibilities in crop production II
7. Wheat production I.
8. Wheat production II.
9. Wheat production III.
10. Maize production I.
11. Maize production II.
12. Maize production III.
13. Sunflower production I.
14. Sunflower production I

**Literature**

Martin, J.H.-Waldren, R.P.-Stamp, D.L. (2006): Principles of Filed Production. 4th edition. Perason Prentice Hall. 954.p. ISBN: 0-13-025967-5

Sheaffer, C.C.-Mondaca, K.M. (2012): Introduction to Agronomy. Food, Crops, and Ebvironment. Delmar Cengage Learning. 704. p. ISBN-13: 978-1-113-1233-6, ISBN-10: 1-1113-1233-8

Havlin, J.L.-Beaton, J.D.-Tisdale, S.L.-Nelson, W.L. (2004): Soil Fertility and Fertilizers. Pearson Prentice Hall. 528. p. ISBN: 0-13-027824-6

Reynolds, M.P. (ed.) (2010): Climate Change and Crop Production Wallingford, UK: CABI, pp. 292,. ISBN-13: 978-1-84593-633-4.

Araus, J.L.-Slafer, G.A. (ed.) (2011): Crop Stress Management and Global Climate Change(1st Edition), CABI Climate Change Series) 224. p. ISBN-13: 978-84593-680-8

**Land use and regional development**

ECTS Credit Points: 4

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

Type of exam: colloquium

Requirements:

- for signature: Working out an individual work related to nutrient balances and nutrient management

- for a grade: An effective oral answer to two questions from the land use and regional development in the colloquium, which should demonstrate the student's sufficient knowledge of the subject matter and his/her ability to organise, reason, explore causal relationships and solve problems.

**Summary of content - theory**:

Students will acquire the knowledge necessary to maintain and increase soil productivity and to make wise use of the energy that can be incorporated into arable production through the soil. They will be able to apply soil fertility enhancement techniques and methods at the level of proficiency. Understand the concepts, interrelationships and processes involved in the overall use and protection of arable land.

**lectures:**

* 1. The object and function of land use, its history and development.
  2. Purpose, importance and development of soil tillage. Elements and practices of soil tillage
  3. Factors influencing the quality of soil tillage and changes in soil conditions
  4. Soil tillage systems
  5. Factors determining the quality and depth of ploughing methods. Deep tillage of the soil
  6. Soil degradation processes and their prevention. New tillage systems.
  7. Principles of crop rotation
  8. Need and purpose of fertilisation. Factors determining the utilisation of nutrients
  9. Basic principles for nutrient balances and nutrient replenishment
  10. Methods of weed control
  11. Cultivation of irrigated soils
  12. Erosion and deflation control
  13. Improvement of acidic, saline and sandy soils
  14. Land use systems

**practices:**

1. Quality assessment of soil tillage, concepts, definitions. Factors determining the quality of ploughing. Evaluation of soil condition when rotary tillage is used.
2. Tillage systems without rotation. Evaluation of soil condition. Calculation exercise to evaluate the soil loosening effect.
3. Precision elements in soil cultivation
4. The need for deep tillage of soils. Factors determining the timing and depth of deep cultivation. Planning precision tillage.
5. Basic principles of preparing a nutrient balance. Nutrient balance of Hungary.
6. A method for calculating nutrient uptake based on soil analysis.
7. Calculating the nutrient replenishment, individual exercise.

**Literature**

Required reading:

Birkás M. (2014): Book of soil tillage. Szent István University Press, Budapest. 322 pp. ISBN: 978-963-269-447-4

Recommended reading:

Adel El Titi (Ed). (2014): Soil Tillage in Agroecosystems. CRC Press. 376 pp. ISBN: 9780849312281

Köller K. (2003): Techniques of Soil Tillage. In: El Titi (ed) Soil tillage in Agroecosystems. CRC Press, Boca Raton. ISBN: 13: 978-0849312281

**Agricultural machinery**

ECTS Credit Points: 4

2 hour(s) lecture and 2 hour(s) seminar per semester

Type of exam: practical mark

Requirements:

- for signature: The condition for signing is participation in the exercises.

- for a grade: The condition of the practice is the successful completion of the dissertation

**Summary of content - theory**:

The aim of the course is to introduce combine harvesters, forage harvesters, cattle, pig and poultry breeding machines. Another goal is to skill in how to operate, set up, use, and maintain the combine harvesters, forage harvesters, cattle, pig and poultry breeding machines.

**lectures:**

1. Grain harvesting machines, combine harvesters
2. Machines for harvesting maize and oilseeds
3. Potato harvesting machines
4. Forage harvesters I. - Mowing structures, tedders
5. Forage harvesters II. - Trailers, balers, bale wrappers
6. Forage harvesters III. - Fermentation machines, choppers and silage machines
7. Feed mixing plant machinery
8. Cattle breeding machines, equipment, buildings I. - Dairy farming
9. Cattle breeding machines, equipment, buildings II. - Milking machines and equipment
10. Cattle breeding machines, equipment, buildings III. - Milking parlors
11. Pig farming machines, equipment, buildings
12. Poultry and egg production machines, equipment, buildings
13. Sheep and horse breeding machines, equipment, buildings
14. Precision crop and livestock machinery

**practices:**

1. Combine harvesters
2. Combine harvesters for harvesting maize and oilseeds
3. Potato harvesters
4. Mowing machines, tedders
5. Balers
6. Choppers
7. Hammer grinder, mixers
8. Machines in dairy farm
9. Milking machines
10. Milking parlors
11. Pig farming machines
12. Poultry and egg production machines
13. Sheep and horse breeding machines
14. Precision livestock machinery

**Literature**

Brian Bell: Farm Machinery ISBN 1903366682

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

**Animal nutrition**

ECTS Credit Points: 5

2 hour(s) lecture and 2 hour(s) seminar per semester

Type of exam: colloquium (oral exam)

Requirements:

- for signature: participation on seminar lessons, prepare a diet formulation

- for a grade: successful exam

**Summary of content - theory**:

Course objectives: to introduce the students into the principles of the nutrition alongside the newest researches, by the concepts of the precision nutrition.

**lectures:**

1. Introduction to animal nutrition; Challenges of 21st Century Animal Nutrition.
2. Chemical composition of feedstuffs; Concept of “Total Nutrition”.
3. Digestibility of the nutrients in livestock.
4. Protein/amino acids
5. Lipids (fats)
6. Crude fiber
7. Nitrogen free extract
8. Macro-, micro and ultra-trace minerals.
9. Vitamin nutrition.
10. The role of the water into the nutrition
11. Flow diagram of energy terms; Energy metabolism of livestock.
12. Feed conservation I.
13. Feed conservation II.
14. Feed production

**practices:**

1. Historical background of the development of nutrition
2. The legislation background of the animal nutrition
3. Energy, protein, vitamin and mineral element requirements for maintenance and production I.
4. Energy, protein, vitamin and mineral element requirements for maintenance and production II.
5. Energy, protein, vitamin and mineral element requirements for maintenance and production III.
6. Theoretical background of diet formulation I.
7. Theoretical background of diet formulation II.
8. Theoretical background of diet formulation III
9. Diet formulation in practice I.
10. Diet formulation in practice II.
11. Diet formulation in practice III.
12. Diet formulation in practice IV.
13. Diet formulation in practice V.
14. Practical task of diet formulation

**Literature**

1. Fekete S. 2008: Veterinary Nutrition and Dietetics. Pro Scientia Veterinaria Hungarica Foundation,
2. 1. Babinszky L. 2008. The concepts of ileal digestible amino acid and ideal protein in swine and poultry nutrition. In: S. Gy. Fekete (Ed): Veterinary nutrition and dietetics (Chapter VII). Digestibility of nutrients. „Pro Scientia Veterinaria Hungarica” Budapest. ISBN 978-963-06-5166-0. 119-146.
3. 2. Babinszky, L., V. Halas. 2009: Innovative swine nutrition: some present and potential applications of latest scientific findings for safe pork production. Italian Journal of Animal Science. Suppl. 3: 7-20.
4. 3. Babinszky L., V. Halas, M.W.A. Verstegen. 2011. Impacts of climate change on animal production and quality of animal food products In: J. A. Blanco and H. Kheradmand (Eds): Climate change, socioeconomic effects. InTech Publisher. London, UK. ISBN 978-953-307-419-1. 165-190.

**Economic sciences I (macro and micro economics)**

ECTS Credit Points: 2

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

Type of exam: C

Requirements:

- for signature: -

- for a grade:

The exam is a written test which will be evaluated according to the following grading schedule:

0 - 50% – fail (1)

50.01% - 64.00% – pass (2)

64.01% - 76.00% – satisfactory (3)

76.01% - 87.00% – good (4)

87.01% - 100% – excellent (5)

**Summary of content - theory**:

The first half of the semester focuses on the principles of the economic way of thinking and the basic concepts of microeconomics, whereas the second part is concerned with the most important macro- and microeconomic variables and their measurement. After an overview of the subject, method, and principles of economic thinking, the course considers the model of demand and supply and its applications. Of the many macroeconomic variables, the course concentrates on GDP and price indices. Besides, stylized facts of economic growth, the labour market, money, and finance are also discussed.

**lectures:**

1. Basic concepts and fundamental questions of economics
2. Ten principles of economics and the economic way of thinking I. (Understanding the basic concepts of rational decisions)
3. Ten principles of economics and the economic way of thinking II. (Understanding the market as a process of cooperation and the metaphor of the invisible hand)
4. Production possibilities frontier (Graphical representation of opportunity cost)
5. How markets work: demand and supply I. (Understanding the concept of demand and supply and their determinants)
6. How markets work: demand and supply II. (The meaning of the equilibrium (market-clearing) price, and comparative statics)
7. Measuring a nation’s income (Understanding the notions of nominal and real GDP)
8. Measuring the cost of living (The meaning of the price level and inflation, GDP deflator and the consumer price index)
9. Exercises on measurement (Exercises in calculating GDP and inflation)
10. Savings and investment, and the role of the financial system (The market for loanable funds, and the determination of the real interest rate)
11. Money and inflation I. (Definition of money, understanding the significance of using money in trade)
12. Money and inflation II. (The role of the banking system in money creation)
13. Unemployment (The fundamentals of the labour market)
14. Summary (Systematic review of the topics discussed)

**Literature**

Compulsory readings:

Mankiw, Gregory: Principles of Economics. Fifth Edition. South-Western, Mason, USA, 2009. ISBN-13: 978-0-324-58998-6

Recommended readings:

Heyne, Paul – Boettke, Peter – Prychitko, David: The Economic Way of Thinking. Twelfth Edition. Pearson Education International, New Jersey, 2010. ISBN-10: 0132991292

Alchian, Armen, A.; Allen William R.: Universal Economics. Edited by Jerry L. Jordan Published by Liberty Fund, 2018 https://oll.libertyfund.org/title/universal-economics

**Economic sciences I., MTB7020\_AA and MTB7020\_BA**

ECTS Credit Points: 4

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

Type of exam: written exam

**Requirements:**

- for signature: Class attendance

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

**Summary of content**

Micro-and Macroeconomics

The course will provide the students with the basic concepts of economics: how economists think about the behavior of households, firms; how to think about markets, how to analyze the economy as a whole, what is inflation and unemployment. By the end of the course students should be able to use some basic tools of economics and apply them in solving basic economic problems.

Agricultural economics, History and functioning of the EU

The aim of the course is to study the role of agriculture in the national economy, not only in the traditional approach but also from the viewpoint of agribusiness and multifunctional agriculture. The students will be able to put the topics discussed in an international perspective and get the skills to use the basic concepts in training. Having information about the EU will help them to build their future. The students will study about the role of agricultural policy from the beginning of the EU integration, gain information about the international agricultural market and its theoretical background. Getting information about the advancement of environmental policy and its principles can become the basis of knowledge-based thinking.

**lectures:**

Micro- and Macroeconomics

1. Introduction
2. Principles of economics
3. Market demand
4. Market supply
5. How markets work
6. Demand, supply and governmental interventions
7. Analysis of the market demand
8. Market structures
9. Measuring national income I.
10. Measuring national income II.
11. Measuring the cost of living
12. Production and economic growth
13. Money
14. Unemployment

**practices:**

Agricultural economics, History and functioning of the EU

1. Agricultural economics
2. The role of the agribusiness in the national economy
3. Resources of the agriculture I.
4. Resources of the agriculture II.
5. Economic structure
6. Agricultural foreign trade
7. Global challenges in the agriculture
8. EU history
9. Institutions of the EU
10. Economic and Monetary Union, EU budget
11. Common Agricultural Policy I.
12. Common Agricultural Policy II.
13. Rural development policy
14. Energy policy

**Literature, handbooks**

Mankiw, G. (2009): Principles of Economics. South-Western, Mason, USA.

Banse, M. – Gorton, M. – Hartel, J. – Hughes, G. – Köckler, J. – Möllman, T. – Münch, W. (1999): The evolution of competitiveness in Hungarian agriculture: from transition to accession. MOCT-MOST Economic policy in transitional economies. 1999. vol. 9. No. 3. pp. 307-318.

EC (2017): European Commission. Proposal for a Directive of the European Parlament and of the Council on the promotion of the use of energy from renewable sources, This document corrects document COM (2016) 767 final of 30.11.2016, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016PC0767R%2801%29>

EUROSTAT (2017): Agricultural, forestry and fishery statistics. Statistical books. http://ec.europa.eu/eurostat/statistics-explained/index.php/Agriculture,\_forestry\_and\_fishery\_statistics

EUROSTAT (2018): Farm structure statistics <http://ec.europa.eu/eurostat/statistics-explained/index.php/Farm_structure_statistics> (on 6 June 2018)

**Economic Sciences II. MTB7024\_AA and MTB7024\_BA**

ECTS Credit Points: 4

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

Type of exam: written exam

**Requirements:**

- for signature: The students shall write a test in the last week of the semester. The pre-requisitive of the signature of the course is that the score of this test will reach, or exceed 60% of the maximum score. Another pre-requisitive of the signature is the submission of an essay and the oral presentation of the individually written essay of a given field of agricultural enterprise, with the pre-given content till the deadline (the end of the 8th week of the semester). The head of the course is going to refuse to sign the course if each of the three above-mentioned requirements are unsuccessful (e.g. in case of absence from the oral presentation, or failure to meet the deadline)..

- for a grade: : Written exam..

**Summary of content – theory**

To become familiar with the basic knowledge of Farm Business Management.

**lectures:**

1. RESOURCES IN AGRICULTURE AND ITS’ SPECIALITY
2. CALCULATION OF THE AGRICULTURAL PRODUCTION
3. COSTS OF PRODUCTION AND COST-CONCEPTS FOR AGRICULTURE
4. EFFICIENCY AND IT’S MEASUREMENT IN AGRICULTURE
5. DECISION-MAKING AND RISK MANAGEMENT IN AGRICULTURAL PRODUCTION
6. ECONOMIC PRINCIPLES: CHOOSING PRODUCTION LEVELS
7. ECONOMIC PRINCIPLES: CHOOSING INPUT AND OUTPUT COMBINATIONS
8. ENTERPRISE BUDGETING AND PLANNING OF CASH FLOW
9. INVESTMENT ANALYSIS
10. FARM BUSINESS ORGANIZATIONS
11. COMPLEX PLANNING OF AGRICULTURAL PRODUCTION
12. FARM BUSINESS AND ENTERPRISE ANALYSIS
13. ECONOMICS OF PLANT PRODUCTION
14. ECONOMICS OF ANIMAL PRODUCTION

**practices:**

1. Time Value of Money, Role of time value in finance
2. Future Value versus Present Value
3. Future value calculation for single amounts
4. Present value calculation for single amounts
5. Present value of Annuity
6. Futures value of Annuity
7. Perpetuities
8. Value maximalisation of Investments
9. Weighted Average Cost Of Capital
10. Value maximalisation of Shares
11. Value maximalisation of Bonds
12. Introduction to financial analysis,
13. Analyis with ratios and indicators
14. Property analysis, Financial analysis

**Literature, handbooks**

Ronald D. Kay William M. Edwards Patricia A. Duffy: Farm Management. McGraw-Hill , 2006.

