

**BULLETIN**

**UNIVERSITY OF DEBRECEN**

**ACADEMIC YEAR 2015/2016**

**Faculty of Agricultural and Food Sciences and  
Environmental Management**

**ANIMAL HUSBANDRY ENGINEERING MSc**

Coordinating Center for International Education



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## CHAPTER 1 UNIVERSITY OF DEBRECEN

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### UNIVERSITY OF DEBRECEN

**Date of foundation:** 1912 Hungarian Royal University of Sciences; 2000 University of Debrecen

**Legal predecessors:** Debrecen University of Agricultural Sciences; Debrecen Medical University; Wargha István College of Education, Hajdúböszörmény; Kossuth Lajos University of Arts and Sciences

**Legal status of the University of Debrecen:** state university

**Founder of the University of Debrecen:** Hungarian State Parliament

**Supervisory body of the University of Debrecen:** Ministry of Education

**Accreditation dates and statute numbers:** Debrecen University of Agricultural Sciences: 17 December 1996, MAB/1996/10/II/1.; Debrecen Medical University: 5 July 1996, OAB/1996/6/II/6; Wargha István College of Education, Hajdúböszörmény: 5 July 1996, OAB/1996/6/II/2; Kossuth Lajos University of Arts and Sciences: 5 July 1996, OAB/1996/6/II.5.; University of Debrecen: 3 October 2012, MAB/2012/8/VI/2.

**Number of faculties at the University of Debrecen:** 14

- Faculty of Law
- Faculty of Medicine
- Faculty of Humanities
- Faculty of Health
- Faculty of Dentistry
- Faculty of Economics and Business (before 1 August 2014 the predecessors of the Faculty were the Faculty of Applied Economics and Rural Development and the Faculty of Economics and Business Administration)
- Faculty of Child and Adult Education
- Faculty of Pharmacy
- Faculty of Informatics
- Faculty of Agricultural and Food Sciences and Environmental Management (before 1 March 2010 the name of the Faculty was the Faculty of Agriculture)
- Faculty of Engineering
- Faculty of Public Health
- Faculty of Sciences and Technology
- Faculty of Music

**Number of accredited programmes at the University of Debrecen:** 73 degree programmes with the pre-Bologna 5-year-system university education, 41 supplementary degree programmes offering transfer-degree continuation of studies towards the university degree (MSc), 50 degree programmes with the pre-Bologna 3-year-system college education, 67 BSc and 78 MSc programmes according to the Bologna system, 5 unified one-cycle linear training programmes, 35 specializations offering post-secondary vocational certificates and 159 vocational programmes.

**Number of students at the University of Debrecen:** 28812

according to time of studies: 22888 full-time students, 5899 part-time students having corresponding classes and 25 part-time students having evening classes or distance education according to education level: 944 students at post-secondary vocational level, 17406 students at BSc, 3112 students at MSc, 21 students at college level, 190 students at university level (MSc), 5320 students at one-cycle linear training, 954 students at vocational programmes, 865 students at PhD, 3741 foreign students.

**Full time teachers of the University of Debrecen:**1421

194 full college/university professors and 1055 lecturers with a PhD.

**CHAPTER 2**  
**DEAN'S WELCOME**

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Thank you for your interest in our university with a great past and in our agricultural higher education with approximately 150 year old traditions.

The University of Debrecen is one of the institutions offering a wide range of courses and research activities in Hungary. As one of the most significant think tanks in the country and the knowledge centre of the region, we seek to provide unprecedented opportunities for our students to gain state-of-the-art knowledge and to carry out significant activities.

With excellent infrastructure and high level education, the Faculty of Agricultural and Food Sciences and Environmental Management ensures excellent facilities for its students. In addition to gaining in-depth modern experience, a wide range of opportunities are available to perform professional and scientific activities beyond the scope of academic studies. After obtaining their certificates in higher education vocational training and BSc diploma courses, our students acquire a thorough practical knowledge, they can continue their studies in MSc training and then the best ones in Ph.D. training.

We firmly believe that the variety of trainings and courses we offer are attractive to many students who choose the Faculty of Agricultural and Food Sciences and Environmental Management for academic education.

I wish you every success in your studies and hope to meet you personally in the near future.

*Prof. Dr. István Komlósi*  
Dean

**CHAPTER 3**  
**HISTORY OF THE FACULTY**

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**History of the Faculty**

Agricultural higher education in Debrecen started in 1868 with the foundation of the National Higher Economic School of Debrecen. This date marks the beginning of agricultural higher education in Debrecen and East Hungary. Between 1876 and 1906 the institute's official name was Secondary Economic School. Then it was run under the name Hungarian Royal Academy of Economy until 1944. Between 1944 and 1949 our institute went on with its work as the Debrecen Department of the Agricultural Sciences at the Hungarian Agricultural University. In 1953 tuition began again at the Agricultural Academy. Training of professionals reached University level between 1962 and 1970 at the Agricultural College. Between 1970 and 1999 the institute got its university title and as the Agricultural University of Debrecen it operated with two branch faculties (Szarvas, earlier Hódmezővásárhely, later Mezőtúr).

The University of Debrecen was established with 5 university-, three college faculties and three research institutes on 1<sup>st</sup> January, 2000. In 2002 the Faculty of Agriculture and Rural Development was established, and by 2006, the university had comprised 15 faculties.

## **CHAPTER 4**

### **MISSION OF THE FACULTY**

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#### Mission of the Faculty

The mission of the Faculty of Agricultural and Food Sciences and Environmental Management is the multifunctional development of agriculture and rural development in the North Great Plain Region. Accordingly, the institution deals with regional, national and international research and consultancy, as well as the primary goal of training professionals within the Center for Agricultural and Applied Economic Sciences. Our spectrum of educational, training and research areas have broadened, in compliance with the demands of sustainable agricultural and rural development. The interconnection between the branches of science is strengthening, which is desirable both in the long and the short terms. Our aspiration can be used as a motto, as well: "diverse training and mobility".

Our Faculty provides all the personal and infrastructural conditions of linear training. The structure of our educational programs is flexible and provides students with diverse course contents.

Our accredited laboratories provide us with the opportunity to impact sectors of the economy in such a way that these can meet the ever-changing demands on markets. Our purpose is to create high-standard student and research laboratories and to provide the conditions for special high-value machines and measurement processes.

The doctoral schools and doctoral programs operating at the Faculty have an ever-widening base - providing talented young people with a suitable environment for scientific development.