John Soloman-Elisabeth Jones: Essential Economics for Business, Pearson, Pearson, 4th Edition, 2014

John Soloman-Kevin Hinde-Dean Garratt: Economics for Business 6th edition, 2013.

F.R. David: Strategic Management, Cases and Concepts, McGraw Hill, 2012.

[Berk, Jonathan](javascript:%7bdocument.mainform.submit()%7d): Fundamentals of Corporate Finance. Global Edition. 2014.

**Economic sciences III. MTB7026\_AA and MTB7026\_BA**

ECTS Credit Points: 3

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

Type of exam: written exam

**Requirements:**

- for signature: Passing a problem solving test.

- for a grade: Colloquium

**Summary of content – theory**

Economic knowledge is an integral part of our everyday lives. The course, based on theoretical background, presents the practice of logistic, professional consultancy and marketing. Students will know the most important planning tools and gain insight in their application, as well.

**lectures:**

1. Logistic: Introduction. The structure of value creating processes. Production processes. Service processes. The role of the operations manager. The evolution of operations management. Supply chain management. Globalization. Productivity and competitiveness.
2. Quality and quality management. The TQM and quality management systems. Quality tools. The focus of quality management: the customer. Quality improvement. Lean six sigma. ISO 9000.
3. Product design. The product design process, idea generation, feasibility study, form design, functional design, reliability, maintainability, usability, and production design. Design for environment, and design for robustness.
4. Service design. The service economy. The service design process. Tools for service design. Waiting line analysis for service improvement. Operating characteristics of the queueing system, traditional cost relationships in waiting line analysis. Psychology of waiting, queuing models.
5. Process design and technology. Outsourcing, process selection wit break even analysis. Process analysis, using process flowcharts, process development. Technology decisions: financial justification and technology primer.
6. Marketing: Orientation, course overview, Introduction Defining Marketing and the Marketing Process Company and Marketing Strategy, Understanding the Marketplace and Consumer Value, Managing Marketing Information to Gain Customer Insights
7. Consumer Markets and Buyer Behaviour, Business Markets and Business Buyer Behaviour, Designing a Customer Value-Driven Strategy and Mix, Segmentation, targeting, positioning, Products, Services, and Brands: Building Customer Value, New-Product Development and Product Life-Cycle Strategies, Pricing: Understanding and Capturing Customer Value, Pricing Strategies: Additional Considerations,
8. Marketing Channels: Delivering Customer Value, Marketing communication: Delivering Customer Value,
9. Professional consultancy: Orientation, course overview Basement of Consulting
10. Basement of Agricultural Consulting
11. Support system of Decision Making
12. Process of Agricultural Consulting
13. Operation of Agricultural Consulting Organization and Systems

**Literature, handbooks**

Russell, R. S. - Taylor, B. W. : Operations Management, 8th Edition, Wiley & Suns, INC., ISBN10 1118808908 ISBN13 9781118808900, 2014

ppt materials of the lectures

**Genetics and biotechnology**

ECTS Credit Points: 3…..

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

Type of exam: …P…

Requirements:

- for signature: Each student should participate in seminars and majority of lectures as well. We are providing opportunity to discuss students’ experiences gained in different countries with the lecturer. Education based on interactive fundamentals, providing chance to overcome student’s difficulties in an efficient way.

- for a grade: At the end of the year student is expected to create a presentation of a particular topic

**Summary of content - theory**

This course focuses both on the fundamentals of genetics/biotechnology and sophisticated methods applied in it. Scientific background will be provided to the biotechnology of sexual/asexual reproduction. This course will explore the methods of the tissue culture. Student will learn the mechanisms of genetic transformation. We will examine those questions strongly related to plant resistance. Student will learn the regulatory of GMO’s and examine plant genomics emphasized nowadays. Student knowledge will be highly enlarged in applied genetics/biotechnology with the attendance of this course.

**lectures:**

1. Terminology (important terms)
2. Basics and history
3. Biotechnology of the asexual reproduction
4. Biotechnology of the sexual reproduction
5. Manipulation of DNA
6. Plant regeneration/molecular selection
7. Genetically modified plants
8. Basis of plant breeding
9. New alternatives in plant breeding
10. Resistance breeding
11. Quality breeding
12. Genetic manipulation in agricultural environment
13. Regeneration of maize and inhibition of pollen grain germination
14. Haploid production of wheat

**practices:**

1. Discussion fundamentals of the genetics and biotechnology
2. Discussion of the terminology
3. Tissue culture
4. Microspore culture
5. Direct gene transformation
6. In vitro plant regeneration
7. GMOs in the world
8. Plant genomics
9. Varieties from environmental point of view
10. Breeding against abiotic and biotic stresses
11. Quality parameters for biotechnology
12. Environmentally sound genetics and biotechnology
13. New methods for genetics and biotechnology
14. Genetic diversity and cryopreservation

**Literature**

Pal Pepo (2012): Genetics and biotechnology provided by electronic form

Bidlack, j., Stern, K.R. Stern’s intriductory Plant biology. ISBN1259682749

Chrispeels, M.J., Gepts, P.: Plants, genes, and agriculture: Sustainability through biotechnology. 1th Edition. ISBN1605356840

Xiaoxian, h., Po, H., Ding, Y.: Contemporary biotechnology and bioengineering. ISBN 1842655574

Streit, W.R., Daniel, R.: Metagenomocs: Metods and protocols. ISBN978-1493966899

Bains, W.: Biotechnology from A to Z. ISBN1432567210

Clark, D.P.: Biotechnology: Applyi the genetic revolution. ISBN978-0121755522

Kreuzer, H.: Molecular biology and biotechnology: A guide for students. ISBN978-1555814724

**Agricultural Chemistry**

ECTS Credit Points: 4…..

2…….hour(s) lecture and 1…… hour(s) seminar per semester

Type of exam:…C…

Requirements:

- for signature: Participating in laboratory exercises, learning the material for the laboratory exercises, submitting reports of measurement

- for a grade: Exam on the theoretical material of the lectures

**Summary of content - theory**:

Students will acquire a basic knowledge of plant nutrition and environmentally friendly nutrient management. They will learn about plant nutrients, the influencing factors of nutrient uptake. They will learn about the occurrence and forms of nutrients in soil, the role of nutrients in plants. They learn about the composition, physical and chemical properties of commercially available fertilizers, their effects on soil and environment. They will learn about the types of organic fertilisers, their nutrient supplying capacity and the rules for their use in agriculture. Learn the basic concepts of fertilisation advice.

**lectures:**

1. The aim of precision, site-specific nutrient supply, Plant nutrients and their classification.
2. Chemical composition of plants (water, ash, organic matter content).
3. Nutrient uptake through roots and leaves and influencing factors.
4. Effect of nutrient supply on yield and quality.
5. Forms of nutrients in the soil. The importance and laws of cation adsorption in soil, anion adsorption in soil.
6. Nitrogen in soil, uptake, role in plant.
7. Phosphorus, potassium in soil, their uptake, role in plants.
8. Calcium, magnesium, sulphur in soil, uptake, role in plants
9. Solid and liquid nitrogen fertilizers and their application
10. Phosphorus containing fertilizers and application, potassium fertilizers and application, magnesium fertilizers and application
11. Micronutrient containing fertilizers and their uses. Compound and mixed fertilizers.
12. Chemical soil amendments, lime fertilisation.
13. Formation, properties and uses of organic fertilizers.
14. Assessment of soil nutrient availability, principles of precision fertilisation advice

**practices:**

1. Laboratory safety, basic laboratory tools, basics of mass and volume measurements
2. Determination of water content and ash content of plant
3. Determination of plant available phosphorus of soil
4. Determination of plant available potassium of soil
5. Calibration process of analytical instrument, counting the amount of AL-P2O5 and AL-K2O, determination of N, P, K supply of soil
6. Plant tissue analysis
7. Analysis of chemical parameters of fertilizers

**Literature**

J. L. Havlin; S.L. Tisdale; W. L. Nelson; J. D. Beaton: Soil Fertility and Fertilizers an introduction to nutrient management ISBN-13: 978-0-13-503373-9.

K. Mengel and E. A. Kirkby (1987). Principles of plant nutrition, Lang Druck AG, Liebefeld/Bern, 685p. ISBN:3-906-535037

Benton jones, Jr. (2012). Plant nutrition and soil fertility manual, CRC press, Taylor and Francis Group, 282p. ISBN: 978-1-4398-1609-7

**Animal Husbandry I.**

ECTS Credit Points: 4

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

Type of exam: oral

Requirements:

- for signature: participating on 2/3 of the practicals and solve the examples given.

- for a grade: taking successfully the oral exam

**Summary of content - theory**:

The general aim of teaching the subject, the student applies her/his knowledge of genetics, zoology, animal physiology and organic chemistry in the field of animal husbandry. The student should get to know the role of animal husbandry in agriculture, the characteristics to be developed, and the relationship between them. S/He also applies his knowledge of all this.

**lectures:**

1. Animal husbandry concept, history, economic importance
2. Origin, domestication, naturalization of farm animals
3. External and internal factors affecting the animal organism
4. Mendelian genetics and its application
5. Factors affecting allele frequency
6. Value measuring properties, growth, development, body composition
7. Data collection, performance tests, registration
8. Quantitative genetics and its application. Heritability, repeatability value, correlations
9. Breeding value estimation. Selection, selection progress
10. Inbreeding. Protection of gene reserves
11. Heterosis. Crossover procedures
12. Reproduction of domestic animals. The importance of biotechnical and technological methods in animal husbandry
13. Behavior of pets. Accommodation and care of farm animals.
14. Sustainable animal husbandry systems

**practices:**

1. Conformation assessment
2. Mendelian inheritance
3. Calculation of allele frequencies
4. Calculation of heritability
5. Calculation of selection response
6. Calculation of inbreeding coefficient
7. Crossing systems

**Literature**

Falconer, D.S. (1996): Introduction to Quantitative Genetics. 3rd ed. Longman Scientific and Technical.

Sewall, W (2017): Principles of Livestock Breeding. [Createspace Independent Publishing Platform](https://www.bookdepository.com/publishers/Createspace-Independent-Publishing-Platform) Animal Fisher, M (2019): Welfare Science, Husbandry and Ethics : The Evolving Story of Our Relationship with Farm Animals. 5M Books Ltd

**Agroecology**

ECTS Credit Points: 3

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

Type of exam: written

Requirements:

- for signature: take part on 70% of lecture

- for a grade: successful written exam

**Summary of content - theory**:

The aim of the course is to describe the structure of ecosystems, the interaction of individual elements, the elements of agricultural production habitat, the interactive relationship between agricultural production and environmental factors, the effects of climate change on agricultural production, the exploration of material and energy turnover in agroecological systems, principles of sustainable agriculture and possibilities of its implementation at different levels of cultivation technologies.

**lectures:**

1. Structure of ecological systems, the importance of individual ecological elements in agriculture.
2. Cycles in ecosystems, interactions between populations and their role in agricultural production.
3. Stability and resilience of agro-ecosystems.
4. The cycle of the elements in the crop space.
5. Factors influencing the water supply, characteristics of soil water management, impact on the crop production area. Regularities and characteristic parameters of evaporation processes.
6. The effect of tillage on the ecological parameters of the crop production area.
7. Effects of crop rotation, species and variety use on the ecological parameters of the crop production area
8. The effect of the nutrient supply system, the forms of fertilization on the ecological parameters of the crop production area.
9. Effect of irrigation types on ecological parameters of crop production area.
10. Interactions between different levels of cultivation technology models and crop production space.
11. Types and characteristics of sustainable, environmentally friendly agrotechnical systems.
12. The effects of climate change on agricultural production, the possibilities of adaptation.
13. Opportunities to maintain and increase soil fertility.
14. Preservation of the balance of agroecological systems, possibilities of its restoration.

**Literature**

Stephen R. Gliessman (2015). Agroecology - The Ecology of Sustainable Food Systems, Third Edition, ISBN 9781439895610, p. 406

Noureddine Benkeblia (2019). Agroecology, Ecosystems, and Sustainability

ISBN 9780367435981, p. 393

V. Ernesto Méndez, Christopher M. Bacon, Roseann Cohen, Stephen R. Gliessman (2016).

Agroecology - A Transdisciplinary, Participatory and Action-oriented Approach ISBN 9780367436018, p. 284

Stephen R. Gliessman - Eric Engles - Robin Krieger(1998). Agroecology: Ecological Processes in Sustainable Agriculture, ISBN 9781575040431

**Horticulture I**

ECTS Credit Points: **3**

**1** hour(s) lecture and **1** hour(s) seminar per semester

Type of exam: **oral**

**Requirements:**

- for signature: Student may miss lectures maximum 3 times during the semester.

- for a grade: passing an oral exam

**Summary of content - theory**:

Knowledge the modern growing technology of more considerable vegetable plant, ability to choice the optimal growing place, skill to define the factors which determine the quality and their application in the growing. The students know the raw material needs of processing industry and the fresh market and are capable of the selection of proper technology and varieties.

**Lectures:**

1. The role of the vegetables in the nourishment; the situation of the growing of vegetables and its peculiarities.
2. The grouping of vegetables according to a heat claim and the applied propagation methods.
3. The characterisation of cucumber and his growing methods.
4. The environmental claim of watermelon and muskmelon, their growing.
5. The environmental claim of a tomato and his growing.
6. The characterisation of sweet pepper, his claims and growing.
7. The characterisation of red pepper, peculiarities of growing and different post-harvest methods.
8. Characterisation and growing of the lettuce and horseradish.
9. The characterisation of root vegetables - the growing of the carrot and parsley.
10. The characterisation of beetroot, parsnip, celery and his growing.
11. The general characterisation of the onion, growing from seeds (one-year growing method) and from sets (two year method).
12. The characterisation of garlic and green beans and their growing technology.
13. The environmental claim of a sugar pea, different types, growing.
14. The environmental claim of sweet corn, special types and growing.
15. The environmental claim of cabbage, the peculiarities of its growing.

**Practices:**

* 1. Characterization of horticultural production
  2. The roil of varieties – some variety selection criteria.
  3. Vegetable transplant production.
  4. Transplants hardening
  5. Mulches and row cover
  6. Biodegradable mulches
  7. High tunnels

15. Ventilation in freestanding high tunnels

**Required literature:**

1. **Kemble, J. M. (2020):** Vegetable Crop Handbook, Southeastern U.S.,355 p. <https://www.aces.edu/wp-content/uploads/2019/12/2020_SEVG_final_web.pdf>
2. **Sánchez, E. S. (2010):** Vegetable Gardening, The Pennsylvania State University, 64 p. <http://www.webgrower.com/regional/pdf/PA_Veg_agrs115.pdf>
3. **Ric Bessin, R. (ed.) (2012):** Vegetable Production Guide for Commercial Growers. Cooperative Extension Service • University Of Kentucky College of Agriculture, Lexington, 132 p. <http://www2.ca.uky.edu/agcomm/pubs/id/id36/id36.pdf>

**Recommended literature:**

* **Kemble, J. M. (2020):** Vegetable Crop Handbook, Southeastern U.S.,355 p. https://www.aces.edu/wp-content/uploads/2019/12/2020\_SEVG\_final\_web.pdf

**Crop Production II**

ECTS Credit Points: 3

2 hour(s) lecture and 2 hour(s) seminar per semester

Type of exam: written and oral

Requirements:

- for signature: Students have to actively participate in the lecture, students have to give two presentations.

- for a grade: Students must meet the exam requirements

**Summary of content - theory:**

Our main tasks and aims to give theoretical and practical knowledge of crop production to BSc students. The students get wide information about the conventional and integrated crop production. This course gives a lot of quantitative and qualitative information and innovative-scientific knowledge to students. Acquirement of practical knowledge of plant production and formation of a theoretical basis for it. Cognition of the biological, ecological and agrotechnical factors of plant production and interactive application of them in practice. Acquirement of practical knowledge of techniques for growing major field crops. The students are able to use and develop their scientific and practical knowledge in the farm management.

* Production of barley I
* Production of barley II
* Production of rye
* Production of triticale
* Production of oat
* Production of rice
* Production of other cereals I
* Production of other cereals II
* Production of peas
* Production of soybeans
* Production of other pulses I
* Production of other pulses II
* Production of canola I.
* Production of canola II.