**CHAPTER 5**

**THE ORGANIZATIONAL STRUCTURE OF THE UNIVERSITY**

RECTOR OF THE UNIVERSITY OF DEBRECEN

Rector: Zoltán Szilvássy M.D., Ph.D, D.Sc.  
Address: 4032 Debrecen, Egyetem tér 1.  
Phone: +36-52-412-060  
Phone/Fax: +36-52-416-490  
E-mail: rector@unideb.hu

FACULTY OF AGRICULTURAL AND FOOD SCIENCES AND ENVIRONMENTAL  
MANAGEMENT

Dean: Prof. Dr. habil. István Komlósi  
Address: 4032 Debrecen, Böszörményi út 138.  
Phone: +36-52/508-412; 88438  
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E-mail: komlosi@agr.unideb.hu

Vice Dean for Educational Affairs: Dr. habil. Csaba Juhász  
Address: 4032 Debrecen, Böszörményi út 138.  
Phone: +36-52/508-454 88454  
Fax: +36-52/508-454 88454  
E-mail: juhasz@agr.unideb.hu

Vice Dean of Scientific Affairs: Dr. László Stündl  
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E-mail: stundl@agr.unideb.hu

DEAN'S OFFICE

Head of Dean's Office: Dr. Mrs. Julianna Fricz Mocsári  
Address: 4032 Debrecen, Böszörményi út 138.  
Phone/Fax: +36-52/508-412, +36-52/508-489  
E-mail: friczj@agr.unideb.hu

REGISTRAR'S OFFICE

Registrar: Dr. Mrs. István Kovács  
Address: 4032 Debrecen, Böszörményi út 138.  
Phone/Fax: +36-52/508-409, +36-52/508-317  
E-mail: ktunde@agr.unideb.hu

Officers  
Mrs. Gizella Kerekes Guthy  
Mrs. Mónika Bátori Pintye  
Ms. Zsuzsanna Házi  
László Lévai

**CHAPTER 6**  
**THE DEPARTMENTS OF THE FACULTY**

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**INSTITUTE OF AGRICULTURAL CHEMISTRY AND SOIL SCIENCE**

Böszörményi út 138., Debrecen, 4032

Full Professor, Head of Institute	János Kátai C.Sc.
Associate Professor	Ms. Andrea Balláné Kovács Ph.D. Ms. Mária Micskeiné Csubák C.Sc. Imre Vágó C.Sc.
Assistant Professor	Ms. Rita Erdei Kremper Ph.D. Ms. Sándorné Kincses Ph.D. Zsolt Sándor Ph.D.
Secretary	Ms. Gizella Szász
Research Assistant	Ms. Magdolna Tállai Ph.D.

**INSTITUTE OF ANIMAL SCIENCE, BIOTECHNOLOGY AND NATURE  
CONSERVATION**

Böszörményi út 138., Debrecen, 4032

Full Professor, Head of Institute	István Komlósi D.Sc.
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**Department of Animal Husbandry**

Böszörményi út 138., Debrecen, 4032

Full Professor, Dean, Head of Department	István Komlósi D.Sc.
Professor Emeritus	Imre Bodó D.Sc. Sándor Mihók C.Sc.
Professor	János Gundel C.Sc.
Technical Assistant	Ms. Beáta Babka Ms. Gabriella Gulyás Attila Sztrik
Associate Professor	Béla Béri C.Sc. Károly Magyar C.Sc. Ms. Gabriella Novotniné Dankó Ph.D. József Prokisch Ph.D. László Stündl Ph.D.

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THE DEPARTMENTS OF THE FACULTY

Assistant Lecturer	Ms. Nóra Pálfyné Vass Ph.D.
Assistant Professor	Péter Bársony Ph.D. Levente Czeglédi Ph.D.
	Ms. Anna Pécsi Ph.D. János Posta Ph.D.
Secretary	Sándor Boros Ms. Ágnes Gere Ms. Károlyné Kiss Ms. Marianna Korcsmárosné Varga Ms. Anikó Nagy

**Department of Nature Conservation, Zoology and Game Management**  
Böszörményi út 138., Debrecen, 4032

Head of Department	Lajos Juhász Ph.D.
Assistant Research Fellow	László Kövér Ph.D.
Professor	Károly Rédei D.Sc.
Technical Assistant	Norbert Tóth
Assistant Professor	Péter Gyüre Ph.D. Lajos Kozák Ph.D. László Szendrei Ph.D.

**Department of Animal Nutrition and Food Biotechnology**  
Böszörményi út 138., Debrecen, 4032

Head of Department	László Babinszky Ph.D.
Associate Professor	Csaba Szabó Ph.D.
Senior Lecturer	Ms. Judit Gálné Remenyik Ph.D.

**Animal Genetics Laboratory**  
Böszörményi út 138., Debrecen, 4032

Head of Department	András Jávör C.Sc.
Professor	András Kovács D.Sc.
Assistant Lecturer	Ms. Zsófia Rózsáné Várszegi Ph.D.
Senior Research Fellow	Ms. Szilvia Kusza Ph.D.

**INSTITUTE OF FOOD SCIENCE**

Böszörményi út 138., Debrecen, 4032

Full Professor, Head of Institute	Béla Kovács Ph.D.
Professor	János Csapó D.Sc.
Technical Assistant	Ms. Éva Bacskainé Bódi
	Ms. Andrea Tóthné Bogárdi
Associate Professor	Ms. Erzsébet Karaffa Ph.D.
	Péter Sipos Ph.D.
Assistant Lecturer	Ms. Diána Ungai Ph.D.
Assistant Professor	Ms. Nikolett Czipa Ph.D.
	Ferenc Peles Ph.D.
Secretary	Ms. Tünde Simon

**INSTITUTE FOR LAND UTILISATION, TECHNOLOGY AND REGIONAL DEVELOPMENT**

Böszörményi út 138., Debrecen, 4032

Head of Institute	János Nagy D.Sc.
Professor	Béla Baranyi D.Sc.
	Gyula Horváth D.Sc.
Associate Professor	Zoltán Hagymássy Ph.D.
	Endre Harsányi Ph.D.
	Tamás Rátonyi Ph.D.
Assistant Professor	Imre Andorkó Ph.D.
	Ms. Adrienn Széles Ph.D.
	András Vántus Ph.D.
Senior Research Fellow	Attila Csaba Dobos Ph.D.
Secretary	Ms. Zsuzsanna Dorogi
	Ms. Sándorné Széles

**INSTITUTE OF HORTICULTURE**

Böszörményi út 138., Debrecen, 4032

Head of Institute	Imre Holb D.Sc.
Assistant Research Fellow	Ferenc Abonyi
Associate Professor	Ms. Mária Takácsné Hájos C.Sc.

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THE DEPARTMENTS OF THE FACULTY

Assistant Lecturer	Ádám Csihon
	Péter Dremák Ph.D.
Assistant Professor	Nándor Rakonczás Ph.D.
Secretary	Ms. Andrea Gátiné Laskai

**INSTITUTE OF CROP SCIENCES**  
Böszörményi út 138., Debrecen, 4032

Head of the Institute	Péter Pepó D.Sc.
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**Department of Landscape Ecology**  
Böszörményi út 138., Debrecen, 4032

Head of Institute	Péter Pepó D.Sc.
Professor	Mihály Sárvári D.Sc.
Associate Professor	József Csajbók Ph.D.
Assistant Lecturer	Ms. Adrienn Novák Ph.D.
	Ms. Enikő Vári Ph.D.
Assistant Professor	Lajos Fülöp Dóka Ph.D.
	Ms. Erika Kutasy Ph.D.
	András Szabó Ph.D.
Secretary	Ms. Gyöngyi Kovács
	Ms. Endréné Szendrei

**Department of Plant Biotechnology**  
Böszörményi út 138., Debrecen, 4032

Professor	Miklós Gábor Fári D.Sc.
Associate Professor	Ms. Szilvia Veres Ph.D.
Assistant Lecturer	Ms. Szilvia Kovács
	Ms. Brigitta Tóth Ph.D.
Assistant Professor	Ms. Éva Domokosné Szabolcsy Ph.D.
	Ms. Zsuzsanna Lisztes-Szabó Ph.D.
	Péter Makleit Ph.D.

**Genetics Group**

Böszörményi út 138., Debrecen, 4032

Head Pál Pepó C.Sc.

**INSTITUTE OF PLANT PROTECTION**

Böszörményi út 138., Debrecen, 4032

Head of Institute György János Kövics C.Sc.

Associate Professor András Bozsik C.Sc.

László Radócz C.Sc.

Assistant Professor Antal Nagy Ph.D.

Senior Research Fellow Gábor Tarcali Ph.D.

Secretary Ms. Tünde Szabóné Asbolt

**AGRICULTURAL LABORATORY CENTRE**

Böszörményi út 138., Debrecen, 4032

Assistant Research Fellow Ms. Nóra Óri

Technical Assistant Ms. Nóra Bessenyei Tarpay  
Csaba Kiss

Ms. Hajnalka Pákozdy

Ms. Istvánné Sörös

Gábor Tóth M.D.

Associate Professor Ms. Tünde Pusztahelyi Ph.D.

**INSTITUTE OF WATER AND ENVIRONMENTAL MANAGEMENT**

Böszörményi út 138., Debrecen, 4032

Deputy Head Csaba Juhász Ph.D.

Head of Institute János Tamás D.Sc.

Assistant Research Fellow Péter Riczu

Ms. Nikolett Szöllösi

Professor Lajos Blaskó D.Sc.

Technical Assistant Ms. Kamilla Berényi-Katona

Ms. Katalin Bökfí

Associate Professor Ms. Elza Kovács Ph.D.

Assistant Lecturer Ms. Tünde Fórián Ph.D.

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THE DEPARTMENTS OF THE FACULTY

	Ms. Ildikó Gombosné Nagy Ph.D.
	Ms. Lili Mézes Ph.D.
Assistant Professor	Attila Nagy Ph.D.
	Csaba Pregun Ph.D.
Secretary	Ms. Imre Lászlóné Huszka
	Ms. Zsuzsanna Szathmáriné Pongor

**FACULTY OF ECONOMICS AND BUSINESS**

Böszörményi út 138., Debrecen, 4032

Assistant Research Fellow	Zoltán Győri Ph.D.
Professor	Csaba Berde C.Sc.
	Miklós Herdon Ph.D.
	András Nábrádi MBA, C.Sc.
	Géza Nagy C.Sc.
	József Popp D.Sc.
	Zoltán Szakály C.Sc.
College Professor	Ferenc Kalmár Ph.D.
	Ms. Edit Gizella Szűcs Ph.D.
Associate Professor	Péter Balogh Ph.D.
	Zsolt Csapó Ph.D.
	Wiwczaroski Dr. Troy B. Ph.D.
	János Felföldi Ph.D.
	István Grigorszky Ph.D.
	Ms. Csilla Juhász Ph.D.
	Levente Karaffa Ph.D.
	István Kuti C.Sc.
	László Lakatos Ph.D.
	Ms. Ilona Nagyné Polyák Ph.D.
	Miklós Pakurár Ph.D.
	Károly Pető C.Sc.
	László Posta C.Sc.
	Sándor Szűcs C.Sc.
	István Szűcs Ph.D.
Assistant Lecturer	Ms. Mónika Harangi-Rákos
Assistant Professor	Ms. Andrea Bauerné Gáthy Ph.D.

Zoltán Csiki M.D., Ph.D.

Ms. Zita Hajdu Ph.D.

Ms. Judit Katonáné Kovács Ph.D.

Sándor Kovács Ph.D.

Ms. Ildikó Tar Ph.D.

Ferenc Buzás Ph.D.

Research Fellow



## CHAPTER 7

### UNIVERSITY CALENDAR

Academic calendar

2015/2016

Events	Dates
Opening Ceremony	September 6 (Sunday)
Enrolment week	September 7 - 11
Study period for not final year students	September 14 - December 18 (14 weeks)
Study period for final year students	September 14 - November 13 (9 weeks)
Deadline for thesis submission	October 30
Examination period for final year students	November 16 - December 4 (3 weeks)
Examination period for not final year students	December 21 – February 5 (7 weeks)
Defending of the thesis	November 30 – December 1
Final exam	December 10 - 11
Graduation ceremony	December 19
Enrolment week	February 8 - 12
Study period for not final year students	February 15 – May 20 (14 weeks)
Study period for final year students	February 15 - April 22 (10 weeks)
Deadline of the thesis	April 22
Examination period for final year students	April 25 – May 20 (4 weeks)
Examination period for not final year students	May 23 - July 8 (7 weeks)
Defending of the thesis	May 26 - 27
Final exam	June 6 - 7
Graduation ceremony	June 18

## CHAPTER 8

### CURRICULUM OF THE FULL TIME PROGRAMME

Compulsory courses														Prerequisites of taking the subject		
1. year																
Subjects	Neptun code	1 <sup>st</sup> semester						2 <sup>nd</sup> semester								
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.					
Animal Nutrition	MTMAE016-K3						2	1	ESE	3					3	None
Applied Biochemistry	MTMAE004-K3	2		1	ESE	3										None
Applied Genetics	MTMAE001-K3	2		1	ESE	3										None
Aquatic Ecology and Hydrobiology	MTMAE007-K3	2		1	ESE	3										None
Biometry	MTMAE013-K3						2	1	AW5	3						None
Cytogenetics	MTMAE014-K3						2	1	ESE	3						None
Ecological Management of Animals	MTMAE018-K3						2	1	ESE	3						None
Feed and Food Chemistry	MTMAE011-K3						2	1	ESE	3						None
Feed Preparation, Processing, Mixing and Trading	MTMAE017-K5						2	2	ESE	5						None
Informatics and Computing	MTMAE003-K2			2	AW5	2										None
Inland fisheries management	MTMAE019-K3						1	2	ESE	3						None

Compulsory courses														Prerequisites of taking the subject	
1. year (continued)															
Subjects	Neptun code	1 <sup>st</sup> semester					2 <sup>nd</sup> semester								
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.				
Livestock Judging	MTMAE008-K3	1		2	AW5	3									None
Microbiology	MTMAE005-K3	2			ESE	3									None
Molecular Genetics in Animal Breeding I.	MTMAE015-K3						2					ESE	3		None
Physiology of Production Traits	MTMAE002-K3	2		1	ESE	3									None
Project work I.	MTMAE022-K8						2					AW5	8		None
Reproductive Biology	MTMAE012-K3						2				1	ESE	3		None
Summer Practical	MTMAE021-K0											SIGN	0		None
HusbandryWorld Animal	MTMAE006-K3	2		1	ESE	3									None

Compulsory courses														Prerequisites of taking the subject	
2. year															
Subjects	Neptun code	1 <sup>st</sup> semester					2 <sup>nd</sup> semester								
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.				
Application of Biotechnology in Animal Breeding	MTMAE025-K2	1		1	ESE	2									None
Feed Analysis	MTMAE026-K3	1		2	AW5	3									None
Food Safety, Quality and Auditing	MTMAE027-K3	2		1	ESE	3									None
Management	MTMAE023-K2	2			ESE	2									None
Meat and Milk Processing	MTMAE033-K3						2			1	ESE	3			None
Molecular Genetics in Animal Breeding II.	MTMAE024-K3			3	AW5	3									None
Nutrition Therapy	MTMAE034-K2						2				ESE	2			None
Organisation of Breeding	MTMAE035-K2						2				ESE	2			None
Project work II.	MTMAE029-K10	4			AW5	10									None
Project work III.	MTMAE038-K12						6				AW5	12			None
Scientific Writing	MTMAE028-K3	1		1	AW5	3									None