**Literature**

Pepó, P. Csajbók, J. (2013) Integrated crop production I. Debrecen, Debreceni Egyetem, 161 p. ISBN: 9789634736509

Pepó, P. Csajbók, J. (2013) Integrated crop production II. Debrecen, Debreceni Egyetem, 208 p. ISBN: 9789634736516

Pepó, P. Csajbók, J. (2013) Integrated crop production III. Debrecen, Debreceni Egyetem, 178 p. ISBN: 9789634736523

McMahon, M., Kofranek, A. M., Rubatzky, V.E.: 2010. Plant Science: Growth, Development, and Utilization of Cultivated Plants. Prentice Hall, ISBN: 9780135014073 674. p.

George Acquaah (2001): Principles of Crop Production. Theory, Techniques, and Technology. Pearson Prentice Hall, Upper Saddle River, New Jersey 07458. ISBN 0-13-114556-8

John H. Martin – Richard P. Waldren – David L. Stamp (2006): Principles of Field Crop Production. Pearson Prentice Hall, Upper Saddle River, New Jersey Columbus, Ohio. ISBN 0-13-025967-5

**Animal Husbandry II**

ECTS Credit Points: 3

2 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: colloquium

Name and title of subject supervisor: Dr. Rózsáné Dr. Zsófia Várszegi, assistant professor, Novotniné Dankó Gabriella, associate professor

Requirements:

- for signature: attendance

- for a grade: Take exam from pig breeding and poultry breeding. The average of these two mark is the final mark of the Animal breeding II. subject.

**Summary of content - theory:**

The aim of the subject is to familiarize students with the most important knowledge of the breeding and keeping technology of poultry and pig species, respectively. The students get adequate knowledge in control of production and breeding of pig and poultry species, as well as the adaptation of technological processes in a given economy as needed. In their work, they can prioritize solutions that support the health of society and individuals, as well as the protection of the environment.

**lectures:**

1. The national and international importance of pig production.
2. Pig breeding techniques. Breeding estimation, breeding selection in pig breeding.
3. Housing system, keeping technologies of sows.
4. Housing system, keeping technologies of fattening pigs.
5. Pig slaughtering, meat qualification.
6. Physiology of reproduction of sows and boars.
7. Feeding pigs according to age and usage.
8. Domestication and origin of poultry species. The international and national importance and position of poultry farming and production. Characteristics of the World Trade in Poultry Products.
9. Biological and hormonal basics of egg production. Egg formation. Condition and method of production of eggs for hatching. The biological, physical and mechanical factors of hatching. Incubation metabolic processes. Specialty of hatching of poultry species. Hatching and self-feeding time. Characterization of poultry species. Definition procedures and methods of sexing.
10. Genetic traits influencing egg production. Basic traits determine egg production.
11. Breeding methods in poultry breeding. Hybridization in egg and meat type populations. Breeding technics increasing meat producing ability by different poultry species. Selection methods of meat production.
12. Genetic specialties of poultry. Heritability of different production traits. Genetic correlation between quantitative traits. Autosomal and sex-linked inheritance in poultry breeding.
13. Feeding methods in poultry production and breeding animal raising. Artificial insemination of poultry. Keeping, feeding, climatic factors for sperm production and fertility of poultry.
14. The slaughtering performance of different poultry species. Criteria for assessing the quality of meat and the carcass. The influence of age, sex, selection and nutrition on meat quality.

**practices:**

1. The structure of the pig's body, appearance judging.
2. The most important pig breeds.
3. The main animal health issues of pig keeping.
4. Reproductive traits of pigs. The technology of pig reproduction, the hygiene of breeding.
5. Basic behavioural characters of pigs.
6. Genetic traits influencing pork production.
7. Opportunities to reduce antibiotic use in pork production
8. Chicken breeds (dual purpose and laying hens)
9. Dual purpose and meat-type chicken breeds
10. Hybrids for egg production
11. Hybrids for meat production
12. Turkey breeds and hybrids
13. Goose and duck breeds and hybrids
14. Egg qualification

**Literature**

1. Kyriazakis I.- Colin T. Whittemore C.T. (2006): Whittemore’s Science and Practice of Pig Production. Blackwell Publishing. ISBN-10: 1-4051-2448-2
2. Swine production and management: <http://extension.psu.edu/courses/swine/reproduction/breeding-systems>
3. DONALD D. BELL - WILLIAM D. WEAVER, JR. Commercial Chicken Meat and Egg Production 5th edition, Springer ScÎence+Business Media New York 2002.
4. Flanders - Gillespie Modern Livestock & Poultry Production,, 9th Edition,
5. Crafford, R. D. (2003) Poultry breeding and technology

**Economic Sciences II (business studies)**

ECTS Credit Points: 2

1 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: practice

Name and title of subject supervisor: Hajnalka Madai assistant professor

**Purpose of teaching the subject:** The general aim of the course is to introduce the basic knowledge of Farm Business Management. Student should be able to apply basic evaluation and planning methods of agricultural enterprises, to be familiar with the basic knowledge of Farm Business Management. Student have to be able to make the basic business calculations in the fields of income – cost and profit analyses, investment analyses, and they have to be familiar with the main concepts of planning in the case of agricultural enterprises.

**Content of the subject : Lectures and practices (1+1) (14 weeks):**

1. Introduction into Farm Business Management
2. Resources in agriculture and its’ specialities
3. Calculation of the agricultural production (yield and results)
4. Costs of production and cost-concepts for agriculture
5. Efficiency and it’s measurement in agriculture
6. Risk and risk management in agricultural production
7. Enterprise budgeting and planning of cash flow
8. Investment analysis
9. Farm business organizations and enterprises
10. Collaboration types in agriculture
11. Economics of plant production
12. Economics of animal production
13. Complex planning of agricultural production
14. Strategic and business planning

**Type of mid-term examination:** The condition for signing is visiting lecture.

**Method of assessment (semester examination mark - report, practical grade, colloquium, examination):** The semester ends with a practical grade 50% of finance and accounting part of the course and 50% of farm business part of the course The students shall write a test in the last week of the semester. The prerequisitive of the signature of the course is that the score of this test will reach, or exceed 60% of the maximum score.

**Teaching aids:** slides and seminar materials

**Recommended literature:**

Ronald D. Kay William M. Edwards Patricia A. Duffy: Farm Management. McGraw-Hill 2006.

John Soloman-Elisabeth Jones: Essential Economics for Business, Pearson, Pearson, 4th Edition, 2014

John Soloman-Kevin Hinde-Dean Garratt: Economics for Business 6th edition, 2013.

F.R. David: Strategic Management, Cases and Concepts, McGraw Hill, 2012.

[Berk, Jonathan](javascript:%7bdocument.mainform.submit()%7d): Fundamentals of Corporate Finance. Global Edition. 2014.

**Plant Protection I (Plant Pathology)**

**ECTS Credit Points:** 3

**Hour(s) lecture and hour(s) seminar per semester:** 1 lecture + 1 practice hour per week (2 theoretical lessons every two weeks and 2 practical lessons every two weeks)

**Type of the subject:** compulsory

**Type of exam**: Written examination.

**Responsible lecturer**: Dr. Gabor Tarcali senior research fellow

**Requirement(s) for signature:**

Attendance at lectures is recommended, and practical training is mandatory. Successful completion of occasional mid-year tests from lectures and practices.

Successful symptom report (disease recognition) from practice at the end of the semester. Written examination from the theoretical part at the end of the semester.

**Requirement(s) for grade:**

Written examination at the end of the semester. Oral exam if the written is unsuccessful.

**Summary of content – theory -** **(in a 7-week schedule):**

**Lectures:**

1. Introduction;

2. Plant pathology, etiology. Non-infectious diseases;

3. Viruses;

4. Prokaryotes (bacteria and phytoplasmas);

5. Fungi I (Protozoa, Chromista);

6. Fungi II (True fungi);

7. Fungi III (True fungi)

**Practices:**

1. Diseases of apples, pears, and nuts. Disease recognition;
2. Diseases of potato, tomato, and pepper. Disease recognition; Symptomatic summary;
3. Diseases of grapes and berries. Disease recognition;
4. Diseases of cereals. Disease recognition;
5. Diseases of maize. Disease recognition;
6. Diseases of sunflower. Disease recognition;
7. Practice of disease recognitions, report of recognition;

**Literature, handbooks, and learning aids:**

* Agrios, G.N. (2005): Plant Pathology, Fifth Edition. Academic Press
* Sambamurti A.P.S.S. (2006): A Textbook of Plant Pathology. IK International.
* Richard Gáborjányi, R., Takács, A.P.: Plant Pathology, University of Pannonia, Georgikon Faculty, Plant Protection Institute, Keszthely
* Slide presentations at lectures. The knowledge material to be submitted and the lists of diseases are available in advance in PDF files. A list of species for recognizable diseases will be issued to students.

**Animal husbandry III.**

ECTS Credit Points: 3

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

Type of exam: written

Requirements:

- for signature: to take part in the seminar as regulated by the university and give a presentation on a specific topic related to ruminant production

- for a grade: to pass the written exam

**Summary of content - theory**:

Course objectives: 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, but we will study the special aspects of family operated farms and organic production as well. Dairy and beef cattle, sheep housing, feeding, breeding will be discussed during the lectures. Animal performance, factors influencing product quantity and quality are included in the studies of both species. Animal behavior and grazing is discussed during the studies.

**lectures:**

1. Production of animal products in the world, trends. Consumption per capita.
2. General introduction to ruminants
3. Cattle breeding and production: beef breeds
4. Cattle breeding and production: dairy and dual purpose breeds
5. Cattle breeding and production: genetics of beef and dairy production
6. Cattle breeding and production: milk production traits, and influencing factors
7. Cattle breeding and production: beef and reproduction traits and influencing factors
8. Cattle breeding and production: cattle feeding and nutrition, grazing
9. Cattle breeding and production: housing of beef and dairy cattle
10. Cattle breeding and production: milking parlors, robot milking
11. Sheep breeding and production: genotypes, breeds
12. Sheep breeding and production: sheep production traits and reproduction
13. Sheep breeding and production: sheep nutrition and grazing
14. Sheep breeding and production: wool production

**Practice:**

1. Farm visit: beef cattle
2. Farm visit: beef cattle
3. Farm visit: beef cattle
4. Farm visit: dairy cattle
5. Farm visit: dairy cattle
6. Farm visit: dairy cattle
7. Farm visit: dairy cattle
8. Farm visit: sheep farm
9. Farm visit: sheep farm
10. Discussion on technologies
11. Students’ presentation
12. Students’ presentation
13. Students’ presentation
14. Students’ presentation

**Literature**

Thomas Field – Robert Taylor (2019): Scientific Farm Animal Production. 12th edition. Pearson. 1-608.

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

**Horticulture II.**

ECTS Credit Points: 3

14 hours lecture and 1 hours seminar per semester

Type of exam: colloquium

Requirements:

- for signature: Regular active attendance of classes (both practical and lectures)

- for a grade: Exam (oral or written form)

**Summary of content - theory**:

Students of the class Horticulture II. are introduced in fruit production of the temperate climate zone, get familiar with physiological and theoretical background of fruit production, just as the main aspects of orchard establishment, training and production systems

**lectures:**

1. National and international situation and development of fruit production I.
2. National and international situation and development of fruit production II.
3. National and international situation and development of fruit production III.
4. Theoretical and practical classification of fruit species and plant parts
5. Ecological demands of fruit orchard establishment
6. Rootstocks, varieties and plantation materials
7. Steps of orchard establishment
8. Test
9. Training systems in intensive and semi-intensive orchard
10. Pruning and phytotechnical strategies of producing orchards I.
11. Pruning and phytotechnical strategies of producing orchards II.
12. Nutrient-management strategies in orchards
13. Irrigation and water management of orchards
14. Phytosanitary management practice in orchards

**practices:**

1. Harvesting practices
2. Harvesting practices
3. Harvesting practices
4. Harvesting practices
5. Post-harvest and storage technology
6. Propagation technologies
7. Training systems
8. Training systems
9. Training systems
10. Pruning systems in apples
11. Pruning of pome fruits
12. Pruning of stone fruits
13. Nutrient supply in practice
14. How to protect our intensive orchards?

**Literature**

Bakshi P. (2011): Practical manual of fruit production (https://www.researchgate.net/publication/270509577\_Practical\_manual\_of\_fruit\_production)

Penn State Tree Fruit Production Guide (2020) – www.extension.psu.edu

**Economic sciences III. (communication, management and organisational skills)**

ECTS Credit Points: 2

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

Type of exam: colloquium

Requirements:

- for signature: Participatation of lectures

- for a grade: Students final grade is added from the end-term exam.   
The calculation is the following: <60% – 1 (failed); 61% – 2; 71% – 3; 81% – 4; 91%– 5. There are two chances to retake the end-term exam.

**Summary of content - theory**:

The aim is the students should get to know the basic management theories, methods, procedures and communication techniques, through which they can prepare themselves to carry out management tasks in organizations and become effective managers. To study basic communication skills. Understand the process of communication. Begin practicing listening skills. Understand the importance of nonverbal communication and of improving their nonverbal communication skills. Recognize importance of intercultural diversity of communication. Understand the differences between management and leadership, understand managerial schools, tasks, styles and methods. To study motivation, conflict and conflicthandling.

**lectures:**

1. Basic communication skills.
2. Process of communication.
3. Nonverbal communication
4. verbal communication skills
5. Active listening skills.
6. Communication barriers.
7. Intercultural communication
8. Management vs leadership
9. Managerial schools
10. Managerial tasks
11. Leader’s styles and methods
12. Organizations
13. Motivation
14. Conflict and conflict handling

**Literature**

[Bovee](https://www.pearson.ch/autor/14814/Courtland-L-Bovee), C.L. & [Thill](https://www.pearson.ch/autor/13314/John-V-Thill), J.V. (2020): Business Communication Essentials: Fundamental Skills for the Mobile-Digital-Social Workplace, Global Edition 8. Edition. Pearson ISBN 1292330090

Burnes, Bernard (2009): Managing Change Fifth Edition, Pearson Education Limited, Essex

Drucker, P. (2006): The effective executive. Harper Business.

McLean, S. (2005). The basics of interpersonal communication. Boston, MA: Allyn & Bacon

Owen, J. (2018) How to Manage, Pearson ISBN 139781292232607

Owen, J. (2018): [How to Lead](https://www.pearson.ch/Informatik/Pearson/EAN/9781292232577/How-to-Lead), Pearson ISBN 139781292232577

Pearson, J., & Nelson, P. (2000). An introduction to human communication: Understanding and sharing. Boston, MA: McGraw-Hill

Robbins, S.P. (2020): [Management, Global Edition](https://www.pearson.ch/HigherEducation/Management/PrinciplesofManagement/EAN/9781292340883/Management-Global-Edition) Pearson, ISBN139781292340883

Yukl, Gary (2010): Leadership in Organizations, seventh edition, Pearson Education Inc. Upper Sadle River, New Jersey

**Economic sciences III (extension services)**

ECTS Credit Points: **2**

**2** hour(s) lecture and **0** hour(s) seminar per semester

Type of exam: **C**

Requirements:

- for signature: presentation on seminars

- for a grade: The exam is a written test which will be evaluated according to the following grading schedule: 0–59% failed (1), –69% acceptable (2), 70–79% medium (3), 80–89% good (4), 90–100% excellent (5).

**Summary of content - theory**:

The main goal of the course is to let know with students the most important methods of Professional Business Consultancy, System of Agricultural Consultancy, organizing and other management tasks of consultancy. What kind of communicational channels can we use of consultancy and how to organize successful consultant work in progress.

Basics of Agricultural Consultancy

Definition of Agricultural Consultancy, System and Organizing of Agricultural Consultancy

Management of Agricultural Consultancy

Communicational tools and methods of Agricultural Consultancy

Ethics of Agricultural Consultancy

**lectures:**

1. Definition, Formation, Goals of Agricultural Consultancy. Main roles of Agricultural Consultancy in Rural Development
2. Obligations and Tasks of Agricultural Consultant. Most important characteristics of successful Consultant, Priorities of Improving a Suitable Agricultural Consultant System
3. Types of Agricultural Consultancy, Conditions of Official Consultant Listing I.
4. Conditions of Official Consultant Listing II.
5. Improving of Agricultural Consultancy System
6. Supporting System of Agricultural Consultancy (2021-2027, 2014-2020,2021-2027)
7. Decision Making Ways and Suitable Methods
8. Crisis Forecast, Business Reorganization
9. Management of Agricultural Consultancy I. (basics of management, self-management)
10. Management of Agricultural Consultancy I.(management of consultancy, marketing of consultancy)
11. Process, organization, logistical questions of consultancy (Pre-solving and Problem Solving methods)
12. Methods of Consultancy
13. Ethics of Consultancy
14. Communicational Tools and Methods of Consultancy

**Literature**

Kristin E. Davis, ed., Suresh Chandra Babu, ed., Catherine Ragasa, ed.: Agricultural extension: Global status and performance in selected countries, International Food Policy Research Institute, 2020

Scott, B – Barnes, B.K.: Consulting on the Inside, American Society for Training & Development, 2011

Kotler, P.T. - Keller, K.L.: Marketing management, Prentice Hall PTR, 2011

**Plant Protection II (entomology)**

ECTS Credit Points: 3

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

Type of exam: written (test)

Requirements:

- for signature: attendance on 70% of practices

- for a grade: reach min 60% at exam (test)

**Summary of content - theory**:

The course introduces the biology of pests damaging the most important crops in Central Europe and the different plant protection strategies against them. Provide knowledge for planning environmentally safe methods in plant protection based on integrated knowledge.

**lectures:**

1. Introduction to the agricultural entomology
2. Evolution of pest populations and general population ecology
3. Population dynamic, population outbreaks, biogeography, spread and invasion of pests.
4. Interaction between populations
5. Biology of Nematodes and Molluscs
6. Insect biology morphology in general
7. Insect biology physiology in general
8. Chemical ecology of insects
9. Post-embryonic insect development, insect larvae
10. General knowledge of the pest control (physical, chemical, biological, biotechnological, integrated)
11. Methods of monitoring and forecast of pest population dynamics
12. Microbes against insect pests
13. Beneficial organisms against insect pests I.
14. Beneficial organisms against insect pests II.

**practices:**

1. Polyphagous pests of crops and vegetables I.
2. Polyphagous pests of crops and vegetables I.
3. Polyphagous pests of crops and vegetables I.
4. Pest community of cereals
5. Pest community of maize
6. Pest community of cabbage and rape
7. Pest community of sunflower and onion
8. Pest community of potato and tobacco
9. Pest community of sugar beet
10. Pest community of alfalfa, pea and bean
11. Pest community of soybean
12. Pest community of tomato and green pepper
13. Pest community of cucumber, marrow and melon
14. Greenhouse and stored product pests

**Literature**

- Marczali Zs. (2020): Modul of applied entomology: Field pests in temperate zone of Europe <http://dtk.tankonyvtar.hu/xmlui/handle/123456789/2953>

- Pénzes-Kónya, E. & Varga J (2020): Ecology for students of Medical Plant Production Expert higher level vocational training programme. <https://dtk.tankonyvtar.hu/handle/123456789/3634>

- Marczali Zs. (2020): Insect ecology <https://dtk.tankonyvtar.hu/handle/123456789/2949>

- Marczali Zs. (2020): Insect Physiology [https://dtk.tankonyvtar.hu/handle /123456789/3205](https://dtk.tankonyvtar.hu/handle%20/123456789/3205)

- Fodor András, Lehoczky Éva, Varga Ildikó (2011): Biológiai növényvédelem 2 - Methods of biological control 2. <http://dtk.tankonyvtar.hu/xmlui/handle/123456789/3335>

**Crop Production III**

ECTS Credit Points: 3

2 hour(s) lecture and 2 hour(s) seminar per semester

Type of exam: written and oral

Requirements:

- for signature: Students have to actively participate in the lecture, students have to give two presentations.

- for a grade: Students must meet the exam requirements

**Summary of content - theory:**

This course gives a lot of quantitative and qualitative information and innovative-scientific knowledge to students. Acquirement of practical knowledge of plant production and formation of a theoretical basis for it. Cognition of the biological, ecological and agrotechnical factors of plant production and interactive application of them in practice. Acquirement of practical knowledge of techniques for growing major field crops. The students are able to use and develop their scientific and practical knowledge in the farm management.

1. Production of sugar beet
2. Production of other sugar crops
3. Production of potato I
4. Production of potato II
5. Production of other tuber crops
6. Production of tobacco
7. Production of fiber crops I
8. Production of fiber crops II
9. Production of sorghums
10. Production of other oil crops I
11. Production of other oil crops II
12. Production of alfalfa I
13. Production of alfalfa II
14. Production of red clover

**Literature**

Pepó, P. Csajbók, J. (2013) Integrated crop production I. Debrecen, Debreceni Egyetem, 161 p. ISBN: 9789634736509

Pepó, P. Csajbók, J. (2013) Integrated crop production II. Debrecen, Debreceni Egyetem, 208 p. ISBN: 9789634736516

Pepó, P. Csajbók, J. (2013) Integrated crop production III. Debrecen, Debreceni Egyetem, 178 p. ISBN: 9789634736523

McMahon, M., Kofranek, A. M., Rubatzky, V.E.: 2010. Plant Science: Growth, Development, and Utilization of Cultivated Plants. Prentice Hall, ISBN: 9780135014073 674. p.

George Acquaah (2001): Principles of Crop Production. Theory, Techniques, and Technology. Pearson Prentice Hall, Upper Saddle River, New Jersey 07458. ISBN 0-13-114556-8

John H. Martin – Richard P. Waldren – David L. Stamp (2006): Principles of Field Crop Production. Pearson Prentice Hall, Upper Saddle River, New Jersey Columbus, Ohio. ISBN 0-13-025967-5

**Statistics**

ECTS Credit Points: 3

1 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: Practical

Requirements:

- for signature: The overall course grade will be based on the working on practices and the final computer exams

- for a grade: The overall course grade will be based on the working on practices and the final computer exams

**Summary of content - theory**:

The basic concepts of statistics; descriptive statistics: analysis of quantitative variables; stochastic relationships, graphical methods; sampling; estimation theory, point and interval estimation, basics of hypothesis tests.

**lectures:**

1. The statistical concepts and sub-areas. Statistical basic concepts of the population, criteria, parameters, sample. The statistical work phases.
2. Sampling procedures, random sample, systematic error parameter. Databases. The criteria of a good database. Database design rules.
3. Levels of measurement data. Definition of the data for the different scales of measurement.
4. Relative numbers. Correlations between the relative numbers
5. Central tendency measures: median, mode, mean.
6. Central values: arithmetic, geometric, harmonic, quadratic. Calculation of weighted averages.
7. The measures of variability: standard deviation, variance, range, absolute, relative differences in coefficient of variation, the relative coefficient of variation.
8. The normal distribution as a model. Distribution and density function. Skewness and kurtosis characterization.
9. Standard values and regularities of normal distribution. Tests of normal distribution.
10. One-sided asymmetrical and two-sided symmetrical probabilities.
11. Student's t-distribution. The standard error of the mean. Confidence interval.
12. Statistical hypothesis tests
13. One-sample parametric statistical tests
14. Two-sample parametric statistical tests

**practices:**

1. Data collection and utilization methods, data sources. Statistical opportunities in the Excel spreadsheet program. Functions and procedures, basic statistical operations.
2. Independent and identically distributed samples, simple sample, stratified sample. Group of samples, non random sampling techniques, combined and artificial samples. Non-responses in the sample. Selection rate calculation.
3. Definition of the data for the different scales of measurement. Creating and interpreting charts.
4. Distribution, coordination, comparative calculation of performance ratios. Determination of the intensity ratios.
5. Calculation of central indicators at different levels of measurement variables
6. Calculation of means.
7. Calculation of dispersion from the population and sample.
8. Preparation of Normal Distribution. Analysis of density and distribution functions. Standardization. Calculation of skewness and kurtosis, practical interpretation.
9. Tests of normal distribution.
10. One-sided asymmetrical and two-sided symmetrical probabilities.
11. Practical application of the confidence intervals.
12. Statistical hypothesis tests.
13. Practical application of z-test, t-test
14. Practical application of paired and independent t-tests

**Literature**

Compulsory literature:

Anderson, Sweeney, Williams, Freeman and Shoesmith: Statistics for Business and Economics, Second edition, Cengage Learning EMEA, 2010. UK, 928. p. ISBN: 1408018101

Howitt, D. – Cramer D.: Introduction to Statistics in Psychology, 6/E Pearson, Harlow. 2014. 744. p. ISBN-13: 9781292000749

Recommended literature:

Field A.: Discovering Statistics Using SPSS (Introducing Statistical Methods), 4th Edition, SAGE Publications Ltd., London, 2013. 915. p. ISBN-13: 978-9351500827

**Forest management**

ECTS Credit Points: 3

2 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: practical mark

Requirements:

- for signature: yes

- for a grade: yes

**Summary of content - theory**:

The main aim of the subject’s teaching is to provide basic knowledge on the priorities and tasks of the Hungarian forest management as well as the main management directions and forest administration. Within this frame the students are to acquire the following factual knowledge: tangible and intangible assets providing by the forest management; criteria of forest site classification; silvicultural characteristics of the main stand-forming tree species; nature-like forest management; plantation forestry; forest mensuration; structure and tasks of forest administration; forest plans and other technical documentations.

**lectures:**

1. Priorities and characteristics of the Hungarian forest management.
2. Criteria of forest site classification (I).
3. Criteria of forest site classification (II).
4. Silvicultural characteristics of the main stand- forming tree species (I).
5. Silvicultural characteristics of the main stand-forming tree species (II).
6. Stand establishment (afforestation and artificial regeneration) techniques (I).
7. Stand establishment (afforestation and artificial regeneration) techniques (II).
8. Plantation forestry.
9. Agro-forestry systems.
10. Nature-like forest management. .
11. Introduction to Forest Mensuration.
12. Forest subsidiary use.
13. Structure and tasks of forest administration.
14. Basic documents for forest management planning.

**practices:**

1. History of the Hungarian forest management.
2. Effects of climate changes on forest management.
3. Combating desertification by forest management tools.
4. Forest dendrology (addition).
5. Nature-like forestry tools.
6. Plantation forestry tools.
7. Agroforestry systems.
8. Forest dendrometry I.
9. Forest dendrometry II.
10. Forest plans, forest management planning.
11. Field program (merged practices).
12. Field program (merged practices).
13. Field program (merged practices).
14. Field program (merged practices).

**Literature**

1. Hibberd, B. G. ed. 1986: Forestry Practice. Forestry Commission Bulletin. 14. London, pp. 104. (ISBN 0 11 710156 7).
2. Savill, P. et al. 1997. Plantation Silviculture in Europe. Oxford University Press. pp 297. (ISBN 0 19 854909 1).

**Regulation and administration of agriculture**

**ECTS Credit Points**: 3 credit

14.hour (s) lecture

**Type of exam:** essay

**Requirements:**

- for signature: attendance of classes

- for a grade: essay

**Summary of content - theory**:

In the last decade, agriculture has been given more emphasis in the operation of the national economy, and in recent years Hungary has given priority to the protection of Hungarian arable land, which represents national value. One of the means of achieving this noble goal was the reform of the system of rules: the agricultural sector became transparent and traceable, and the Hungarian civil law rules and the administrative system were simplified. An extensive fragmented legal network only reduces the administrative burden on farmers.

In addition to the large supply chains in Hungary, small market producers have been given the opportunity to sell their products, thus increasing the availability of locally produced and seasonal foods. The goal set in the public catering sector, according to which 80% of the raw materials will come from domestic production, poses great challenges to the Hungarian administrative authorities that Hungary must also comply with the Common Agricultural Policy of the European Union.

During the semester, we will also examine the processes of tillage, environmental protection and genetic modification from both a legal and technological point of view. By completing this course, students from third countries can interpret a wide range of public administration tasks, draw a parallel with the institutional system of their home country and acquire a critical approach. The acquired knowledge and experience also support the use of export-import opportunities, the establishment of research collaborations and the introduction of domestic reform ideas. The main goal of the University of Debrecen is to be able to transfer good practices in Hungary to other countries, with which Hungary can develop a prosperous partnership, effective support and mutually beneficial economic relations.

The topics of the course are supplemented by lectures by experts who share practical experience and innovative solutions with students in the fields of national management, legislation and foreign trade.

**lectures:**

1. Presentation of agriculture as a production sector. Basic issues of Hungarian agricultural and rural development. Environmental and nature conservations directives, legislation.
2. The Common Agricultural Policy and its operation in the European Union and the foundations of integration processes.
3. Structure of the Hungarian government system, presentation of policies. The concept of public administration, its separation from other state activities. Tasks and functions of the public administration.
4. Areas and institutional system of agricultural administration. Duties and powers of the Ministry of Agriculture.
5. Management methods of public administration. Operation, tasks and powers of government offices.
6. The future of agriculture. National Agricultural Research and Innovation Centre
7. (NARIC), the structure and tasks of Hungarian agricultural research.
8. Tasks and powers related to food chain safety. The National Food Chain Safety Office. Legal protection of the origin of food, GM organizations, tobacco production and pálinka production. Grape growing and wine production.
9. The role and tasks of the Hungarian State Treasury in agriculture. Tasks and powers of the Hungarian Chamber of Agriculture.
10. The common’s nature protection system of the European Union (Natura 2000), the domestic system and requirements of nature protection law.
11. The subject and basic concepts of environmental law. Common rules for the protection of the environment.
12. Land use and land protection (utilization for other purposes, change of cultivation branch), Soil protection, common rules for soil and water protection.
13. Forest protection and environmental rules related to game management, as well as tasks and regulations related to hunting.
14. Tasks and powers of the National Land Center.
15. Rules for the acquisition of ownership of agricultural land, rules for the use of agricultural land, Tasks related to the real estate register.

**Literature**

Hungarian Fundamental Law and hungarian sectoral laws.

**Animal health and hygiene**

ECTS Credit Points: 3

1 hour lecture and 1 hour seminar per semester

Type of exam: oral

Requirements:

- for signature: attendance in at least 60% of the lectures and seminars; essay writing and a PPT presentation from a topic in the field of animal health or hygiene

- for a grade: the essay and presentation, and the written exam in the end of the semester will evolve the final grade.

**Summary of content - theory**:

The aim of this study is to present the environmental and individual factors that can cause diseases in animals. We introduce the most important infectious and non-infectious diseases in connection with animal health, focusing on the prophylaxis, the environmental factors, and the tools of fighting back the disease (viral, bacterial, prion, parasite and fungus-borne diseases). The second half of the semester is about animal hygiene (establishing a farm, hygiene of nutrition, water, grazing).

**lectures:**

1. Animal health and it’s relationship with other sciences.

2. Keeping livestock healthy. Health and illness. Checking health status.

3. Groups of causative agents. General epidemiologic declarations.

4. Illnesses (procession, outcome, fighting back). Regulations and laws in animal health, institutional background. Notifiable animal diseases and the acting plan in connection with these.

5. Viral and prion caused diseases.

6. Bacterial and fungal diseases.

7. Parasite borne diseases.

8. The animal and it’s environment.

9. Hygiene of establishment and operation of farms.

10. Hygiene of nutrition.

11. Hygiene of water, mycotoxin-borne diseases.

12. Cleaning, scrubbing and sterilisation.

13. Consultations, presentations.

14. Consultations, presentations.

**practices:**

1. Examination of farm animals I.
2. Examination of farm animals II.
3. Basics of herd health check ups I.
4. Basics of herd health check ups II.
5. Key features of animal hygiene in a dairy farm.
6. Key features of animal hygiene in a small ruminant farm.
7. Key features of animal hygiene in a swine farm.
8. Key features of animal hygiene in a poultry farm.
9. Farm visit I.
10. Farm visit II.
11. Consultations, presentations.
12. Consultations, presentations.
13. Consultations, presentations.
14. Consultations, presentations.

**Literature**

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.