<b>Compulsory courses</b>													<b>Prerequisites of taking the subject</b>	
<b>2. year (continued)</b>														
<b>Subjects</b>	<b>Neptun code</b>	<b>1<sup>st</sup> semester</b>					<b>2<sup>nd</sup> semester</b>							
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.			
<b>Sectoral Economics and Planning</b>	<b>MTMAE036-K4</b>						2			2		ESE	4	None

<b>Required elective courses</b>													<b>Prerequisites of taking the subject</b>
<b>1. year</b>													
<b>Subjects</b>	<b>Neptun code</b>	<b>1<sup>st</sup> semester</b>					<b>2<sup>nd</sup> semester</b>						
		<b>L</b>	<b>S</b>	<b>P</b>	<b>Exam</b>	<b>Crd.</b>	<b>L</b>	<b>S</b>	<b>P</b>	<b>Exam</b>	<b>Crd.</b>		
<b>Communication, Rhetorics</b>	<b>MTMAE009-K2</b>	1			ESE	2							None
<b>Human Resource Management</b>	<b>MTMAE010-K2</b>	1			ESE	2							None

Required elective courses														Prerequisites of taking the subject	
2. year															
Subjects	Neptun code	1 <sup>st</sup> semester					2 <sup>nd</sup> semester					Crd.			
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.				
Breeding of Laboratory Animals and Nutrition	MTMAE039-K2						1						ESE	2	None
Environmental Impact Assessment and Auditing	MITMAE030-K3	1		1	ESE	2									None
Feed Safety, Auditing	MTMAE040-K2						2						AW5	2	None
Pond fish culture	MTMAE032-K3	1		2	ESE	3									None
Quality Management	MTMAE031-K2	2			ESE	2									None

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## CHAPTER 9

### ANIMAL HUSBANDRY ENGINEERING MSc PROGRAMME

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#### ANIMAL HUSBANDRY ENGINEERING MSc PROGRAMME

##### About the course:

The MSc in Animal Science is designed to develop your undergraduate knowledge and improve it through application and research. The field of Animal Science is broad and the programme reflects this diversity, with emphasis on Physiology, Nutrition and Genetics. Gene Conservation, Functional Food and Molecular Biology are the key research areas of the Institute.

##### Requirements:

Application requirements: BSc degree or higher in Biological or Animal Science. BSc degree or higher in a biologically-related degree. Other approved accreditation or professional qualification. Upper-intermediate English language certificate.

Length of the Study programme: Two year full-time taught programme plus dissertation. Presently no part-time options are available.

Number of ECTS credits: 120

The course consists of lectures and seminars. Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up a practice class with another group. The attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as an absence because of the lack of active participation in class.

The knowledge of the students will be tested several times depending on the class types during the entire course. The training ends in a Final Exam (FE) of the whole semester material and a minimum of four FE dates will be set during the examination period. Unsuccessful students may repeat

During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.

Tests are evaluated according to the followings:

Score Grade

0-59 fail (1)

60-69 pass (2)

70-79 satisfactory (3)

80-89 good (4)

90-100 excellent (5)

absence for any reason counts as 0%.

If the score of any test is below 60, the student can take a retake test in conformity with the EDUCATION AND EXAMINATION RULES AND REGULATIONS.

An offered grade: It may be offered for the students if the average of the mid-term and end-term tests is at least good (4). The offered grade is the average of them.

##### Careers:

Postgraduates may progress to a PhD or find employment in animal science research, lecturing, consultancy or other science-based sectors of the animal science industry. Our Institute has a good relationship with animal husbandry enterprises of the region.



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## CHAPTER 10

### COURSE DESCRIPTIONS

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## Agricultural Laboratory Centre

Subject: **APPLIED BIOCHEMISTRY**

Year, Semester: 1<sup>st</sup> year/1<sup>st</sup> semester

Lecture: **2**

Practical: **1**

### Requirements

Classification of biomolecules. Differences between biomolecules and inorganic compounds. Carboxylic acids, carbohydrates, proteins, lipids, nucleic acids. Enzymes, vitamins, hormones. Photosynthesis. Biosynthesis and decomposition of polysaccharides, lipids and proteins. Szentgyörgyi-Krebs cycle. Urea cycle. Glyoxylic acid cycle. Focusing on carbohydrate metabolism, proteins, fatty acids, and signal- and regulation mechanisms at an advanced level.

### Required reading materials

*McDonald, P., R.A.Edwards, J.F.D.Greenhalgh, C.A. morgan: Animal nutrition*  
Pearson education, Limited, Harlow, UK., 2002.

*Squires, E. J.: Applied Animal Endocrinology*  
CABI Publishing, 2003.

*Mathews-van Holde: Biochemistry*  
The Benjamin/Cummings Publishing Company, 2000.

*Baldi, P.: DNA Microarrays and gene expression*  
Cambridge University Press, 2002.

*Bedford, M. R.: Enzymes in Farm Animal Nutrition*  
Wallingford: CABI Publishing, 2001.

Subject: **AQUATIC ECOLOGY AND HYDROBIOLOGY**

Year, Semester: 1<sup>st</sup> year/1<sup>st</sup> semester

Lecture: **2**

Practical: **1**

### Requirements

Aquatic ecology course is introducing an extraordinarily broad and interesting field of the science. The main aim of this course is that students will be capable to interpret and use in their practice the interplay between aquatic organisms and their physical, chemical, and biological environment. This course encompasses all freshwater ecosystems, including spring, streams, rivers, lakes, wetlands. During this study a wide diversity will be discussed of different organisms, ranging from tiny bacteria to large fishes, facing a myriad of different processes such as biogeochemical cycles, genetic differentiation, and climate change. Applied research part of this course makes major contributions to biotechnology, fisheries, water management, nature conservation, and environmental policy of aquatic sciences. Reassessments and syntheses in aquatic ecology are stimulating to the discipline as a whole, as well as enormously useful to graduate and postgraduate students in natural and agricultural sciences.

### Required reading materials

- Ambasht R. S., Navin K. Ambasht: Modern Trends in applied Aquatic Ecology*  
Plenum Pub Corp., 2003.
- Belgrano A., Ulanowicz R. E., Scharler U.M., Dunne J.: Aquatic Food Webs: An Ecosystem Approach*  
Oxford University Press, 2005.
- Burk A. R.: Progress in Aquatic Ecosystems Research*  
Nova Science Publ Inc., 2005.
- Kalff J: Limnology*  
The Benjamin Cummings Publishing Company, 2001.
- Williams D. D.: The Ecology of Temporary Waters*  
Blackburn Pr., 2001.

Subject: **INFORMATICS AND COMPUTING**

Year, Semester: 1<sup>st</sup> year/1<sup>st</sup> semester

Practical: **2**

### Requirements

Hardware and software architecture. Computer networks. Computer network elements, Internet services. WWW services and development. Database systems and database management. Data models, modelling techniques. Objects in relational database systems. Introduction to GIS. Types of GIS. Hardware and software elements in GIS. Application areas. Mathematics and statistics program packages.

### Required reading materials

- Ed Bott, Woody Leonhard: Using Microsoft Office*  
QME, 2007.
- Jeff Thurston, Thomas K., Poiker, J. Patrick Moore: Integrated Geospatial Technologies: A Guide to GPS, GIS and Data Logging*  
*Tannenbaum: Computer Networks*  
4th. Prentice Hall,

Subject: **LIVESTOCK JUDGING**

Year, Semester: 1<sup>st</sup> year/1<sup>st</sup> semester

Lecture: **1**

Practical: **2**

### Requirements

General aspects of the conformation judging, concept of the type. Systems and methods in judgment. Taking of body measures, body measurements and –indices. Importance of relative production. Additional information used in the estimation of the conformation. Evaluation of external characteristics and constitution. Theory and application of conformation judging of domestic animals species by utilisation type and breed. Conformation as an economically important trait.

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### Required reading materials

*Hunsley, Roger E., Beeson, Malcolm W.: Livestock judging, selection and evaluation*  
IPP. The Interstate Printers and Publishers, Inc., Danville,  
*Willaim O Reece: Physiology of Domestic Animals.*  
Lippincott Willims and Wilkins, ISBN: 0683072404  
*L.J. Keeling-H. W. Gonyou: Social Behavior in Farm Animals.*  
CABI Publishing, 2001. ISBN: 13:978-085199-397-3  
*Blakely, J. - Reston: The science of animal husbandry*  
Reston Publishing Company, 1989.  
*Weller, J. I.: Economic aspects of animal breeding*  
London: Chapman and Hall, 1994.  
*Leland S. Shapiro: Introduction to animal science*  
Prentice-Hall, New Jersey, 2001.

Subject: **MICROBIOLOGY**

Year, Semester: 1<sup>st</sup> year/1<sup>st</sup> semester

Lecture: **2**

### Requirements

The aim of this course is two-fold: first, it is to obtain a general understanding of microorganisms (bacteria, fungi, yeasts, viruses), including their classification, metabolism, the way they interact with their environments and with other living organisms, such as plants, animals and humans. We will characterize the cellular biology of the selected microorganisms (cell wall, cell membrane, intracellular structures), and will analyse their functions. Energy metabolism and reproduction will also be discussed. Classification of bacteria will be based on the Second Edition of Bergey's Manual of Systematic Bacteriology. Second, the course will also deal with the applied aspects of microbiology including industrial fermentations (biogas, ethanol, hydrogen formation), environmental applications (bioremediation, biodegradation), agricultural, as well as food technologies (preservation, food and feed production).

### Required reading materials

*Tortora G, Funke BR, Case CL: Microbiology: an Introduction*  
8th. The Benjamin Cummings Publishing Company, 2003.  
*McNeil B, Harvey LM: Fermentation: a practical approach*  
Oxford University Press, 1990.  
*Laskin, A. et al: Advances in Applied Microbiology*  
Elsevier Science Inc, New York, 2008.

## Animal Genetics Laboratory

Subject: **WORLD ANIMAL HUSBANDRY**

Year, Semester: 1<sup>st</sup> year/1<sup>st</sup> semester

Lecture: **2**

Practical: **1**

### Requirements

Economic impact of the livestock industry in different regions. Sustainable animal husbandry (safe, humane and sustainable ways). Species discussed: rabbit, sheep, cattle, llama, goat, pig, poultries, horse, buffalo, fish, camel, alpaca, mollusks, crustaceans. Breeding organisations. Systems of production. Management, housing and equipments. Main diseases. Maintenance of health. Main products and product quality. Directions, tools, results of developing animal breeding. Definition and areas of animal breeding policy; relationship between agricultural policy and animal breeding policy. Ratio of species and its regulation in animal husbandry, determination of the production, profitability. Estate structure of animal husbandry, concentration of livestock. Animal husbandry activities of farmers, planning. Funding of animal husbandry. Enactment and setting up regulations in animal husbandry, laws and regulations in the operating animal husbandry. Safeguarding and harmonization of interests in animal husbandry. Profit harmonization between the participants of animal husbandry. Methods and tools of the qualitative development of animal husbandry. International co-operation. Special tasks of animal husbandry (nature conservation, environmental protection). Environmental impact of animal husbandry. Animal husbandry policy of farmers.

### Required reading materials

*WJA Payne and RT Wilson: Introduction to Animal Husbandry in the Tropics*  
Blackwell Publishing Ltd., 1999.

*Acker, Duane & Tour, Mickey La & Cunningham, Merl: Animal Science and Industry*  
7th. Pearson, London-New York, 2004.

*James Blakely, David H. Bade: Science of Animal Husbandry*  
6. Reston publishing Company, Inc, Reston Virginia, 1994.

## Department of Animal Husbandry

Subject: **APPLIED GENETICS**

Year, Semester: 1<sup>st</sup> year/1<sup>st</sup> semester

Lecture: **2**

Practical: **1**

### Requirements

Mendelian and population genetics. Heritability, repeatability, correlations. Inbreeding. Genetic imprinting. Genotype-environment interaction. Elements of breeding programs. Resemblance between relatives. Genetic and environmental variance, covariance. Pheno- and genetic and environmental correlations. Individual, family and index selection. Selection for several traits: limit, tandem and simultaneous selection. Selection for threshold traits. Genetic response in direct and indirect selection. Heterosis. Crossbreeding. Breeding for resistance. Breeding for product quality.

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### Required reading materials

*Falconer, D.S.: Introduction to Quantitative Genetics*

3rd. Longman Scientific and Technical, 1989.

*Mrode, R. A. : Linear Models for the Prediction of Animal Breeding Experiments*

CAB International, 1996.

*Lynch, M., Walsh, B.: Genetics and Analysis of Quantitative Traits*

Sinauer Associates, 1998.

Subject: **PHYSIOLOGY OF PRODUCTION TRAITS**

Year, Semester: 1<sup>st</sup> year/1<sup>st</sup> semester

Lecture: **2**

Practical: **1**

### Requirements

Interaction of the farm animal and the environment of production. Function of the digestive system; process of feed-digestion; the intermediary metabolism; characteristic of ruminant digestion. Physiology of muscle system. Biology of meat production. The endocrine system. Physiology of reproduction. Physiology of milk production. Specialties and dysfunctions in metabolism of high-yield milk cows. Energy turnover and thermoregulation. Microclimate of the stall. The reproduction physiology of the hen. Production of other animal products for human consumption (e.g. rabbit meat, honey).

### Required reading materials

*Biotechnology in Animal Husbandry (I. kötet)*

Belgrád: Institute for Animal Husbandry, 2007.

*Biotechnology in Animal Husbandry (II. kötet)*

Belgrád: Institute for Animal Husbandry, 2007.

*P. L. Senger: Pathways to Pregnancy and parturition*

Current Conceptions, Inc., 2003.

*Cronjé, P. B.: Ruminant Physiology*

Wallingford: CABI Publishing, 2004.

*P. Jensen: The Etology of Domestic Animals*

CABI Publishing, 2002.

*Blakely, J. - Reston: The science of animal husbandry*

Reston Publishing Company, 1989.

## Agricultural Laboratory Centre

Subject: **FEED AND FOOD CHEMISTRY**

Year, Semester: 1<sup>st</sup> year/2<sup>nd</sup> semester

Lecture: **2**

Practical: **1**

### Requirements

The objective of the course is to provide students with up-to-date knowledge about feed and food components. Students will learn the roles and importance of minerals, water, carbohydrates, proteins (chemical reactions and linking of proteins, denaturation through physical and chemical methods, functional characteristics of proteins, quantitative determination, grouping, knowing the transformation of food and feed proteins through processing and storage), lipids, vitamins, natural colorants, taste and aroma components, other organic materials, enzymes, additives, toxic materials, packaging materials, cleaning agents and disinfectants in food and feed production. Furthermore, they can deepen their knowledge about the chemistry of functional food production.