**Food technologies, food safety**

ECTS Credit Points: 3

2 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: practical mark

Requirements:

- for signature: presence on practices

- for a grade: written exam

**Summary of content - theory**:

The aim of this course is to introduce students to the processing technologies of plant and animal originated products and by-products. The course aims to introduce students the quality, rating, storage and processing of fruits and vegetables, the properties and requirements of main product groups and the factors influencing their quality. The students are familiarized with the quality and quality control of the main raw materials of food production, the operations used in the technologies and their effects on the properties of products, storage and processes during storage and its effects on the usability.

**Lectures:**

1. Significance of food industry in the world. Ingredients of grain crops. Quality and storage of different grains. Processing of wheat (storage and milling).
2. Baking industry. Making of bread and bakery products.
3. Processing of corn. Sugar production based on sugar beet.
4. Vegetable oil production. Processing and products of potato.
5. Quality of fruits and vegetables; chemical and physical parameters. Process of freezing, effects to the quality of the products.
6. Preservation using heat treatment, effects to the quality of the products.
7. Process of drying; dried products. Concentrated products, thermal and non-thermal processes, fruit syrups and jams.
8. Fermented fruits and vegetables.
9. Ingredients of milk, physical and chemical properties.
10. Processing of milk, fermented dairy products.
11. Properties of meat, chemical composition, the structure of muscles, post-mortem processes.
12. Processing of meat products, packaging.
13. Factors influencing on food quality and safety, most important regulations and standards.
14. Chemical and microbiological risks of plant and animal originated raw materials.

**practices:**

1. Milling technologies
2. Baking technologies
3. Baking technologies
4. Pasta technologies
5. Extraction technologies
6. Drying technologies
7. Concentration technologies
8. Fruit juice
9. Preservation technologies
10. Measurements (Brix, refractometer, penetrometer)
11. Dairy products
12. Dairy products
13. Animal originated food products
14. Animal originated food products

**Literature**

Brennan, J.G. Food Processing Handbook. WILEY-VCH Verlag gmbh & Co. kgaa, Weinheim. ISBN: 3-527-30719-2, 2006.

Smith, J.S., Hui, Y.H. Food Processing: Principles and Applications. John Wiley & Sons, ISBN 9-780-470-28997-6, 2008,

Y. H. Hui, S. Ghazala, D. M. Graham, K.D. Murrell, .W Nip 2004: Handbook of Vegetable Preservation and Processing. Maecel Dekker Inc., 752.p.

Y. H. Hui, J. Barta, M. P. Cano, T.W. Gusek, J. S. Sidhu, N. K. Sinha 2006: Handbook of Fruits and Fruit Processing. Wiley-Blackwell, 712. p.

D. M. Barrett, L. Somogyi, H. S. Ramaswamy 2004: Processing Fruits: Science and Technology. CRC Press, 864. p.

P.D. Warriss: Meat Science, 2nd Edition. An Introductory Text. CABI Publishing, 2010. ISBN 978-1-84593-593-1

Professor H. Douglas Goff, Dairy Science and Technology Education Series, University of Guelph, Canada.

Neville G. Gregory, Temple Grandin: Animal Welfare and Meat Production. CABI Publishing, 2007. ISBN-13: 978 1 84593 215 2

M.F.W. te Pas, M.E. Everts, H.P. Haagsman (Eds): Muscle Development of Livestock Animals. Physiology, Genetics and Meat Quality. CABI Publishing, 2004. ISBN 0 85199 811 9

**Economics of Agricultural Sectors**

ECTS Credit Points: 3

2 hour(s) lecture and 2 hour(s) seminar per semester

Type of exam: colloquium

**Purpose of teaching the subject:** The general aim of the course is to introduce the basic knowledge of Farm Business Management in the fields of the main plant and animal production sectors. Student should be able to apply basic calculation and evaluation methods of agricultural enterprises involved in plant and animal production. Student have to be able to make the basic business calculations in the fields of income – cost and profit analyses, and they have to be familiar with the main international regulations and organizations of plant and animal production sectors, products and trade.

**Content of the subject: Lectures and practices (2+2) (14 weeks):**

1. The situation, resources and global economic role of crop production and animal husbandry.
2. Trends in consumption of animal and plant products, factors affecting consumption.
3. The economic role and importance of plant cultivation - production volume, output, foreign trade.
4. Economic characteristics of cereals, resource requirements, cost-revenue-income relationships, reserves for efficiency improvement
5. Economic characteristics of the cultivation of oil crops, resource requirements, cost-revenue-income relationships, reserves for increasing efficiency
6. Farm economic characteristics of the cultivation of other food and fodder crops, resource requirements, cost-income-income relationships, reserves for increasing efficiency
7. The economic role and importance of livestock breeding - production volume, output, foreign trade.
8. Economic characteristics of the dairy cattle sector, resource requirements, cost-revenue-income relationships, reserves for efficiency improvement
9. Economic characteristics of the beef cattle, sheep and goat sectors, resource requirements, cost-revenue-income relationships, reserves for efficiency improvement
10. Economic characteristics of pig sectors, resource requirements, cost-revenue-income relationships, reserves for increasing efficiency
11. Economic characteristics of the poultry sector, resource requirements, cost-revenue-income relationships, reserves for efficiency improvement
12. The economic characteristics of the fishing and aquaculture sector, resource requirements, cost-revenue-income relationships, reserves for efficiency improvement.
13. International regulation and organizations of plant growing sectors and plant products.
14. International regulation and organizations of livestock sectors and animal products.

**Type of mid-term examination:** Random testing of previous lecture and practice topics.

**Method of assessment (semester examination mark - report, practical grade, colloquium, examination):** The semester ends with a The students shall write a test in the last week of the semester involving the topics of lectures and they also have to hand in a written form personal work (essay) based on the economic situation of a specific plant and animal sector. The prerequisitive of the signature of the course is that the score of this test will reach, or exceed 60% of the maximum score.

**Teaching aids:** slides and seminar materials

**Recommended literature:**

1. Ronald D. Kay William M. Edwards Patricia A. Duffy: Farm Management. McGraw-Hill , 2006.
2. John Soloman-Elisabeth Jones: Essential Economics for Business, Pearson, Pearson, 4th Edition, 2014
3. John Soloman-Kevin Hinde-Dean Garratt: Economics for Business 6th edition, 2013.

**Grassland management**

ECTS Credit Points: 3

1 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: Practical course mark

Requirements:

- for signature: attending lectures and compulsory presence in seminars

- for a grade: ppt presentation on 2 homeworks during the semester

**Summary of content - theory**:

The subject presents the basic skills on grasslands, on the effect of natural conditions (ecology) on grasslands, on the basic elements of successful grassland production (inputs, renovation works etc.), on the formation of grassland yields, yield quantity and quality, describe the main uses of grasslands use (grazing, conservation), the use of grasslands for amenity purposes.

**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**

1. 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

2. 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

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

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

**Plant Protection III.**

ECTS Credit Points: 3

1 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: Practical

Requirements:

- for signature: Attending the exercises is mandatory, participation in the lecture is optional. The maximum amount of absenteeism allowed during the exercises: 30%.

- for a grade: It is mandatory to complete a weed recognition report before the exam.

**Summary of content - theory**:

I. Weed biology and weed control

Targets: Basic knowledge of weed biology. To study the most important weed species and weed control technologies in arable plant cultures and fruits.

II. Integrated plant protection

Targets: To learn the most important principles of integrated plant- and fruit protection. To present the most important pests and pathogens of the important plant cultures as well as to study the basic technologies (mechanical, agrotechnical, chemical, biological) against them.

**Lectures:**

1. Introduction: the most important weed species in Hungary and in the World.
2. Weed biology.
3. Agrotechnical, mechanical, biological methods in weed control.
4. Chemical weed control and integrated weed management. Resistance against herbicides.
5. Weed management in arable crops.
6. Weed management in vegetables and fruits.
7. Basic of integrated plant protection and plant protectional forecasting.
8. Integrated plant protection of cereals.
9. Integrated plant protection of sunflower and oilseed rape.
10. Integrated plant protection of pea, bean and alfa-alfa.
11. Integrated plant protection of vegetables (tomato, pepper, onion).
12. Integrated plant protection potato, tobacco and sugarbeet.
13. Integrated plant protection of apple and stone fruits.
14. Integrated plant protection of grapes.

**Practices:**

1. Presentation: the most important weed species in Hungary and in the World.
2. Weed biology practice.
3. Demonstration of agrotechnical, mechanical, biological methods in weed control.
4. Demonstration of chemical weed control and integrated weed management. Resistance against herbicides.
5. Demonstration of weed management in arable crops.
6. Demonstration of weed management in vegetables and fruits.
7. Demonstration of basics of integrated plant protection and plant protectional forecasting.
8. Presentation of integrated plant protection of cereals.
9. Presentation of integrated plant protection of sunflower and oilseed rape.
10. Presentation of integrated plant protection of pea, bean and alfa-alfa.
11. Presentation of integrated plant protection of vegetables (tomato, pepper, onion).
12. Presentation of integrated plant protection potato, tobacco and sugarbeet.
13. Presentation of integrated plant protection of apple and stone fruits.
14. Presentation of integrated plant protection of grapes.

**Literature**

- Radosevich S. R.- Holt J. S.. (1994): Weed Ecology and Vegetation Management. Wiley-Interscience publication, New York.

-Glenn C. klingman and Floyd M. Ashton (2004): Weed Science (3rd edition). Wiley-Interscience Publication. New York.

- Diseases of Fruits and Vegetables - Diagnosis and Management  
Edited by S Naqvi Springer  2004

- General Concepts in Integrated Pest and Disease Management  
Edited by A Ciancio and K G Mukerji    
Springer  2007

- Ecologically-Based Integrated Pest Management  
Edited by O Koul and G W Cuperus  CABI  2007.

- Biorational Tree Fruit Pest Management  
Edited by M Aluja, T Leskey and C Vincent CABI  2009.

- Emerging Technologies for Integrated Pest Management  
Edited by George G. Kennedy and Turner B. Sutton  APS  2000.

**Feed knowledge, feed production**

**Javasolt cím: Compound feed production**

ECTS Credit Points: 3

1 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: colloquium (oral exam)

Requirements:

- for signature: participation on lectures and seminar lessons,

- for a grade: successful exam

**Summary of content - theory**:

Course objectives: to introduce the students into the principles of the feed production and different raw materials.

**lectures:**

1-2 lessons: Historical background of compound feed production

3-4 lessons: Different raw materials I. (cereal seeds and by-products)

5-6 lessons: Different raw materials II. (oil seeds and by-products)

7-8 lessons: Different raw materials III. (feed supplements)

9-10 lessons: Different raw materials IV. (animal origin by-products)

11-12 lessons: Different raw materials V. (by products of the alcohol industry)

13-14 lessons: Different raw materials VI. (others)

**practices:**

1-6 lessons: Compound feed production in practice

7-14 lessons: Field trip in a feed factory

**Literature**

1. Fekete S. 2008: Veterinary Nutrition and Dietetics. Pro Scientia Veterinaria Hungarica Foundation,
2. 1. Babinszky L. 2008. The concepts of ileal digestible amino acid and ideal protein in swine and poultry nutrition. In: S. Gy. Fekete (Ed): Veterinary nutrition and dietetics (Chapter VII). Digestibility of nutrients. „Pro Scientia Veterinaria Hungarica” Budapest. ISBN 978-963-06-5166-0. 119-146.
3. 2. Babinszky, L., V. Halas. 2009: Innovative swine nutrition: some present and potential applications of latest scientific findings for safe pork production. Italian Journal of Animal Science. Suppl. 3: 7-20.
4. 3. Babinszky L., V. Halas, M.W.A. Verstegen. 2011. Impacts of climate change on animal production and quality of animal food products In: J. A. Blanco and H. Kheradmand (Eds): Climate change, socioeconomic effects. InTech Publisher. London, UK. ISBN 978-953-307-419-1. 165-190.

**Livestock genetics**

ECTS Credit Points: 3

2 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: C

Requirements:

- for signature: ……..

- for a grade: ……..

**Summary of content - theory**:

The students apply their knowledge of genetics, zoology and organic chemistry in the field of animal husbandry. The students will learn about the role of animal husbandry in agriculture, the traits to be developed and their interrelationship. All this knowledge is applied. Students will learn about the economic role of livestock production, its history and expected trends. They will learn about the genetic basis of certain traits and the relationships between them. Environmental influences on traits and how they can be influenced. Students will learn about the possibilities of selection for different traits using different breeding methods.

**lectures:**

1. Structure of literature reviews
2. Monogenic inheritance, Mendel's laws, gene effects, genes of major influence, testing ratios
3. Molecular genetic tests biometric tests
4. Discussion of publications related to the previous topics
5. Allele frequency, determinants, selection, migration, gene drift and related statistical tests
6. Effective population size, related communications
7. Value traits, data acquisition, correction for environmental effects
8. Parameter estimation, population establishment, related communications
9. Performance testing in practice
10. A brief overview of matrix algebra
11. Breeding value estimation, selection index
12. BLUP, individual model, repeatability model
13. Estimation of selection progress, direct and indirect selection
14. Presentation of project tasks, lecture

**practices:**

1. Monogenic inheritance, Mendel's laws, gene effects, genes of major influence, testing ratios
2. Monogenic inheritance, Mendel's laws, gene effects, genes of major influence, testing ratios
3. Molecular genetic tests biometric tests
4. Molecular genetic tests biometric tests
5. Allele frequency, determinants, selection, migration, gene drift and related statistical tests
6. Effective population size, related communications
7. Parameter estimation, population establishment, related communications
8. Parameter estimation, population establishment, related communications
9. Performance testing in practice
10. Performance testing in practice
11. Breeding value estimation, selection index
12. BLUP, animal model, repeatability model
13. Estimation of selection progress, direct and indirect selection
14. Estimation of selection progress, direct and indirect selection

**Literature**

FALCONER D.S., MACKAY T.F.C. (1996): Introduction to Quantitative Genetics. 4th Ed. Longman, London, UK. 1-464. ISBN: 9780582243026

Szabó F., Bokor Á., Polgár P.J., Bene Sz. (2011): Animal breeding. University of Pannonia - Kaposvár University

**Etology**

ECTS Credit Points: 3

1 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: written

Requirements:

- for signature: take part on lessons

- for a grade: to write a review of the ethological literature (freely chosen animal species; at least 12 source; at least 10 pages).

**Summary of content - theory**:

The focus of the course is on fundamental concepts in ethology/animal behavior. The course aims to familiarize the students with the behavioral characteristics of different farm animal species. It helps to manage the large-scale farming technology properly.

**lectures:**

1. Vision and other special senses
2. Optimizing production on large scale farm system
3. Behavioural control
4. Social organization, dominance hierarchies and leadership
5. Hormonal control of feeding behaviour
6. Hormonal regulation of reproductive behaviour
7. Sexual behavior
8. Maternal-offspring behavior
9. Play behaviour.
10. Stress-related behaviour
11. Welfare assessment
12. Behavioral disorders
13. Learning and memory.
14. Associative learning: Pavlovian an instrumental condition

**practices:**

1. Human-animal relations
2. Human- animal communication
3. The effects of animal environment on animal behaviour
4. Feeding and sexual behaviour,
5. Raising offspring, communication.
6. Social behaviour, welfare and behavioural disorders
7. Learning and cognition. Adaptation to an artificial environment.
8. Behaviour of domesticated birds
9. Behaviour of horses
10. Behaviour of cattle
11. Behaviour of sheep and goats
12. Behaviour of pigs
13. Social organization
14. Formulate and design data collection

**Literature**

* Per Jensen (2017): The ethology of Domestic Animals. An Introductory txt. 3rd edition. CABI
* Paul Marin, Patric Bateson (2007): Measuring behaviour. An Introductory guide. University Printing House, Cambridge.
* Aubrey Manning – Marian Stamp Dawkins (2012): An introduction to Anima Behaviour. sixth edition. Cambridge University Press.