### Required reading materials

*Coultate, T. P.: Food-The chemistry of its components*

The Royal Society of Chemistry. Cambridge, 1992.

*Kritchevsky, D., Bonfield, C.: Dietary fiber in health and disease*

Eagen Press, St. Paul Minnesota, USA, 1997.

*Whistler, R. L., BeMiller, J. N.: Carbohydrate chemistry for food scientists*

Eagen Press, St. Paul Minnesota, USA, 1997.

## Animal Genetics Laboratory

Subject: **CYTOGENETICS**

Year, Semester: 1<sup>st</sup> year/2<sup>nd</sup> semester

Lecture: **2**

Practical: **1**

### Requirements

The definition and history of cytogenetics (chromosome investigations). Techniques of chromosome preparation: Direct preparation of meiotic and mitotic chromosomes. Cell cultures, stimulation of peripheral lymphocytes and mitotic arrest

Morphological classification of metaphase chromosomes: size and shape (centromere-position): metacentric, submetacentric, acrocentric, telocentric. Meiotic investigations from gonads, oocytes and spermatozoa. Synaptonemal complex analysis of the meiosis by electron microscopy. Chromosome banding techniques, karyotyping. Fluorescence in situ hybridization (FISH, zoo-FISH, chromosome painting). Chromosome evolution: Karyotype-evolution, Sex-chromosomes . Comparison of related species (human and apes, domestic animals and their wild relatives). The normal karyotypes of domestic animals.

Chromosome polymorphisms and abnormalities. Eradication programmes. Positive cytogenetics. Artificial chromosomes.

### Required reading materials

*V. Lance: Vertebrate Sex Determination*

S Karger Publisher, 2003.

*Bhanu P. Chowdhary: Animal Genomics*

S Karger Publisher, 2003.

*Paul Popescu, Helene Hayes, Bernard Dutrillaux, R. Popescu: Techniques in Animal Cytogenetics*  
Springer Verlag., 2000.

Subject: **REPRODUCTIVE BIOLOGY**

Year, Semester: 1<sup>st</sup> year/2<sup>nd</sup> semester

Lecture: **2**

Practical: **1**

### Requirements

Reproduction and production. Anatomy, function and regulation of the female and male reproductive system. Cyclicity of reproductive activities (follicular and luteal phase, seasonality/aseasonality) sexual behaviour. Oogenesis and spermatogenesis, fertilisation, early embryogenesis. Successive development, systematical differences (Arthropoda: bee, silkworm, crayfish), fish, crocodiles, birds, mammals (decidua formation, pregnancy, delivery, puerperium, lactation), progeny care, artificial rearing.

History and application of artificial insemination in different species (bee, fishes, birds, mammals, wild animals). Semen collection (artificial vagina, massage, electroejaculation, taken from the epididymis alive, or post mortem). Semen evaluation (volumen, density, motility, morphology, viability status by staining and microscopy, or flow cytometry), extension, cryopreservation, application for artificial insemination. Oocyte collection from live and dead animals, in vitro maturation, in vitro fertilization and in vitro cultivation. Embryo flushing, cryopreservation and transfer. Cryopreservation of gonadal cells and early embryos and their importance for gene bank purposes.

### Required reading materials

*Kinghorn, B.: Animal breeding use of new technologies*

Armidale: University of NE, 2000.

*Artificial Insemination in Sheep*

West Virginia University Agricultural Experiment Station, 1974.

*Meske, C.: Fish aquaculture*

Oxford: Pergamon Press, 1985.

*P. L. Senger: Pathways to Pregnancy and parturition*

Current Conceptions, Inc., 2003.

*W. M. Muir, S. E. Aggrey: Poultry Genetics, Breeding and Biotechnology.*

CABI Publishing, 2003.

*Oldenbroek, K.: Utilisation and conservation of farm animal genetic resources*

Wageningen: Wageningen Academic Publ., 2007.

## Department of Animal Husbandry

Subject: **BIOMETRY**

Year, Semester: 1<sup>st</sup> year/2<sup>nd</sup> semester

Lecture: **2**

Practical: **1**

### Requirements

Design of research. The objective of experiments. Experimental units, treatments. Determination of experimental units. Sampling. Sampling error and influencing the error. The effects of systematic errors. The importance of repetition. Effects influencing repetitions. Relative precision for few treatments. Continuous (normal, exponential, gamma ) and discrete (binomial, Poisson). Design of experiments. One factorial and multi factorial and hierarchical designs. Comparing two-sample means, and means from several samples (Shceffe, Tukey). Analysis of variance. Randomisation, random complete block design, latin square. Fix and random models. Analysis of hierarchical models. Analysis of covariance. Non-parametric tests.

### Required reading materials

*Campbell, R. C.: Statistics for Biologists*

Cambridge University Press, 1992.

*Steel, R.G. and torrie J.H.: Principles and procedures of statistics*

2nd. McGraw Hill, 1986.

*Toutenburg, H.: Statistical Analysis of Designed Experiments*

Springer Verlag., 2002.

Subject: **ECOLOGICAL MANAGEMENT OF ANIMALS**

Year, Semester: 1<sup>st</sup> year/2<sup>nd</sup> semester

Lecture: **2**

Practical: **1**

### Requirements

The importance of ecological animal production in EU and Hungary. Processed animal bioproducts. Good practice in grassland management for ecological meat and milk production. Ruminant keeping and nutrition specialized for environmental consequences. Conditions required for non-ruminants. Production of ecological feed. The possibilities for using medicinal plants in feeding. Regulations, donations concerning ecological farming.

The role and importance of grassland management and grazing in the world, Europe and Hungary.

Possibilities and methods of livestock grazing, animal production on grassland. Grazing etology.

### Required reading materials

*Hodgson, J.: The Ecology and Management of Grazing Systems*

Oxford University Press, 1998.

*Bootroyd, J: Animals and the Environment*

Lerners Publishing Group, 2008.

*Chaerika, N. et al.: Know to move, move to know. Ecological knowledge and herd management strategies*



FAO, 2003.

*Bohlen, P, J. Staff: Sustainable Agroecosystem Management. Integrating: ecology, Economics and Society*

CRC Press LLC, 2008.

Subject: **INLAND FISHERIES MANAGEMENT**

Year, Semester: 1<sup>st</sup> year/2<sup>nd</sup> semester

Lecture: **1**

Practical: **2**

### Requirements

All key management issues of inland fresh waters are covered: e.g., stock control, population dynamics, utilisation, including administrative and legal issues, recreation and nature conservation.

### Required reading materials

*Cowx I.: Stock Assessment in Inland fisheries*

Fishing New Books, Blackwell Science Ltd., 1996.

*King M.: Fisheries Biology, Assessment and Management*

Fishing New Books, Blackwell Science Ltd., 1995.

*Templeton R. G.: Freshwater Fisheries Management*

Fishing New Books, Blackwell Science Ltd., 1995.

*FAO (2003): Inland Fisheries*

FAO, Rome, 2003.

Subject: **MOLECULAR GENETICS IN ANIMAL BREEDING I.**

Year, Semester: 1<sup>st</sup> year/2<sup>nd</sup> semester

Lecture: **2**

### Requirements

Basic of molecular genetics: DNA structure, DNA synthesis, genetic code, protein synthesis, Genome structure, Genome projects, Structure of the gene, Gene maps, Types of molecular genetic markers, use of genetic markers in animal breeding; Most important QTLs and major genes identified in farm animals (cattle, pig, sheep, goat, horse), Cloning, Transgenic animals

### Required reading materials

*Simm, G.: Genetic Improvement of Cattle and Sheep*

Farming Press, 1998.

*Fries, R.: The Genetics of Cattle*

Wallingford: CAB Publishing, 1999.

*Piper, L.: The genetics of sheep*

Wallingford: CAB Publishing, 1997.

*Ruvinsky, A.: The genetics of the dog*

Wallingford: CABI Publishing, 2006.

*Bowling, Ann T.: The genetics of the horse*

CABI Publishing, 2000.

*Deonier, Richard C: Computational Genome Analysis*

Berlin: Springer, 2005.

Subject: **PROJECT WORK I.**

Year, Semester: 1<sup>st</sup> year/2<sup>nd</sup> semester

Lecture: **2**

Subject: **SUMMER PRACTICAL**

Year, Semester: 1<sup>st</sup> year/2<sup>nd</sup> semester

## Department of Animal Nutrition and Food Biotechnology

Subject: **ANIMAL NUTRITION**

Year, Semester: 1<sup>st</sup> year/2<sup>nd</sup> semester

Lecture: **2**

Practical: **1**

### Requirements

Characterization of feed for animal nutrition (forage, grain). Mould in feedstuffs and mycotoxicosis. Regulation of feed intake of ruminants and non ruminant species.

Energy, protein, vitamin and mineral element requirements for maintenance and production (meat, milk, wool, egg). Requirements for reproductive activities. Nutrition technologies concerning species, age, type of utilization. The special digestive apparatus of cattle, sheep and goat and its nutrition-physiological consequences. Protein and energy turnover of ruminants.

### Required reading materials

*Greenhalg, J. F. D et al: Animal Nutrition*

Pearson Education Publication, 2002.

*Cheeke, P: Applied Animal Nutrition*

Pearson Education Publication, 2004.

*Ortigue - Marty, Isabelle : Energy and protein metabolism and nutrition*

Wageingen Academic Publ., 2007.

Subject: **FEED PREPARATION, PROCESSING, MIXING AND TRADING**

Year, Semester: 1<sup>st</sup> year/2<sup>nd</sup> semester

Lecture: **2**

Practical: **2**

### Requirements

Definitions of feed processing and its importance in animal production. Overview the history and progress of feed preparation in Hungary and in the World. Hungarian and EU regulations on feed processing and trading. Official organizations (authorization, controlling). Nutrients and other substances in feedstuffs. Feed ingredients used in feed mixing. Chemical and microbiological analysis of nutrients and feedstuffs. Technologies of feed processing and mixing plants – machines and equipment. Diet formulation.

### Required reading materials

*Bedford, M. R.: Enzymes in Farm Animal Nutrition*

Wallingford: CABI Publishing, 2001.

*Mannetje, L. 't.: Field and laboratory methods for grassland and animal production research*  
CABI Publishing, 2000.

*Underwood, E. J.: The mineral nutrition of livestock*

CABI Publishing, 1999.

## Agricultural Laboratory Centre

Subject: **MANAGEMENT**

Year, Semester: 2<sup>nd</sup> year/1<sup>st</sup> semester

Lecture: **2**

### Requirements

Introduces MSc students to the history, development, most important schools of thought, trends and theories of management science. Additionally, we will present the most important relationship forms, managerial methods and procedures. Main topics: development of management, managerial schools, trends, group management, organizational development, organizational culture, change management, motivation, conflict management, managerial method, managerial style, innovation management.

### Required reading materials

*Noe, R: Fundamentals of Human Resource Management*

McGraw Hill College, 2006.

*Harris, M. M.: Human Resource Management*

Cengage Learning, 1999.

*Beierlein, J. G. et al: Principles of Agrobusiness Management*

Waveland Press Inc., 2008.

Subject: **SCIENTIFIC WRITING**

Year, Semester: 2<sup>nd</sup> year/1<sup>st</sup> semester

Lecture: **1**

Practical: **1**

### Requirements

Scientific professionals must be able to interrogate, process and critique highly structured texts which are often written in compact, difficult language. The process of learning how to write in an academically acceptable way requires formal introduction and training. This course instructs students in strategies for handling the creation such texts, in order to

- Create appropriate titles for their publications
- Formulating thesis statement(s), paragraph content and argumentation
- Explain read information in one's own words, i.e. avoiding plagiarism

## CHAPTER 10

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- Handle difficult vocabulary and phraseology
- Properly use summarizing and paraphrasing techniques, abstract writing
- Properly use citations, especially of electronic references
- Understand requirements of individual scientific publications
- Write scientific reports

### Required reading materials

*Russey, W. E.: How to Write a Successful Science Thesis*  
New York, Wiley, 2006.

*Murray, R.: How to write a thesis?*  
Open University Press, McGraw-Hill, UK, 2006.

*Malmfors, B.: Writing and presenting scientific papers*  
Nottingham University Press, 2006.

## Animal Genetics Laboratory

Subject: **APPLICATION OF BIOTECHNOLOGY IN ANIMAL BREEDING**

Year, Semester: 2<sup>nd</sup> year/1<sup>st</sup> semester

Lecture: **1**

Practical: **1**

### Requirements

Genetic investigations for the diagnosis of carriers and susceptible individuals. Genetic investigations to recognize important characteristics for the breeders.

Reproduction biology: production of sex-determined and sex-oriented semen samples and their control. Embryology: Gene mapping, gene transfer, knock out, silencing.

Biometrical methods for the identification and application of the contacts of major genes and their markers. Biotechnology in animal nutrition, food production, medicine and other fields.

### Required reading materials

*Kinghorn, B.: Animal breeding use of new technologies*  
Armidale: University of NE, 2000.

*Lynch, M., Walsh, B.: Genetics and Analysis of Quantitative Traits*  
Sinauer Associates, 1998.

*Lyons, T. P.: Biotechnology in the Feed Industry*  
Alltech Technical Publications, 1991.

*Axford, R. F. E.: Breeding for disease resistance in farm animals*  
Wallingford: CABI Publishing, 1999.

*Sim, J. S.: Egg Nutrition and Biotechnology*  
Wallingford: CAB Publishing, 2000.

*Ruvinsky, A.: Mammalian Genomics*  
Wallingford: CABI Publishing, 2005.

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## Department of Animal Husbandry

Subject: **MOLECULAR GENETICS IN ANIMAL BREEDING II.**

Year, Semester: 2<sup>nd</sup> year/1<sup>st</sup> semester

Practical: **3**

### Requirements

DNA extraction from animal tissue; determination of DNA concentration, Polymerase Chain Reaction (PCR), agarose gel-electrophoresis, restriction endonuclease, PCR-RFLP (restriction fragment length polymorphism), SSCP (single strand conformation polymorphism), capillary electrophoresis, microsatellite analysis, isolation of RNA, cDNA synthesis, gene expression by real-time PCR

### Required reading materials

*J. F. Burke: Essential Techniques*

PCR. Promega, 1996.

*H. Kreuzer and A. Massey: Molecular Biology and Biotechnology*

Blackwell Publishing Ltd., 2007.