**Lake economical husbandry technologies**

ECTS Credit Points: 3

1 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: colloquium (oral exam)

Requirements:

- for signature: participation on lectures and seminar lessons,

- for a grade: successful exam

**Summary of content - theory**:

Course objectives: to introduce the students into the principles of pond fish culture. Introduce them into the different pond systems, the technology and the nutrition

**lectures:**

1-2 lessons: Development of pond fish culture in different regions

3-4 lessons: Pond systems and pond types

5-6 lessons: Technical solutions and equipment in pond fish culture

7-8 lessons: Breeded fish species

9-10 lessons: Physical and chemical attributes of the water of fish ponds

11-12 lessons: Stocking at fish ponds

13-14 lessons: Biological life in fish ponds

**practices:**

1-2 lessons: Fertilization at fish ponds

3-4 lessons: Nutrition at fishponds

5-6 lessons: Harvesting of fishponds

7-8 lessons: Storage and transporting of fish

9-14 lessons: Field trip in a Fisheries Ltd

**Qualification of animal origin products**

Name and title of subject supervisor: Dr. Rózsáné Dr. Zsófia Várszegi, assistant professor

Additional instructors involved in teaching the subject:

Subject type: Facultative subject

The subject's teaching timetable, exam type: 2+1 C

Credit value of the subject: 3

The purpose of teaching the subject: Within the framework of the subject, students learn about and master the factors affecting the quality of animal products. The methods of qualification, the technological connections of possible errors.

Content of the subject ( in 14 weeks):

**Lectures**

Week 1: History of the dairy production

Week 2: Properties of milk.

Week 3: Raw milk quality, classification, and effect on the preparation.

Week 4: General operations of milk processing.

Week 5: Production technologies of dairy products.

Week 6: Quality assurance in the dairy farm.

Week 7: Milk and milk products in nutrition.

Week 8: Historical overview of meat inspection, meat properties

Week 9: Rules and conditions of meat inspection.

Week 10: Slaughter of animal

Week 11: Cooling, freezing and storage of meat products.

Week 12: Postmortem changes in muscle and adipose tissue.

Week 13: Production of meat products, sampling and control procedures.

Week 14: Egg qualification, egg product technology

**Practice:**

Week 1: Qualification of meat (pH, color)

Week 2: Qualification of meat (pH, color)

Week 3: Qualification of meat (water holding capacity)

Week 4: Qualification of meat (water holding capacity)

Week 5: Grading systems in the meat industry

Week 6: Grading systems in the meat industry

Week 7: Qualification of milk

Week 8: Qualification of milk

Week 9: Quality control of milk products

Week 10: Quality control of milk products

Week 11: Quality control of meat products

Week 12: Quality control of meat products.

Week 13: Egg qualification

Week 14: Egg qualification,

Method of mid-year inspection: Participation in 70% of the exercises is mandatory. Hold individual presentations about the quality of your different products and the possibilities of their qualification

Method of assessment (method of creating a semester exam mark – report, practical mark, colloquium, rigor): colloquium

Teaching aids: Lecture slides.

**Recommended literature:**

1. Meat Science: An Introductory Text 2 nd edition ISBN 9780851994246
2. 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
3. Meat products handbookPractical science and technology, G. Feiner, , **eBook ISBN:** 9781845691721, Woodhead Publishing, 2006.
4. https://books.lib.uoguelph.ca/dairyscienceandtechnologyebook

**Reproduction biology**

ECTS Credit Points: 3

1 hour lecture and 1 hour seminar per semester

Type of exam: oral

Requirements:

- for signature: attendance in at least 60% of the lectures and seminars; essay writing and a PPT presentation from a topic in the field of reproduction

- for a grade: the essay and presentation, and the written exam in the end of the semester will evolve the final grade.

**Summary of content:**

Discovering the background of the reproduction of domestic animals is a key point in animal health and sustainable farming and production also. The aim of this subject is to present the basics of anatomy and physiology of reproduction in different animal species and highlight the importance of assisted reproduction also. Taking part in farm visits, and examining live animals, the students will be able to see the most important details of farm reproductive management and reproductive check ups of pregnant and non-pregnant female animals, and also andrological examinations.

**lectures:**

1. Anatomy of the reproductive organs I.
2. Anatomy of the reproductive organs II.
3. The physiology of reproduction I.
4. The physiology of reproduction II.
5. Bovine reproduction.
6. Reproduction of small ruminants.
7. Reproduction of the horse.
8. Reproduction of the swine.
9. Reproduction of the dog and cat.
10. Biotechnology and assisted reproduction techniques in animal breeding I.
11. Biotechnology and assisted reproduction techniques in animal breeding II.
12. Pregnancy (physiology, anatomy, pregnancy diagnosis).
13. Abnormalities in reproduction and pregnancies.
14. Presentations

**practices:**

1. Anatomy of the reproductive organs: dissection I.
2. Anatomy of the reproductive organs: dissection II.
3. Anatomy of the reproductive organs: dissection III.
4. Control of the hormonal background of reproduction in vivo I.
5. Control of the hormonal background of reproduction in vivo II.
6. Ruminant reproduction.
7. Reproduction of the horse.
8. Reproduction of the swine.
9. Assisted reproductive techniques I.
10. Assisted reproductive techniques II.
11. Pregnancy check up in farm animals.
12. Management of reproduction in a dairy farm.
13. Management of reproduction in a small ruminant farm.
14. Consultations.

**Literature**

P.L. Senger: Pathways to pregnancy and parturition. 3rd edition, 2012. ISBN-13: 978-0965764834

ISBN-10: 0965764834

D. Fasso: Animal reproduction and physiology. 2016. **ISBN**: 1682861856

**Pigeon and rabbit farming**

ECTS Credit Points: 3

1 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: C

Requirements:

- for signature: ……..

- for a grade: ……..

**Summary of content**:

The students will review the biological characteristics, physiological needs, value traits and feeding characteristics of the farm pigeon and rabbit. The different utilisation options will be described. They will learn about the basic genetics used in breeding, the breeds of pigeons and rabbits suitable for meat production and their cross-breeding possibilities. The knowledge acquired in lectures and practices will enable students to run a pigeon farm and provide expert advice to hobby breeders.

**lectures:**

1. History of pigeon breeding, the domestic and international situation of commercial pigeon breeding.
2. Valuing characteristics of the farm pigeon: foraging ability; reproduction; breeding, rearing; meat-producing ability.
3. Feeding of the pigeon, feeds. Feeding systems.
4. Specific genetic knowledge of pigeon breeding.
5. Pigeon breeds.
6. Breeding of ornamental pigeons. Pigeon breeding. Post pigeon breeding, racing. Pigeon breeding.
7. Housing technology in pigeon breeding.
8. Status of rabbit breeding, ethology of the domestic rabbit
9. Basic knowledge of genetics and breeding in rabbit breeding
10. Breeding of domestic rabbits
11. Feeding the domestic rabbit
12. Husbandry technology, rabbit rearing
13. Breed knowledge of domestic rabbits
14. Angora rabbit breeding

**practices:**

1. Quantitative genetic examples in squab pigeon breeding
2. Solving qualitative genetic problems, colour genetics of the domestic pigeon
3. Solving qualitative genetic problems, colour genetics of the domestic pigeon
4. Feeding pigeons
5. Composition of feed mixtures for ornamental, racing and racing pigeons
6. Design of a pigeon farm
7. Design of a pigeon farm
8. Quantitative genetic problems in rabbit breeding
9. Solving qualitative genetic problems
10. Inheritance of colour in domestic rabbits
11. Feeding of domestic rabbits, aspects of compound feeding
12. Application of specific practical feeding knowledge related to fur production
13. Designing a rabbit farm
14. Designing a rabbit farm

**Literature**

* Sell, A.: Pigeon genetics ISBN: 9783981292039
* Fontanesi, L: The Genetics and Genomics of the Rabbit. ISBN: 978-1780643342

**Soil ecology**

ECTS Credit Points: 4

2 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: written and oral

Requirements:

- for signature: Students have to actively participate in the lecture, students have to give two presentations.

- for a grade: Students must meet the exam requirements

**Summary of content - theory:**

Soil ecology:

We set a goal to make it clear in the students' way of thinking that the biosphere is the part of the atmosphere, pedosphere and hydrosphere where living organisms play an important role. "Soil, water, air as environment" is also a living environment. We present the abiotic and biotic components of ecosystems, as well as agroecosystems.

Soil living organisms play an important role in soil formation (the first step is biological weathering), in the transformation (humus formation) and decomposition processes (mineralization) of organic matter in the soil, in the cycle of elements and in the energy flow of ecosystems. We describe the impact of human activity on soil properties. We will speak about the soil quality, soil fertility and soil pollution and amelioration.

Our goal is for students to be able to integrate new knowledge about soil. When imparting knowledge, we strive to emphasize the harmony of sustainable, environmentally friendly farming, environmental and nature protection

**lectures:**

1. The place and role of ecology. Basic concepts in ecology.
2. Functions of agroecosystems.
3. The soil as habitat. The most important physical and chemical properties of the soil.
4. Prokaryotes. The bacteria.
5. Eukaryotic algae and fungi.
6. Micro- and mesofauna in the soil.
7. Macro- and megafauna in the soil.
8. The role of biome is in the soil and the process of soil formation.
9. Interaction of populations in the ecosystem.
10. The cycle of C, P and K in the soil-plant-atmosphere system.
11. The cycle of N and S in the soil-plant-atmosphere system.
12. Soil functions, with particular regard to biodiversity.
13. The effect of agrotechnical factors on soil features and soil organisms.
14. The relationships between the plant root system and microbes in the soil.

**Seminars (short lectures and student presentations)**

1. Student introduction.
2. Student introduction.
3. About soil classification in your country
4. About soil classification in your country
5. The effect of soil pollution on soil properties and living organisms.
6. The effect of soil pollution on soil properties and living organisms.
7. What is the soil fertility? How are we able to increase soil fertility? How effect the soil fertility on biome?
8. What is the soil fertility? How are we able to increase soil fertility? How effect the soil fertility on biome?
9. What is the meaning of biodiversity in soil? What is the soil quality? Why is soil microbiological activity important?
10. What is the meaning of biodiversity in soil? What is the soil quality? Why is soil microbiological activity important?
11. The effect of human activity on soil fertility during amelioration
12. The effect of human activity on soil fertility during amelioration?
13. Effect of soil inoculants (bacteria, fungi, algae) on soil–plant systems.
14. Effect of soil inoculants (bacteria, fungi, algae) on soil–plant systems.

**Literature**

The presentations ppt

Brady, N.C. (1990) The Nature and Properties of Soil. Collier Macmillan Publishers (London) 10th ed.

Eash, N. S., Green, C.J., Razvi, A., Benneth, W.F. (2008) Soil Science Simplified (fifth ed.) Blackwell Publishing

Killham, K. (2004) Soil Ecology. Cambridge University Press

Wood, M. (1995) Environmental Soil Biology. Cambridge University Press.

Wall, D.H. et al (2012) Soil Ecology and Ecosystem Services. Oxford. University Press.

Ward Chesworth: Encyclopedia of Soil Science.

**Irrigated crop production**

ECTS Credit Points: 3

2 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: written and oral

Requirements:

- for signature: Students have to actively participate in the lecture, students have to give two presentations.

- for a grade: Students must meet the exam requirements

**Summary of content :**

The main goals are to give effective academic and practical knowledge connecting to the irrigated crop production: Interaction between water management and crop production in agriculture. Knowledge about water balance and water requirement of plants. Learning of significance of environment friendly and economic irrigation. Effects of the irrigation on soil, plant and environment. Principles of irrigation, main functions of irrigation and crop production. Irrigation regime of main crops.

* Interaction between water management and crop production in agriculture.
* Water balance of plants, water demand of plants.
* Bases of water regulation in crop production.
* Learning of significance of environment friendly and economic irrigation.
* Effects of irrigation on soil and plants.
* Production requirements of irrigation. Aims of irrigated crop production.
* Necessary of irrigation, efficiency of water use.
* Principles of fertilization in irrigated fields.
* Evaluation of irrigation patterns.
* Main functions of irrigation and crop production.
* Correlations between irrigation and yield stability.
* Irrigation regime of main crops I (green peas, alfalfa, red clover).
* Irrigation regime of main crops II (corn, sweet corn, corn seed).
* Irrigation regime of main crops III (rice, potato, sugar beet).

**Literature**

1. Burton, M. (2010): Irrigation Management: Principles and Practices, CAB Intl. ISBN: 9781845935160

2. Lee, T.S. (2012): Irrigation Systems and Practices in Challenging Environments,Intech, Rijeka, Croatia ISBN 978-953-51-0420-9

3. Esteve, Y.V, Brebbia, C.A. Rico, D.P. (2008): Sustainable Irrigation Management, Technologies and Policies II WIT Press, Southampton, UK ISBN: 978-1-84564-116-0

4. Brebbia, C.A, Marinova, M, Bjornlund, H (2010): Sustainable Irrigation Management, Technologies and Policies III, Wit Press/Computational Mechanics, Billerica, USA, ISBN: 9781845644468

5. Ali, M.H. (2010)-Fundamentals of Irrigation and On-farm Water Manage-ment-Springer-Verlag New York ISBN 978-1-4419-6334-5

**Plant nutrition management**

ECTS Credit Points: 3

2 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: written

Requirements:

- for signature: take part on lessons

- for a grade: 2 preparations of an independent work (ppt, at least 40 slides) on the topic of nutrient supply to field crops during the semester.

**Summary of content - theory**:

Within the course, students master the nutrient requirements of field crops, the principles of nutrient supply, in relation to yield and quality. After mastering the knowledge, the graduated engineers are able to organize and manage the nutrient management of plants.

**lectures:**

1. The purpose, task and history of fertilization. Evaluation of fertilization in Hungary.
2. The role of macroelements (N, P, K, Ca, Mg S) in plant life, their importance in plant nutrient supply.
3. The role of microelements (Fe, B, Cu, Zn, Mn, Mo) in the life of plants, their importance in the supply of nutrients to plants.
4. Requirements and significance of crop rotation, crop rotation, sowing structure for soil fertility, quantity and quality of plant products.
5. The importance of tillage for soil fertility, quantity and quality of plant products.
6. Nutrient turnover of soils (nutrient capital, uptake of nutrients, nutrient flux).
7. Organic fertilization, forms of organic fertilizers,
8. Fertilization, forms of fertilizers.
9. Forms of green manure.
10. Nutrient management in the integrated crop production.
11. Precision nutrient management I.
12. Nutrient replenishment in organic farming
13. Effect of fertilization on the physical and chemical properties of soils.
14. Development opportunities of nutrient management, future trends.

**practices:**

1. The practice of macroelement fertilization.
2. The practice of microelement fertilization.
3. The practice of barn fertilization.
4. The practice of slurry.
5. The practice of solid fertilization.
6. The practice of liquid fertilization.
7. The practice of green manure.
8. Practical development of winter wheat fertilization.
9. Practical development of corn fertilization.
10. Practical development of sunflower fertilization.
11. Practical elaboration of fertilization of winter rapeseed.
12. Practical development of soybean fertilization.
13. Precision nutrient replenishment practice.
14. Practical implementation of nutrient replenishment in organic farming.

**Literature**

* Allen V. Barker, David J. Pilbeam: 2016. Handbook of Plant Nutrition. CRC Press. (ISBN: 9781420014877) 632 p.
* J Benton Jones: 2012. Plant Nutrition and Soil Fertility Manual. Taylor & Francis Inc. ISBN: 1439816093. 304 p.

**Seed production and variety use**

ECTS Credit Points: 3

1 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: written

Requirements:

- for signature: take part on 70% of lecture

- for a grade: successful written exam

**Summary of content - theory**:

In the course Seed production and variety use we acquaint students with the importance, conditions, legal regulation of the use of propagation material, the significance of biological bases, their peculiarities in the most important field plant species, the aspects of modern variety use and variety selection.