Subject: **PROJECT WORK II.**

Year, Semester: 2<sup>nd</sup> year/1<sup>st</sup> semester

Lecture: **4**

## Institute of Food Science

Subject: **FEED ANALYSIS**

Year, Semester: 2<sup>nd</sup> year/1<sup>st</sup> semester

Lecture: **1**

Practical: **2**

### Requirements

Sampling of grains, forages and compound feeds. Sample preparation, homogeneity analysis. Organoleptic analysis, determining moisture, nitrogen, raw lipid, raw ash, raw fibre content, peroxide and acid number determination. Determination of amino acid and fatty acid content. Fibre content determination with enzymes. Carbohydrate determination. Determination of starch and sugar content (refractometer, polarimeter, HPLC sugar content determination). Determination of ash components with flame photometer and spectrophotometer, AAS, GFAAS, ISP, ICP MS. Determination of vitamin content with HPLC. Determination of mycotoxin content with HPLC. Determination of medicine and pesticide residues with HPLC and GC. Analysing feed supplements. Determination of antinutritive materials.

### Required reading materials

*Methodologies, analysis standards*

*Codex Pabularis Hungaricus 2004.*

*AOAC methods*

Subject: **FOOD SAFETY, QUALITY AND AUDITING**

Year, Semester: 2<sup>nd</sup> year/1<sup>st</sup> semester

Lecture: **2**

Practical: **1**

### **Requirements**

Basics of food quality and safety. Basic principles of food safety policy. Requirements for the quality assurance of food processing businesses. Systems and methods of quality management MSZ EN ISO 9000, 14000, 22000 standards, TQM, QS 9000, HACCP, Integrated Quality Systems. Developing quality assurance systems. Principles of auditing, controlling audit programs. Characteristics of auditing activities. Preparedness of auditors, audit techniques. Main aspects for auditing quality managements systems. Pre-audit and main audit, maintaining and upgrading the system.

### **Required reading materials**

*Tickle, F. and G. Vorley: Quality Management Introduction to Quality*  
2002.

*I. Alli: Food Quality Assurance: Principles and Practices CRC Press*  
2003.

*Beier, R. C.- Pillai S. D.-Phillips T. D.: Preharvest and Postharvest Safety*  
Blackwell Publishing, 2004.

*Andres, J. Vasconcellos: Quality Assurance for the Food Industry: A Practical Approach. CRC press*  
2003.

## **Agricultural Laboratory Centre**

Subject: **SECTORAL ECONOMICS AND PLANNING**

Year, Semester: 2<sup>nd</sup> year/2<sup>nd</sup> semester

Lecture: **2**

Practical: **2**

### **Requirements**

Economic and managerial questions of the animal husbandry, international outline, european review, macroeconomic approach in Hungary. Fixed assets, current assets, human workload. Cost-benefit analysis, income, natural and economic efficiency in the husbandry. Regulations, subsidy in husbandry. Elaboration of technological and business plans in the animal sector.

### **Required reading materials**

*H. S, Thomas: Storey's Guide to Raising Beef Cattle*

3. Storey Publishing, LLC,

*Maggie Sayer: Storey's Guide to Raising Meat Goats*  
2007.

*Jerry Berlinger: Storey's Guide to Raising Dairy Goats, managing breeding, marketing*

Storey Publishing, LLC, 2000.

*Kelly Klober: Storey's Guide to Raising Dairy Pigs, managing breeding, marketing*

Storey Publishing, LLC, 1996.

*Leonard Mercia: Storey's Guide to Raising Dairy Poultry, managing breeding, marketing*

Storey Publishing, LLC, 2000.

*Julius Ruechel: Grass-Fed Cattle*

Storey Publishing, LLC, 2006.

## Animal Genetics Laboratory

Subject: **MEAT AND MILK PROCESSING**

Year, Semester: 2<sup>nd</sup> year/2<sup>nd</sup> semester

Lecture: **2**

Practical: **1**

### Requirements

Economic aspects of milk and dairy products. Qualification system of raw milk. Constituents, characteristics of milk and its role in nutrition. Microbes of milk and the control of their functioning. Primary milk treatment. Major operations of milk processing. Production of milk for consumption and flavoured milk products. Production of cured dairy products. Production of curd. Production of butter. Production of cheese. Production of bulk cheese. Production of milk powder. Utilization of by-products from dairy processing. Cleaning and disinfection in dairy plants. Chemical composition of meat, its significance in nutrition. Tissues of meat. Physiology of slaughtering, processes in meat. Meat quality. Qualification of slaughter animals. Classification and processing of slaughter animals and carcass. Egg production and egg processing. Fish and fish processing. Production of products with meat as a basic material. Packaging of meat and meat products. Quality assurance in meat production and processing.

### Required reading materials

*Robinson, R. K.: Dairy Microbiology*

London: Elsevier Applied Science, 1990.

*Welch, R.A.S.: Milk composition, production and biotechnology*

Wallingford: CABI Publishing, 2002.

*Hui, Y. H. : Meat Science and Applications*

Marcel Dekker, 2001.

## Department of Animal Husbandry

Subject: **ORGANISATION OF BREEDING**

Year, Semester: 2<sup>nd</sup> year/2<sup>nd</sup> semester

Lecture: **2**

### **Requirements**

Organisation of breeding in the European Union and other countries with developed cattle breeding. Laws and regulations at international level. The development of animal breeding structure during the history. The role of ministry and other public organisations in. Recognised breeding associations in different species, breeds. Breeding objectives. Breeding programmes. Performance recording and registration in different species. Breeding value evaluation in different species. Institutions, firms, associations linked to the breeding industry.

### **Required reading materials**

*Kyntaja, J.: Breeding, production, recording, health and the evaluation of farm animals*  
Wageningen Academic Publishers, 2006.

Subject: **PROJECT WORK III.**

Year, Semester: 2<sup>nd</sup> year/2<sup>nd</sup> semester

Lecture: **6**

## **Faculty of Economics and Business**

Subject: **NUTRITION THERAPY**

Year, Semester: 2<sup>nd</sup> year/2<sup>nd</sup> semester

Lecture: **2**

### **Requirements**

Medical Nutrition Therapy is an essential component of comprehensive health care services. Individuals with a variety of conditions and illnesses can improve their health and quality of life by receiving medical nutrition therapy. MNT can increase consumer health and well-being, and increase productivity and satisfaction levels through decreased doctor visits, hospitalizations and reduced prescription drug use. The main aim of this course is that students will be capable of interpreting and using the interplay between the human organism and animal derived nutrients, i.e. foods. This course encompasses all animal derived foods. A wide selection of foods – meat, milk and egg - will be presented with special emphasis on their health-related effects, including food allergies, intolerances and effects on general well being and quality of life of human beings. Synthetising the nutrition related health topics is useful to graduate and postgraduate students in natural and agricultural sciences.

### **Required reading materials**

*Gibney M. J., Voster H. H., Kok F. J.: Introduction to Human Nutrition*  
Blackwell Publishing Ltd., 2005. ISBN: 978-0-632-05624-8

*Gibney M. J., Elia M., Ljungqvist O., Dowset J.: Clinical Nutrition.*  
Blackwell Publishing Ltd., 2005. ISBN: 978-0-632-05626-2

*Gibney M. J., Macdonald J. A., Roche H. M.: Nutrition & Metabolism.*  
Blackwell Publishing Ltd., 2005. ISBN: 978-0-632-05625-5