**lectures:**

1. The development of seed production, the development of state supervision of seed production and processing. Institutional background and legal regulation of seed production, breeding and distribution
2. International organizations of variety use and seed certification
3. The situation of domestic and international seed production, the most important sectors of seed production
4. Seed trade between Hungary and the EU
5. The domestic system of seed production and distribution
6. State recognition of plant varieties and variety protection
7. The state administration system and regulation of the recognition of plant varieties in the EU, the protection of plant varieties
8. Implementation of arable land inspection. The process of seed testing and seed certification
9. Practical technology of winter wheat variety use and seed production.
10. Practical technology of cultivar use and seed production of other ryegrasses.
11. Practical technology of hybrid corn variety use and seed production.
12. Practical technology of sunflower cultivar use and seed production
13. Practical technology of sugar beet variety use and seed production.
14. Practical technology of alfalfa cultivar use and seed production

**practices:**

1. The development of seed production, the development of state supervision of seed production and processing. Institutional background and legal regulation of seed production, breeding and distribution
2. International organizations of variety use and seed certification
3. The situation of domestic and international seed production, the most important sectors of seed production
4. Seed trade between Hungary and the EU
5. The domestic system of seed production and distribution
6. State recognition of plant varieties and variety protection
7. The state administration system and regulation of the recognition of plant varieties in the EU, the protection of plant varieties
8. Implementation of arable land inspection. The process of seed testing and seed certification
9. Practical technology of winter wheat variety use and seed production.
10. Practical technology of cultivar use and seed production of other ryegrasses.
11. Practical technology of hybrid corn variety use and seed production.
12. Practical technology of sunflower cultivar use and seed production
13. Practical technology of sugar beet variety use and seed production.
14. Practical technology of alfalfa cultivar use and seed production

**Literature**

Miller McDonald, Lawrence O. Copeland (2012): Seed Production (Principles and Practicles). Springer Science & Business Media ISBN: 978-1-4615-4074-8

George Acquaah (2001): Principles of Crop Production. Theory, Techniques, and Technology. Pearson Prentice Hall, Upper Saddle River, New Jersey 07458. ISBN 0-13-114556-8

John H. Martin – Richard P. Waldren – David L. Stamp (2006): Principles of Field Crop Production. Pearson Prentice Hall, Upper Saddle River, New Jersey Columbus, Ohio. ISBN 0-13-025967-5

Medicinal plants

Basics of applied

Basics of the applied chemistry

**Game management**

ECTS Credit Points: 3

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

Type of exam: Colloquium

Requirements:

- for signature: Lecture presence

- for a grade: Homework

**Summary of content - theory**:

Following the presentation of the historical foundations of hunting and game management, the introduction to the management of small and large game stocks and the acquisition of the closely related legal regulations. They learn the theoretical foundations of the tools used for hunting, and at the same time get an idea of the limitations and rules of their use. They get to know the relationship system of wildlife management and other nature-related sectors and the basic principles of their harmonious coexistence.

**lectures:**

1. The most important elements of game management

2. The development of today's game management system

3. Legal regulation of hunting and game management

4. Income and cost factors of game management

5. The importance of red deer in game management, herd dynamics, ethology

6. Domestic distribution, nutrition and reproductive biology of fallow deer and roe deer.

7. Wild boar and mouflon game management and nature conservation judgement

8. Population conditions of pheasants and partridges in Hungary

9. Population biological characteristics of the hare, possibilities of its utilization

10. Population conditions of water game species, nature conservation aspects of their utilization

11. Indoor small game breeding.

12. Indoor large game breeding

13. Types and ammunition of ball firearms, construction of shotgun firearms, caliber types and ammunition

14. Hunting kynology

**Literature:**

1. Leopold A. (1986): Game Management, University of Wisconsin, 520 p.
2. Dorn O. (2017): Hunting Book, teNeues Publishing, UK, 256 p.

**Environment technology**

ECTS Credit Points: 3

1 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: colloquium

Requirements:

- for signature: participation in practical and laboratory classes

- for a grade: written exam

**Summary of content - theory**:

This course reviews the basic knowledge of soil pollution, characterization methods of polluted sites, regulations of remediation in Hungary, contamination transport processes in soils, and biological, chemical, physical, phytoremediation (clean-up) technologies in details. Introduction of the reasons and consequences of the main soil degradation processes. Introduction of the technical, agronomical, soil protection, chemical, mechanical, complex amelioration and recultivation methods suitable for the moderation of the unfavourable effects.

**lectures:**

1. Definition of remediation, national and international background and main steps of remediation plans and environmental status assessment.
2. Requirements of site characterization, regulation for underground water and geological medium in EU.
3. Sampling methods, impoundment methods for contaminated sites.
4. Pollution transport in soil and pollution distribution and transformation in soil.
5. Aspects of appropriate remediation technologies.
6. In-situ and ex-situ physical remediation methods.
7. In-situ and ex-situ chemical remediation methods.
8. In-situ and ex-situ biological remediation methods.
9. The soil conservation, land reclamation, environmental and soil acidification, salinization, secondary salinization, soil structure degradation, soil compaction.
10. Improving acidic and saline soils.
11. Improve sandy soils, improving soil physical properties of deep ploughing.
12. Water erosion. Technical and agronomic possibilities of protection against erosion.
13. Wind Erosion. Protection against deflation agronomic possibilities.
14. Complex amelioration (soil improvement, drainage, surface drainage and subsurface drainage).

**practices:**

1. Calculation: Relation of particle and bulk density.
2. Laboratory measurement: particle and bulk density (I).
3. Laboratory measurement: particle and bulk density (II).
4. Laboratory measurement: Particle size distribution analysis.
5. Calculation: Particle size distribution (PSD) analysis (I).
6. Calculation: Particle size distribution (PSD) analysis (II).
7. Evaluation of the PSD analysis in Grapher software (I).
8. Evaluation of the PSD analysis in Grapher software (II).
9. Assessment of remediation tasks (I).
10. Assessment of remediation tasks (II).
11. Assessment of remediation tasks (III).
12. Modelling of water fluxes in Hydrus software.
13. Modelling of root water uptake in Hydrus software.
14. Modelling of water balance in Hydrus software.

**Literature**

1. Prasad, MNV. 2005. Trace Elements in the Environment: Biogeochemistry, Biotechnology, and Bioremediation CRC Press/Taylor & Francis Group Boca Raton FL 33487 USA 744 ISBN: 978-1-56670-685-8.
2. P Lens, T Grotenhuis, G Malina, H Tabak 2005. Soil and Sediment Remediation. IWA Publishing London SW1H 0QS United Kingdom 544 ISBN: 9781843391005.
3. Neilson, Alasdair H. 2007. Environmental Degradation and Transformation of Organic Chemicals. Taylor & Francis (USA) Philadelphia, PA 19106 USA ISBN: 9780849372414.
4. Mirsal I.A. 2004. Soil pollution: Origin, Monitoring and Remediation Springer 312. ISBN: 978-3-540-70775-5.
5. Saligram Bhatt (2004): Environment Protection and Sustainable Development. APH Publishing. 241. p. ISBN: 9788176485128.

**Precision farming**

ECTS Credit Points: 3

1 hour(s) lecture and 1 hour(s) seminar per semester

Type of exam: written

Requirements:

- for signature: take part on 70% of lecture

- for a grade: successful written exam

**Summary of content - theory**:

The general goal of teaching the subject is to provide comprehensive knowledge of the current situation of precision agriculture, the expected directions, and its necessity. Students can acquire the latest theoretical and practical knowledge related to the application of precision and site-specific technologies. We present the latest modern technologies, the various

row guidance and automatic steering systems, for site-specific and chlorophyll content

based nutrient supply. The subject introduces you to precision field and horticulture

plant protection, precision sowing and presents fleet management systems.

**lectures:**

1. The future of crop production. The concept of precision crop production.
2. Comparison of traditional and precision crop cultivation.
3. Fundamentals of satellite positioning.
4. GPS operation, DGPS operation.
5. Geospatial basic concepts.
6. Operations with spatial objects.
7. Spatial heterogeneity in crop production.
8. Power and machine optimization in precision crop cultivation.
9. Precision soil sampling in plant cultivation.
10. Precision sowing technology technologies in plant cultivation.
11. Precision nutrient management in plant cultivation.
12. Precision plant protection in plant cultivation.
13. Precision technological elements in harvesting field crops.
14. Determination of the heterogeneity of crop elements.

**practices:**

1. The future of crop production. The concept of precision crop production.
2. Comparison of traditional and precision crop cultivation.
3. Fundamentals of satellite positioning.
4. GPS operation, dgps operation.
5. Geospatial basic concepts.
6. Operations with spatial objects.
7. Spatial heterogeneity in crop production.
8. Power and machine optimization in precision crop cultivation.
9. Precision soil sampling in plant cultivation.
10. Precision sowing technology technologies in plant cultivation.
11. Precision nutrient management in plant cultivation.
12. Precision plant protection in plant cultivation.
13. Precision technological elements in harvesting field crops.
14. Determination of the heterogeneity of crop elements.

**Literature**

Krishna, K. R. (2013) Precision Farming: Soil Fertility and Productivity Aspects 188 p. ISBN-13 ‏: ‎978-1926895444Qin Zhang (2016): Precision Agriculture Technology for Crop Farming. 374 p. ISBN 9781032098272

D. Kent Shannon, David E. Clay, Newell R. Kitchen (2018): Precision Agriculture Basics. ISBN:9780891183662 265 p.

**Quality management system**

ECTS Credit Points: 3

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

Type of exam: colloquium

Requirements:

- for signature: -

- for a grade: mid-year written exams, written exam

**Summary of content - theory**:

The aim of the subject is the introduction of the basic concepts and characteristics of quality and quality management, furthermore the basics of the quality and environmental management systems and related standards.

Knowledge to be acquired: basic quality concepts, basics of quality assurance, good practices, HACCP, ISO standards (9000, 9001, 14001), TQM.

Developed competencies: development of quality approach, participation in quality assurance activities.

**lectures:**

1. Concept and importance of quality
2. History of quality development
3. GHP
4. GMP
5. GAP
6. GLOBALGAP
7. HACCP
8. ISO 9000
9. ISO 9001
10. ISO 14001
11. EMAS
12. TQM
13. Quality awards
14. Auditing of management systems

**Literature**

Peles, F. – Juhász, Cs. (2014): Quality assurance. University lecture notes. University of Debrecen. /ISBN 978-963-473-656-1/ TÁMOP 4.1.2.A/1-11/1-2011-0009. 177p.

Vasconcellos, J.A. (2004): Quality Assurance for the Food Industry. A Practical Approach. CRC Press. 448 p.

Jacxsens, L. – Devlieghere, F. – Uyttendaele, M. (2009): Quality Management Systems in the Food Industry. Ghent University. 153p.

**Professional language skills I. (English)**

ECTS Credit Points: **3**

0 hour(s) lecture and 54 hour(s) seminar per semester (0+4/week)

Type of exam: practical

Requirements:

- for signature: 3 allowed absences per semester.

- for a grade: Completing assignments / exercises.

**Summary of content - practice**:

The aim of the course is to prepare students for academic studies in the field of agriculture. The focus is specifically on the skills which students of agribusiness and agriculture need, that include written and oral communication, technical vocabulary. During the course we intend to cover key facts and concepts from the discipline of agriculture.

1. Orientation, needs analysis
2. Agriculture and business (Listening, speaking activities)
3. The origins of agribusiness
4. Foundations of modern agriculture (reading, writing activities)
5. Agricultural advances through the ages
6. Soil, land and environment (Listening, speaking activities)
7. Food security
8. Midterm exam. Organic farming methods
9. Technology and agribusiness (reading, writing activities)
10. Using IT for research .
11. Agribusiness marketing (Listening, speaking activities)
12. Products and strategies, marketing mix (reading, writing activities)
13. Revision
14. End term, Evaluation

**Literature**

ROBIN MATHESON (2014): Agribusiness and Agriculture in Higher Education Studies. Garnet publishing Ltd. ISBN 978-1-859664-450-0

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.

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

Michael McCarthy, Felicity O’Dell: Academic Vocabulary in Use

**Professional language skills II. (English)**

ECTS Credit Points: **3**

0 hour(s) lecture and 54 hour(s) seminar per semester (0+4/week)

Type of exam: practical

Requirements:

- for signature: 3 allowed absences per semester.

- for a grade: Completing assignments / exercises.

**Summary of content - practice**:

The aim of the course is to prepare students for academic studies in the field of agriculture. The focus is specifically on the skills which students of agribusiness and agriculture need, that include written and oral communication, technical vocabulary. During the course we intend to cover key facts and concepts from the discipline of agriculture.

1. Orientation, revision
2. The effective production manager (Listening, speaking activities)
3. The qualities needed by a production manager
4. Rural economies and financial management (reading, writing activities)
5. The concepts in agri-economics (reading, writing activities)
6. Managing financial accounts Listening, speaking activities)
7. Documentation, profit and loss account and balance sheets
8. Revision and Midterm exam.
9. Food safety (reading, writing activities)
10. Case study: a proactive approach to food safety
11. The future of farming (Listening, speaking activities)
12. EU agricultural policy
13. The good agribusiness
14. End term, Evaluation

**Literature**

ROBIN MATHESON (2014): Agribusiness and Agriculture in Higher Education Studies. Garnet publishing Ltd. ISBN 978-1-859664-450-0

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.

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

Michael McCarthy, Felicity O’Dell: Academic Vocabulary in Use

**Internship**

Students must complete 80 hours internships in the semester 2 and semester 4 as specified in the model curriculum. The internship course must be pre-registered through the NEPTUN study registration system. At the end of the training programme, in the 7th semester, a 12-week internship in a selected company is required to gain practical experience. Completion of the internships is a prerequisite for the award of the pre-degree certificate.

**Work and fire safety course**

In accordance with the University of Debrecen regulations, the student must complete the online course in occupational safety and fire protection. To obtain the diploma, enrollment and completion of the course is required. Enrollment in the Neptun system per subject.

Students must complete the online material to be signed in Neptun to complete the course. The link to the online course is available on the faculty website.

# **Physical Education**

According to the Rules and Regulations of University of Debrecen a student has to complete Physical Education courses at least in two semesters during the Bachelor training. Our University offers a wide range of facilities to complete them. Further information is available from the Sport Centre of the University, its website: [http://sportsci.unideb.hu.](http://sportsci.unideb.hu/)

# **Thesis**

A thesis is a creative development of a professional project in written form. In solving the assignment, the student draws on his/her studies, using national and international literature, under the guidance of a supervisor. By solving the assignment, the agricultural engineering student demonstrates his/her ability to apply the knowledge acquired in practice, to summarise the work carried out and its results in a professional manner, to solve problems related to his/her subject in a creative way and to carry out independent professional work. The deadline for submission of the thesis is set by the academic calendar of the faculty.

The number of credits allocated to the thesis in the agricultural engineering programme is 30.

The thesis topics are published by the departments, but the student may propose a thesis topic, which is decided by the designated head of department.

The thesis will be evaluated by the referee and assessed and graded individually by the department. The head of the department will make a recommendation to the final examination committee.

If the examiner gives an unsatisfactory grade, the student will not be allowed to take the final examination and will have to prepare a new or revised thesis. The student must be informed of this. The conditions for resubmission of the thesis are determined by the programme coordinator.

# **Final examination (Final Exam)**

Students who have obtained a pre-degree certificate complete their studies with the final examination. Final examinations may be taken during the next examination period following the award of the pre-degree certificate while an active student, and in any examination period within five years of the end of the student's active student status, in accordance with the applicable training requirements. No final examination may be taken after the fifth year following termination of the student's studies. Only students who have no outstanding fees may sit the final examination.

A student who has obtained an undergraduate degree (diploma) shall complete his/her studies by passing the final examination. The final examination is an assessment and validation of the knowledge and skills acquired in higher education, during which the candidate must demonstrate that he/she can apply the knowledge acquired in practice.

The final examination may be taken in the next examination period after the initial qualification. The faculty will announce two final examination dates per year. A final examination must be taken before the board on the date set. If a candidate does not pass the final examination before the end of his/her student status, he/she may take the final examination on any final examination day of the academic year after the end of his/her student status, in accordance with the rules in force concerning the final examination.

The final examination shall consist of two parts, in accordance with the curriculum.

1) Written and oral examinations on the topics indicated.

2) Thesis defence (presentation of the thesis, answering questions, comments and then answering questions based on knowledge related to the thesis topic).

A final examination may be started if the candidate is admitted to the final examination on the basis of a firm opinion of the examiners. The two parts must be held on the same day.

The parts of the final examination shall be marked on a five-point scale by the members of the Final Examination Committee. The final grade for the final examination will be decided in closed session after the final examination, followed by a vote. In the event of a tie, the chairman of the committee will decide. The results of the final examination are announced by the chairman of the committee. The results of the final examination and the thesis defence are announced at the end of the examination day (when all candidates have completed the final examination and the thesis defence on the day in question). A record of the final examination is written.

*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*

The chair and members of the committee are appointed by the Dean with the approval of the Faculty Council. They are selected from a pool of recognised internal and external experts in the field. Traditionally, the Chairperson is invited, and in his/her absence or incapacity, the Vice-Chairperson. In addition to the chairperson, the committee consists of at least one member (university professor, associate professor or college professor) and at least two questioners (lecturers), and the examiner. The appointment of 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 Bachelor of Agricultural Engineering 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. 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 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 result 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 AGRICULTURAL ENGINEER BSC**

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/agricultural-engineering-bsc

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| *Head: Dr. József Csajbók, associate professor* | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |
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| **Code of the subjects** | **Title of the subjects** | | | | **Semester 1** | | | | **Semester 2** | | | | **Semester 3** | | | | **Semester 4** | | | | **Semester 5** | | | | **Semester 6** | | | | **Semester 7** | **Lecturer** | | |
| **14** | | | | **14** | | | | **14** | | | | **14** | | | | **14** | | | | **14** | | | | **12** |
| lec | prac | e | cr | lec | prac | e | cr | lec | prac | e | cr | lec | prac | e | cr | lec | prac | e | cr | lec | prac | e | cr |  |
| MTB7003A | Zoology |  |  |  | 2 | 2 | C | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Gyüre Péter | | |
| MTB7004A | Agricultural history |  |  |  | 2 | 0 | C | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Fekete István | | |
| MTB7005BA | Mathematics |  |  |  | 2 | 2 | P | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Vincze Szilvia | | |
| MTB7006A | General and inorganic chemistry |  |  |  | 2 | 1 | C | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Vágó Imre | |  |
| MTB7007A | Agricultural botany |  |  |  | 2 | 2 | C | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Kovács Szilvia | | |
| MTB7008A | Informatics |  |  |  | 0 | 2 | P | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Várallyai László | | |
| MTBM7001A | Agricultural fundamentals I |  |  |  | 0 | 2 | P | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Szabó András | | |
|  | **Sum total** |  |  |  | 10 | 10 |  | 27 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MTBM7002A | Animal physiology | |  |  |  | | | | 2 | 1 | C | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Novotniné Dr. Dankó Gabriella | | |
| MTB7009A | Organic and biochemistry | | |  |  | | | | 2 | 1 | C | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Kincses Sándorné Dr. | | |
| MTB7010A | Basics of mechanical engineering | | | |  | | | | 2 | 1 | P | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Hagymássy Zoltán | | |
| MTB7011A | Soil science | | | |  | | | | 2 | 1 | C | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Csubák Mária | | |
| MTB7012A | Water management | | | |  |  |  |  | 2 | 1 | C | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Juhász Csaba | | |
| MTB7013A | Agricultural and food industrial microbiology | | | |  |  |  |  | 2 | 1 | C | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Karaffa Erzsébet | | |
| MTBM7003A | Agricultural fundamentals II | | |  |  |  |  |  | 0 | 2 | P | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Fehér Milán | | |
| MTB7014A | Basic of plant physiology |  |  |  |  |  |  |  | 2 | 1 | C | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Veres Szilvia | | |
| MTB7015A | Environmental management | | |  |  |  |  |  | 2 | 0 | C | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Juhász Csaba | | |
|  | **Sum total** |  |  |  |  |  |  |  | 16 | 0 |  | 31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MTB7016BA | Crop production I |  |  |  |  |  |  |  |  |  |  |  | 2 | 2 | C | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Pepó Péter | |  |
| MTB7017A | Land use and regional development |  |  |  |  |  |  |  |  |  |  |  | 2 | 1 | C | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Rátonyi Tamás | | |
| MTB7018A | Agricultural machinery | | |  |  |  |  |  |  |  |  |  | 2 | 2 | P | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Hagymássy Zoltán | | |
| MTB7019A | Animal nutrition | |  |  |  |  |  |  |  |  |  |  | 2 | 2 | C | 5 |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Bársony Péter | | |
| MTB7020\_AA | Economic sciences I (macro and micro economics) | | | |  |  |  |  |  |  |  |  | 2 | 0 | C | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  | Bauerné Dr. Gáthy Andrea | | |
| MTB7020\_BA | Economic sciences I (EU agricultural policy, agricultural economics) | | | |  |  |  |  |  |  |  |  | 2 | 0 | C | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Harangi-Rákos Mónika | | |
| MTB7021A | Genetics and biotechnology | | | |  |  |  |  |  |  |  |  | 2 | 1 | P | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Pepó Pál | | |
| MTB7022A | Agricultural chemistry | | |  |  |  |  |  |  |  |  |  | 2 | 1 | C | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  | Balláné Dr. Kovács Andrea | | |
| MTB7023A | Animal husbandry I | |  |  |  |  |  |  |  |  |  |  | 2 | 1 | C | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Komlósi István | | |
|  | **Sum total** | |  |  |  |  |  |  |  |  |  |  | 18 | 10 |  | 32 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MTBM7004BA | Agroecology | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 0 | P | 3 |  |  |  |  |  |  |  |  |  | Dr. Szabó András | | |
| MTBM7005A | Horticulture I | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 | C | 3 |  |  |  |  |  |  |  |  |  | Dr. Sipos Marianna | | |
| MTBM7006A | Crop production II | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 2 | C | 4 |  |  |  |  |  |  |  |  |  | Dr. Csajbók József | | |
| MTBM7007A | Animal husbandry II | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 1 | C | 3 |  |  |  |  |  |  |  |  |  | Dr. Rózsáné Dr. Várszegi Zsófia | | |
| MTB7024\_AA | Economic sciences II (business studies) | | | |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 | P | 2 |  |  |  |  |  |  |  |  |  | Dr. Posta László | | |
| MTB7024\_BA | Economic sciences II (financial knowledge and accounting) | | | |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 | P | 2 |  |  |  |  |  |  |  |  |  | Dr. Kvancz József | | |
| MTB7025A | Plant protection I (plant pathology) | | | |  | | | | | | | | | | | | 1 | 1 | P | 3 |  |  |  |  |  |  |  |  |  | Dr. Tarcali Gábor | | |
|  | **Sum total** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 10 | 7 |  | 20 |  |  |  |  |  |  |  |  |  |  |  |  |
| MTBM7014A | Animal husbandry III | | | |  | | | | | | | | | | | | | | | | 2 | 2 | C | 3 |  |  |  |  |  | Dr. Czeglédi Levente | | |
| MTBM7008A | Horticulture II | | | |  | | | | | | | | | | | | | | | | 1 | 1 | C | 3 |  |  |  |  |  | Dr. Csihon Ádám | | |
| MTB7026\_AA | Economic sciences III. (communication, management and organisational skills) | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 0 | C | 2 |  |  |  |  |  | Dr. Juhász Csilla | | |
| MTB7026\_BA | Economic sciences III (extension services) | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 0 | C | 2 |  |  |  |  |  | Dr. Pető Károly | | |
| MTB7027A | Plant protection II (entomology) | | | |  | | | | | | | | | | | | | | | | 1 | 1 | P | 3 |  |  |  |  |  | Dr. Nagy Antal | | |
| MTBM7009A | Crop production III | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 2 | C | 4 |  |  |  |  |  | Dr. Csajbók József | | |
| MTB7028A | Statistics | | | |  | | | | | | | | | | | | | | | | 1 | 1 | P | 3 |  |  |  |  |  | Dr. Balogh Péter | | |
| MTBM7010A | Forest management | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 1 | P | 3 |  |  |  |  |  | Dr. Rédei Károly | | |
|  | **Sum total** | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 13 | 8 |  | 23 |  |  |  |  |  |  |  |  |
| MTB7029A | Regulation and administration of agriculture | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 0 | C | 3 |  | Dr. Szilágyi Bay Péter | | |
| MTBM7011A | Animal health and hygiene | | | |  | | | | | | | | | | | | | | | | | | | | 1 | 1 | P | 3 |  | Dr. Pálfyné Dr.Vass Nóra | | |
| MTBM7012A | Food technologies, food safety | | | |  | | | | | | | | | | | | | | | | | | | | 2 | 1 | P | 3 |  | Dr. Babka Beáta | | |
| MTBM7013A | Economy of agricultural sectors | | | |  | | | | | | | | | | | | | | | | | | | | 2 | 2 | C | 3 |  | Dr. Madai Hajnalka | | |
| MTBM7015A | Grassland management | | | |  | | | | | | | | | | | | | | | | | | | | 1 | 1 | P | 3 |  | Dr. Nagy Géza | | |
| MTB7030A | Plant protection III (weed control and integrated plant protection) | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 | P | 3 |  | Dr. Radócz László | | |
|  | **Sum total** | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 9 | 6 |  | 18 |  |  |  |  |
|  | ***Total number of hours:*** | | | | 10 | 10 |  | 27 | 16 | 0 |  | 31 | 18 | 10 |  | 32 | 10 | 7 |  | 20 | 13 | 8 |  | 23 | 9 | 6 |  | 18 |  |  | | |
|  | **Internship** | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MTBM7NG1A | Internship I\* | | | |  | | | | 80 | | | |  | | | |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Csajbók József | | |
| MTBM7NG2A | Internship II\*\* | | | |  | | | | | | | | | | | |  | 80 |  |  |  | | | |  |  |  |  |  | Dr. Csajbók József | | |
| MTB7GYAKBSCA | Internship program (12 weeks long practice) | | | |  | | | | | | | | | | | |  |  |  |  |  | | | |  |  |  |  | 30 |  | | |
|  | ***Total number of hours:*** | | | |  | | | |  | | | |  | | | |  | | | |  | | | |  | | | |  |  | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | ***The first week connected to the basic subjects (Botany, Animal science) and the fundamental subjects (Soil science, Water management) practice.*** | | | | | | | | | | | | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | ***The second week is crop production and animal husbandry practice.*** | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | ***One week crop production and one week animal husbandry practice.*** | | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Facultative subjects** | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |  | | |
|  | *Animal husbandry subject group* | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |  |  |  |
| MTBM7017A | Feed knowledge, feed production | | | |  | | | | | | | |  |  |  |  | 1 | 1 | C | 3 |  |  |  |  |  |  |  |  |  | Dr. Bársony Péter | | |
| MTBM7018A | Livestock genetics | |  |  |  | | | | | | | | | | | | 2 | 1 | C | 3 |  |  |  |  |  |  |  |  |  | Dr. Posta János | | |
| MTBM7019A | Etology |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 | C | 3 |  |  |  |  |  |  |  |  |  | Novotniné Dr. Dankó Gabriella | | |
| MTBM7020A | Lake economical husbandry technologies | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 | C | 3 |  |  |  |  |  | Dr. Bársony Péter | | |
| MTBM7021A | Qualification of animal products |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 1 | P | 3 |  |  |  |  |  | Dr. Rózsáné Dr. Várszegi Zsófia | | |
| MTBM7022A | Reproduction biology | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 | C | 3 |  | Dr. Pálfyné Dr. Vass Nóra | | |
| MTBM7023A | Pigeon and rabbit farming | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 | C | 3 |  | Dr. Posta János | |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | *Crop production subject group* | | | | | | | | | | | | | | | | | | | | | | | | | | | |  |  |  |  |
| MTBM7025A | Soil ecology | |  |  |  | | | | | | | | 2 | 1 | C | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Kátai János | |  |
| MTBM7026A | Irrigated farming | |  |  |  | | | | | | | | | | | |  |  |  |  | 2 | 1 | C | 3 |  |  |  |  |  | Dr. Csajbók József | | |
| MTBM7027A | Plant nutrition management | | |  |  | | | | | | | | | | | |  |  |  |  | 2 | 1 | P | 3 |  |  |  |  |  | Dr. Dóka Lajos | | |
| MTBM7028A | Seed production and variety use | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 | C | 3 |  |  |  |  |  | Dr. Szabó András | | |
| MTBM7029A | Medicinal plants and spice crops production | | | |  | | | | | | | | | | | | | | | |  |  |  |  | 2 | 1 | P | 3 |  | Dr. Kutasy Erika | | |
|  |  | | | |  | | | |  | | | |  | | | |  | | | |  | | | |  | | | |  |  | | |
|  | *Other facultative subjects* | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MTB7001A | Basics of applied plant biology | | |  | 1 | 0 | S | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Veres Szilvia | | |
| MTB7002A | Basics of the applied chemistry | | |  | 1 | 0 | S | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Kincses Sándorné Dr. | | |
| MTBM7030A | Game management | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 0 | C | 3 |  | Dr. Szendrei László | | |
| MTBM7031A | Environment technology | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 | C | 3 |  | Dr. Kovács Elza | | |
| MTBM7032A | Precision farming | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 1 | C | 3 |  | Dr. Szabó András | | |
| MTBM7033A | Quality management system | | |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 0 | C | 3 |  | Dr. Peles Ferenc | | |
|  | ***Total number of hours:*** | | | |  | | | |  | | | |  |  |  | |  |  |  | |  |  |  | |  |  |  | |  |  | | |
|  |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | **Other compolsury subjects** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | |
| MTB7NY1A | Professional language skills I | | | | 0 | 4 | P | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Czellér Mária | | |
| MTB7NY2A | Professional language skills II | | | |  |  |  |  | 0 | 4 | P | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Dr. Czellér Mária | | |
| SI-001 | Physical education | | | | 0 | 2 | S | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | |
| SI-001 | Physical education | | | |  |  |  |  | 0 | 2 | S | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MTBM7H1A | Agricultural practice I | | | | 0 | 40 | S | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MTBM7H2A | Agricultural practice II | | | |  |  |  |  | 0 | 40 | S | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MTBM7H3A | Agricultural practice III | | | |  |  |  |  |  |  |  |  | 0 | 40 | S | 0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MTBM7H4A | Agricultural practice IV | | | |  |  |  |  |  |  |  |  |  |  |  |  | 0 | 40 | S | 0 |  |  |  |  |  |  |  |  |  |  |  |  |
| MTB7D1A | Final dissertation I | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0 | 2 | P | 7 |  |  |  |  |  |  |  |  |
| MTB7D2A | Final dissertation II | | | |  | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0 | 2 | P | 8 |  |  | | |
|  | *Credits for compulsory subjects* | | | |  | | | *30* |  | | | *34* |  | | | *32* |  | | | *20* |  | | | *30* |  | | | *26* |  |  |  | 172 |
|  | *Credits for optional subjects* | | | |  | | |  |  | | |  |  | | | *3* |  | | | *6* |  | | |  |  | | |  |  |  |  | 9 |
|  | **Total credit** | | | |  |  |  | **30** |  |  |  | **34** |  |  |  | **35** |  |  |  | **26** |  |  |  | **30** |  |  |  | **26** |  |  |  | **180** |
|  | **weekly number of hours (compulsory+language+physical education):** | | | | 10 | 16 |  |  | 16 | 6 |  |  | 18 | 10 |  |  | 10 | 7 |  |  | 13 | 8 |  |  | 9 | 6 |  |  |  |  |  |  |
|  | Internship (7th sem.) | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 30 |  |  | **30** |
|  | *Examination forms* | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **210** |
|  | Colloquium | | | |  |  | 4 |  |  |  | 7 |  |  |  | 7 |  |  |  | 4 |  |  |  | 5 |  |  |  | 4 |  |  |  | | |
|  | Practical mark | | | |  |  | 4 |  |  |  | 3 |  |  |  | 2 |  |  |  | 4 |  |  |  | 4 |  |  |  | 5 |  |  |  | | |
|  | Internship program (seventh semester) duration: 12 weeks, thus 40x12 = 480 hours | | | | | | | | |  |  | C: colloquium | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Final exam topics: | |  | Crop production |  |  |  |  |  |  |  | P: practical mark | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | Animal husbandry |  |  |  |  |  |  |  | S: signature | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | Sectoral economics |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |