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

PLANT PROTECTION MSc Program

2023

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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.

# **INTERNATIONAL OFFICE AT THE FACULTY OF AGRICULTURAL AND FOOD SCIENCES AND ENVIRONMENTAL MANAGEMENT**

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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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# **INSTITUTES AND DEPARTMENTS OF THE FACULTY OF AGRICULTURAL AND FOOD SCIENCES AND ENVIRONMENTAL MANAGEMENT**

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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)

[Animal Genetics Laboratory](http://www.agr.unideb.hu/etk/xsearch.php?optLang=en&lstDep=22241)

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 Agriculture Botany and Crop Physiology

Department of Crop Production and Applied Ecology

[**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 Utilisation, Technology and Regional Development**](http://www.agr.unideb.hu/etk/xsearch.php?optLang=en&lstDep=22203)

**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)

**Agricultural Laboratory Center**

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| Dr Csaba JuhászDeputy Head, Associate Professor | blasko@agr.unideb.huroom 10, building N |
| Prof. Dr. Béla BaranyiProfesszor Emeritus | baranyi@agr.unideb.huroom 11, building N |
| Dr Nikolett SzőllősiAssistant Professor | nszollosi@agr.unideb.hu room 22, building N |
| Dr Lajos BlaskóProfessor Emeritus | blasko@agr.unideb.hu room 11, building N |
| Dr Elza KovácsAssociate Professor | ekovacs@agr.unideb.hu room 19, building N |
| Dr Attila NagyAssociate Professor | attilanagy@agr.unideb.hu room 12, building N |
| Dr Csaba PregunAssociate Professor | cpregun@agr.unideb.hu room 12, building N |
| Dr. Péter Tamás NagyAssociate Professor | nagypt@agr.unideb.hu room 22, building N |
| Dr Bernadett Farkas-GályaAssistant Professor | bernadett.galya@agr.unideb.hu room 14, building N |
| Dr Tamás MagyarAssistant Professor | magyar.tamas@agr.unideb.huroom 14, building N |
| Erika Budayné- BódiAssistant Lecturer | bodi.erika@agr.unideb.hu room 14, building N |
| Imre Lászlóné HuszkaAdministrative Assistant | huszka.imrene.ildiko@agr.unideb.hu room 1, building N |

**ACADEMIC CALENDAR**

# General structure of the academic year:

|  |  |  |  |
| --- | --- | --- | --- |
| Fall semester | 1st – 2nd week  | Registration\* | 2 weeks |
| 1st – 14th week | Study Periodfor non-graduating students | 14 weeks |
| 1st – 9th week | Study Periodfor 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 Periodfor non-graduating students | 14 weeks |
| 1st – 10th week | Study Periodfor 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 PLANT PROTECTION ENGINEERING GRADUATE PROGRAM**

INTRODUCTION OF THE PROGRAM

|  |  |
| --- | --- |
| Name of graduate program: | Plant Protecion Graduate Program |
| Level: | MSc |
| Qualification: | Plant Protection Engineer |
| Mode of attendance: | Full-time |
| Faculty: | Faculty of Agricultural and Food Sciences and Environmental Management |
| Program coordinator: | László Radócz, professor |
| Program length: | 4 semesters |
| Credits total: | 120 credits |

The aim of the Plant Protection Programme is to train specialists of plant protection who are able to fulfill directional, managing, organizing, consulting, regulating and marketing tasks, based on their wide theoretical and practical knowledge to prevent losses during crop production. Such experts are able to identify the organisms, which are threatening healthy plants (incl. pathogens, pests and weeds) and they get acquainted with their biology and reproduction, and also with the effects and mechanisms of pesticides concerning even the environment and humane hygiene, moreover apply integrated viewpoints of alternatives of chemical protection. They can prevent harms and damages caused by different pests or environmental effects, and they are applying procedures of ecological and integrated plant protection in order to reduce the pesticide-load of the environment. In their work they are always attentive to the safety of food, processors, consumers and the environment. Having a degree in higher education they are permitted to use restricted chemicals which might be special risks for the environment. The further aim is to prepare the interested and inspired students for research work and PhD training in the fields of plant protection.

**COURSE DESCRIPTIONS FOR PLANT PROTECTION MSC**

The list of subjects in alphabetical order.

|  |  |
| --- | --- |
| Alternative plant production and rural development | MTMNO7011A |
| Applied plant biology, biotechnology and resistance  | MTMNO7014A |
| Biological plant protection and biotechnology I. | MTMNO7039A |
| Biological plant protection and biotechnology II. | MTMNO7040A |
| Chemistry of plant protection | MTMNO7001A |
| Collection and preparation of insects and plants  | MTMNO7029A |
| Crop production | MTMNO7003A |
| Environmental protection and ecotoxicology | MTMNO7002A |
| Forecasting and integrated pest management | MTMNO7015A |
| General plant pathology and diagnostics | MTMNO7004A |
| Herbology | MTMNO7006A |
| Horticulture | MTMNO7010A |
| Human hygiene and first aids | MTMNO7021A |
| Informatics and agricultural extension | MTMNO7013A |
| Integrated pest management, IPM | MTMNO7025A |
| Molecular biology | MTMNO7012A |
| Mycology and fungal toxicology I. | MTMNO7028A |
| Mycology and fungal toxicology II. | MTMNO7030A |
| Outlines of plant pathology I.  | MTMNO7017A |
| Outlines of plant pathology II.  | MTMNO7022A |
| PCR in microbiology | MTMNO7034A |
| Planning and evaluating of plant protection trials | MTMNO7026A |
| Plant protection entomology I. | MTMNO7008A |
| Plant protection entomology II. | MTMNO7018A |
| Plant protection entomology III. | MTMNO7023A |
| Plant protection in greenhouses | MTMNO7033A |
| Plant protection law and administration, food safety | MTMNO7016A |
| Plant protection zoology and ecology | MTMNO7005A |
| Plant protectional application technology | MTMNO7009A |
| Plant protectional mycology | MTMNO7007A |
| Poisonous and pricky weeds | MTMNO7041A |
| Precision plant protection | MTMNO7038A |
| *Summer practice at a plant doctor practitioner* | MTMNO7GYA |
| Weed biology | MTMNO7019A |
| Weed ecology, weed competition | MTMNO7032A |
| Weed management | MTMNO7024A |

**Alternative plant production and rural development ( MTMNO7011A)**

Name and code of the subject: Alternative management and rurual development
(MTMNO7011A)
Name and title of the person responsible for the subject: Dr. Péter Horváth
Subject type: lecture
Teaching timetable of the subject, type of examination: 3 lecture, essay in a given topic
Credit value of the subject: 3

Purpose of teaching the subject: The aim of the subject is to get the students acquainted
with the situations, characteristics, resources and development of rural areas and rural
economy, and their possibilities for diversification.

Content of the subject (14 weeks):
1. What is rural?
2. Basics of rural development I.
3. Basics of rural development II.
4. Characteristics of rural economy
5. Resources in rural economy
6. Spatial processes influencing the situation of rural areas
7. Development and performance of rural areas
8. The role of agriculture in rural economy
9. Programs in rural development I.
10. Programs in rural development II.
11. Rural Development Program 2014-2020
12. Diversification of rural economy: rural tourism
13. Diversification of rural economy: alternative farming
14. Student presentation

Type of mid-term examination: written
Method of assessment (semester examination mark - report, practical grade, colloquium,
examination): colloquium
Teaching aids: -
Recommended literature:
The on-line seminar materials and presentations of the lecturer (available on the e-learning
system

**Applied plant biotechnology and resistance biology (MTMNO7014A)**

ECTS Credit Points: 3

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

Type of exam: oral, presentation

Midterm test from practical topics for the signature

Requirements:

- for signature: Participation in lectures and practices. Regular preparation for practical training with periodic inspections. From diagnostics part written exam, (part) grade recommendation - based on ZH result. Symptomatic exam (recognition of diseases at least 20 out of 25) during the last week of education. Oral examination at the end of the semester in the theoretical part of general plant pathology.

- for a grade: 1. From diagnostics part written exam, (part) grade recommendation - based on ZH result. 2. Symptomatic exam (recognition of diseases at least 20 out of 25) during the last week of education.

**lectures:**

1. History of biotechnology and plant tissue culture
2. Biotechnology of asexual reproduction: Micropropagation. Somatic embryogenesis, somatic seeds / somatic seedlings. Tissue culture in a bioreactors.
3. Presentation of a plant *in vitro* laboratory, acquaintance with the rules of sterile work
4. Micropropagation: direct/indirect organogenesis in practice
5. Somatic embryogenesis, production of artificial seeds by encapsulation. Automatization in plant tissue culture - plant cloning bioreactors. Elicitation.
6. Biotechnological methods of sexual reproduction. Haploidy, diploid technique
7. Anther culture, *in vitro* androgenesis; embryo preparation in practice
8. *In vitro* gene banks, virus elimination, cryopreservation
9. Nuclear and organellar genome organisation, genetic transformation
10. DNA isolation, amplification, visualization practices
11. Protein biotechnology, green biorefinery
12. Green biomass processing for biorefinery purposes practice: Protein determination, proteomic analysis by 1D/2D SDS PAGE - isoelectric focusing
13. Proteomic analysis by 1D/2D SDS PAGE – gel electrophoresis and evaluation
14. Role of biotechnology in agriculture waste management

**practices:**

1.-2.: Presentation of a plant in vitro laboratory, acquaintance with the rules of sterile work

3-4.:Micropropagation: direct/indirect organogenesis

5-6. : Somatic embryogenesis,

production of artificial seeds by encapsulation. Automatization in plant tissue culture - plant cloning bioreactors. Elicitation.

7-8. hours: Anther culture, in vitro androgenesis; embryo preparation.

9-10.: Plant DNA isolation, PCR reaction, horizontal gel electrophoresis of DNA. Demonstration practice of particle bombardment by genebooster

11-12.: Green biomass processing for biorefinery purposes. Protein isolation and determination. Proteomic analysis by 1D/2D SDS PAGE - isoelectric focusing

13-14.: Proteomic analysis by 1D/2D SDS PAGE – gel electrophoresis and evaluation

**literature:**

Altman A., Hasegawa P.M. (2012): Plant biotechnology and agriculture (Prospects for the 21st century)

 Kardung M. et al. (2020): Development of the Circular Bioeconomy: Drivers and Indicators

Freeman and Beattie (2008): An Overview of Plant Defenses against Pathogens and Herbivores

**Biological plant protection I. MTMNO7039A**

Name and code of the subject: Biological plant protection II., MTMNO7035A

Name and title of the person responsible for the subject: Dr. László Radócz associate

professor

Additional instructors involved in teaching the subject:-

Name and level of the program: Plant Protection MSc

Subject type: optional

Teaching timetable of the subject, type of examination: 2+0/Practical

Credit value of the subject: 3

Purpose of teaching the subject:

Demonstration of the use of biological plant protection against plant pathogens and weeds.

Introduction to related biotechnological processes.

Content of the subject (14 weeks):

1. Basics of biological plant protection against pathogens,

2. Mycoparasitism

3. Antibiotics

4. Saprobion competition

5. Viruses against plant pathogens

6. Hypovirulence and mycoviruses

7. Bacteria against plant pathogens,

8. Hyperparasitic fungi

9. Natural enemies of flowering parasites,

10. History of biological weed control

11. Biological weed control with microorganisms

12. Biological weed control with animals

13. Applications of bioherbicides

14. Bioherbicides in the world

Type of mid-term examination: mid-year audit

Method of assessment (semester examination mark - report, practical grade, colloquium,

examination): Practical colloquium

Teaching aids: lecture slides

Recommended literature:

1. Radócz L .: Modern plant protection, II-IV. (Fundamentals of Plant Protection in Major

Field and Horticultural Crops). University Publishing House, Debrecen (2010). (ISBN: 978-

606-10-0181-1).

2. Fischl G .: Basics of biological plant protection. Farmer Publishing House, Budapest

(2000). (ISBN 963 9239 57 7)

3. http:

//www.tankonyvtar.hu/en/tartalom/tamop425/0010\_1A\_Book\_08\_Novenyvedelem/adatok.1

**Biological plant protection II. MTMNO7040A**

**Name and title of the person responsible for the subject:** Dr. Antal Nagy associate professor

**Additional instructors involved in teaching the subject:** Dr. Gabor Tarcali senior research fellow, Kálmán Szanyi guest lecturer (UD, Faculty of Sciences)

**Name and level of the program:** Plant protection MSc

**Subject type:** obligatory

**Teaching timetable of the subject, type of examination:** 2 + 0, E

**Credit value of the subject:** 3

**Purpose of teaching the subject:**

The students get acquainted with the possibilities and limitations of plant protection in organic farming. Be aware of the organizational system of organic farming, the conditions and planning for the transition to organic production. They learn about the most common tecnics of biological control and beneficial organisms using against the economically most important animal (mainly insect) pests.

**Content of the subject (14 weeks)**

1. Agriculture, environment and organic farming;

2. Organic farming in Hungary. Conditions for cultivation and certification. Eco garden design. Plants of the organic garden, plant association. Conditions and planning for the transition to organic cultivation;

3. Living soil, soil life. Nutrient supply and healthy plant. Agrotechnical and physical methods. Soil improvement, composting, nutrient replenishment, plant care;

4. Biological protection against plant pathogens. Antagonist organisms: mycoviruses, bacteria, fungi. Biological buffering with resident antagonists; use of hypovirulent strains to reduce pathogenicity. Tolerant and resistant varieties;

5. The concept, peculiarities and methods of biological plant protection;

6. Fungicides of natural origin. Preparation of organic juices. Conditions and planning for the transition to organic production;

7. Some plants are recommended for organic production. Ecological protection against their pests;

8. Methods of biological control against pest species: range of beneficial organisms used in control methods;

9. Microorganisms in the biological control against animal pests: insect pathogen viruses, bacteria, (Bacillus thuringiensis and Bt toxins), fungi and nematodes;

10. Macroorganisms in the biological control against animal pests: predators and parasitic species widely used in biological control methods;

11. Use of sex pheromones and volatiles in mass-trapping, lure-and-kill, push-and-pull and mate disruption methods;

12. Use of sex pheromones and volatiles in mass-trapping, lure-and-kill, push-and-pull and mate disruption methods;

13. Conservation and augmentation of beneficial organisms in agricultural ecosystems;

14. Importation of beneficial organism: advantages and disadvantages of a widely used biological control method.

**Type of mid-term examination:**

Mid-term (1-7 weeks) and end-of-semester (8-14 weeks) exam (test). The final degree is calculated as the mean of the two tests.

**Method of assessment (semester examination mark - report, practical grade, colloquium, examination):**

Exam in written in a pre-arranged time.

**Teaching aids:**

Presentations and other additional materials are available on the e-learning system.

**Recommended literature:**

Anne Larkin Hansen (2010): The Organic Farming Manual. Storey Publishing LLC**. ISBN** 1603424792. 437 pp.

[Sean Clark](https://www.amazon.co.uk/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Sean+Clark&text=Sean+Clark&sort=relevancerank&search-alias=books-uk) (Ed.) 2016): Sustainable Agriculture-Beyond Organic Farming. MDPI AG. ISBN-10: 3038423041; ISBN-13: 978-3038423041. 356 pp.

[Darryl Benjamin](https://www.amazon.co.uk/Darryl-Benjamin/e/B00IZPKH8C/ref%3Ddp_byline_cont_book_1) - [Lyndon Virkler](https://www.amazon.co.uk/Lyndon-Virkler/e/B01D40RF5U/ref%3Ddp_byline_cont_book_2) (2016): Farm to Table: The Essential Guide to Sustainable Food Systems for Students, Professionals, and Consumers

**Chemistry of plant protection MTMNO7001A**

Title and Code of the subject: Chemistry of plant protection MTMNO7001A

 ECTS Credit Points: 2

Type of the subject: compulsory / optional

Ratio of theory and practice: 2/2 (credit%)

Type and number of classes per semester: 28 hour(s) lecture and 28 hour(s) practice per semester

Number of teaching hours / week : 2+2 (lecture and practice)

Type of exam: exam / practical course mark

Subject in the curriculum: semester 1

Preliminary requirements: -

Summary of content - theory: The aim of the subject to let the students to know the physical and chemical properties, the biological efficiency of pesticides. The dangers of poisoning of pesticides. The safety regulations of storage, transportation and application of pesticides, the basis of biochemistry, and the general characterisation and mode of action of inorganic and organic fungicides, zoocides and herbicides.

Course objectives:

1. Introduction

2. The physical and chemical properties, the biological efficiency of pesticides.

3. The dangers of poisoning of pesticides.

4. The safety regulations of storage, transportation and application of pesticides.

5. The biochemical basis of metabolism of pesticides. The construction and characterisation of enzymes.

6. Macromolecules I.: carbohydrates

7. The inhibition possibilities of synthesis of carbohydrates,

8. The inhibition possibilities of the breakdown processes of carbohydrates

9. Macromolecules II.: lipid

10. The inhibition possibilities of synthesis and breakdown processes of lipids

11. Macromolecules III.: nucleic acids.

12. The inhibition possibilities of synthesis of proteins

13. The inhibition possibilities of the breakdown processes of proteins

14. Photosynthesis

Summary of content - practice: Characterisation and effects of fungicides, zoocides and herbicides. Skills of making solutions, The role of water in making solutions, water harndness

1. The general characterisation and mode of action of inorganic fungicides.

2. General characterisation, grupping and mode of action of organic fungicides I.

3. Organic fungicids and mode of their actions II.

4. Characterisation and classification of zoocides, characterisation and classification of insecticides natural insecticides, synthetic pyrethroids, organophosphate insecticides, carbamate insecticides.

5. Hormones altering the metamorphosis, hormone synthesis inhibitors, attractants, repellents, ferromones,

6. Acaricides, nematicides, molluscicides. rodenticides. Pesticides for soil sterilization, Pesticides for protecting stored products.

7. Plant hormones controlling the growth, hormone synthesis inhibitors, Opportunities for inhibition of photosynthesis.

8. Classification and inhibition possibilities of herbicides I.

9. Herbicides and their inhibition possibilities II.

10. Herbicides and their inhibition possibilities III.

11. Making solutions with different concentrations (counting)

12. Making solutions with different concentrations (in practice)

13. The chemical basics of water hardness, Measurement of water hardness

14. The chemical basics of water softening

Literature, handbooks in English

1. Biochemistry. Christopher K. Mathews, K. E. van Holde, The Benjamin/Cummings Publishing Company, 1990. ISBN: 0-8053-5015-2.

2. The biochemistry and uses of pesticides. Kenneth A. Hassall, Macmillan Press., 1990. ISBN: 0-333-49789-9.

3. Pesticide chemistry, Gy. Matolcsy, M. Nádasy, V. Andriska, Akadémiai kiadó, Budapest, 1988. ISBN: 963-05-4573 X.

4. The biochemistry and uses of pesticides. Kenneth A. Hassall, Macmillan Press., 1990. ISBN: 0-333-49789-9.

5. Interactions between herbicides and the soil, R. J. Hance, ACADEMIC PRESS. INC. (London) LTD. 1980. ISBN: 0-12-323840-4.

Responsible lecturer: Balláné Dr. Kovács Andrea (associate professor)

Terms of course completion:

1. Take a written exam at the end of the semester

Form of examination:

writing test

Requirement(s) to get signature:

Take part in practice, Successful completion of lab practice

Exam questions:

Equal to the course and practice objectives

**Collection and preparation of insects and plants MTMNO7029A**

Name and code of the subject: Collection and preparation of insects and plants MTMNO7029A

Name and title of the person responsible for the subject: Dr. Antal Nagy, associate professor

Additional instructors involved in teaching the subject: Eszter Szilágyi

Name and level of the program: Plant protection MSc

Subject type: facultative subject

Teaching timetable of the subject, type of examination: 0+2, P

Credit value of the subject: 3

Purpose of teaching the subject:

Review of sampling methods of insect and plants and test them in field conditions. Preservation

of the collected economically important species (pests and weeds), making a pest and weed

collections. Review of the tasks and organization of natural history collections and museums.

Content of the subject (14 weeks):

1. Task and importance of scientific collections, organization and establishment of natural

history collections.

2. collecting and preserving methods of plants

3. Visit the scientific collections of the University of Debrecen

4. Overview sampling methods od insects, methods of data collection

5. Theoretical background of collection and preservation of economically important taxa:

Nematoda, Mollusca, Blattoptera, Orthoptera

6. Theoretical background of collection and preservation of economically important taxa:

Coleoptera, lepidoptera, Hymenoptera, hetroptera, Cicadomorpha, Aphids

7. Field samplings 1.

8. Field samplings 2.

9. Field samplings 3.

10. Processing the collected samples.

11. Processing the collected samples.

12. Processing the collected samples.

13. Processing the collected samples.

14. Processing the collected samples.

Type of mid-term examination: the attendance of practices (at least 70%) is obligatory

Method of assessment (semester examination mark - report, practical grade, colloquium,

examination): insect and plant collections made during practices is evaluated

Teaching aids: slides of presentations

Recommended literature:

Murray S. Upton and Beth L. Mantl (2010): Methods for Collecting, Preserving and Studying

Insects and other terrestrial arthropod. AUSTRALIAN ENTOMOLOGICAL

SOCIETY. Canberra https://doi.org/10.1111/j.1440-6055.2012.00871.x

**Crop production MTMNO7003A**

**Environmental protection and ecotoxicology, MTMNO7002A**

ECTS Credit Points: 3

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

Type of exam: oral, presentation

Requirements:

- for signature: Participation in lectures and practices. Means of preparation: from class notes, and from the articles handed out by the lecturer.

- for a grade: The course will end with a presentation project work. This presentation must based on local ecotoxicological or human toxicological problems caused by the agribusiness. It needs to discuss possible solutions.

 **lectures+ practices:**

1. Basics of toxicology, historical backgrounds, basic concepts. CSA
2. Global environmental problems. Role of pesticides in the contamination of soil, water and air and their effects to the living creatures. SZSZ
3. Bioaccumulation, biomagnification in organisms and biocoenosises. SZSZ
4. Usage of agrochemicals. CSA
5. Registration process of agrochemicals in the EU and Hungary. CSA
6. Categorization of pesticide active agens based on modes of action and their human toxicological problems. CSA
7. Acut toxicity. CSA
8. Chronic toxicity, toxins produced by phytopathogens. CSA
9. Basics of mutagenity, mutagenic pesticides SZSZ
10. Molecular fundaments of cancer developement, carcinogenic pesticides SZSZ
11. Basic concepts in teratology, teratogenic pesticides SZSZ
12. Hormone modulants. Basic concepts i immunology, immunemodulant pesticides. SZSZ
13. Genetically modified organisms in crop production. CSA
14. Ecotoxicological evaluation of GM organisms, their effects and hazards. CSA

**Forecasting and integrated pest management MTMNO7015A**

**Name and code of the subject:** Forecasting and integrated plant protection, **MTMNO7015A**

**Name and title of the person responsible for the subject:** Dr. László Radócz, associate professor

**Additional instructors involved in teaching the subject:-**

**Name and level of the program:** Plant Protection MSc

**Subject type:** Obligatory

**Teaching timetable of the subject, type of examination:** 3+2 hours / C

**Credit value of the subject: 3**

**Purpose of teaching the subject:**

Students should become familiar with the concept of plant protection forecasting, Its spatial and temporal levels. Methods and possibilities used in the prediction of pathogens, pests and weeds. Get to know the use of key forecasting tools and tools, computer forecasting models and databases as part of a hands-on demonstration. Students should also get to know the concept and levels of integrated pest management. Methods and possibilities used in the control of pathogens, pests and weeds. Learn how to use key computer decision support and technology design models and databases.

**Content of the subject (14 weeks):**

*1. The concept, spatial and temporal levels of plant protection forecasting.*

*2. General methods used to predict pests,*

*3. General methods used to predict pathogens,*

*4. General methods used to determine the spread of weeds,*

*5. Operation of pheromone traps and their main types,*

*6. Major forecasting targeting tools and software,*

*7. The concept of integrated pest management, its integration into farming practice,*

*8. Mechanical-physical methods in integrated pest management,*

*9. Agrotechnical methods in integrated pest management,*

*10. Chemical methods in integrated pest management,*

*11. Biological methods in integrated pest management,*

*12. Genetic-biotechnological methods in integrated pest management,*

*13. Determination and calculation of injury thresholds,*

*14. Databases, computer models, software for use in the planning / implementation of integrated pest management.*

**Type of mid-term examination:** Participation in the exercises is mandatory. Attendance at 70% of lectures is also mandatory.

**Method of assessment (semester examination mark - report, practical grade, colloquium, examination):** Colloquium

**Teaching aids:** the slide series of the presentations

**Recommended literature:**

1.http://www.tankonyvtar.hu/en/tartalom/tamop425/0010\_1A\_Book\_08\_Novenyvedelem/adatok.1

2. <https://food.ec.europa.eu/plants/pesticides/sustainable-use-pesticides/integrated-pest-management-ipm_en>

3. Radócz L.: Korszerű növényvédelem, I. (Növényvédelmi előrejelzés és integrált növényvédelem alapjai). Egyetemi Kiadó, Debrecen (2010). (ISBN: 978-606-10-0181-1).

4. Glits-Horváth-Kuroli-Petróczi: Növényvédelem. Mezőgazdasági Kiadó. 1997. (ISBN 963 286 042)

5. Fischl G.: A biológiai növényvédelem alapjai. Mezőgazda Kiadó, Budapest (2000). (ISBN 963 9239 57 7)

**General plant pathology and diagnostics, MTMNO7004A**

ECTS Credit Points: 3

42 hour(s) lecture and 42 hour(s) seminar per semester

Type of exam: practical course mark

Requirements:

- for signature: Participation in lectures and practices. Regular preparation for practical training with periodic inspections. From diagnostics part written exam, (part) grade recommendation - based on ZH result. Symptomatic exam (recognition of diseases at least 20 out of 25) during the last week of education. **Oral examination** at the end of the semester in the theoretical part of general plant pathology.

- for a grade: From diagnostics part written exam, (part) grade recommendation - based on ZH result. Symptomatic exam (recognition of diseases at least 20 out of 25) during the last week of education.

**Summary of content - theory**:

 **lectures:**

1. Introduction of plant pathology, universal and national history of plant pathology
2. Introduction of plant pathology, universal and national history of plant pathology
3. Formation of mycotoxins and their role in food safety
4. Endogenous (genetic) diseases. Exogenous, non-infectious diseases (climatic, edaphic factors, toxic substances)
5. Endogenous (genetic) diseases. Exogenous, non-infectious diseases (climatic, edaphic factors, toxic substances)
6. Infectious diseases: viruses, viroids, subviral forms
7. Infectious diseases: viruses, viroids, subviral forms
8. Prokaryotes (bacteria, selective bundle bacteria)
9. Prokaryotes (bacteria, selective bundle bacteria), diseases caused by phytoplasmas (and spiroplasmas)
10. Epidemiological concepts, types; Plant protection forecast options of plant diseases for major diseases
11. Disease control: agrotechnical, mechanical, chemical protection
12. Knowledge of plant pathophysiology: host-parasite interactions; forms of resistance, tolerance and their role in plant protection
13. Knowledge of plant pathophysiology: host-parasite interactions; forms of resistance, tolerance and their role in plant protection
14. Mycorrhizae; biological control against plant pathogens

**practices:**

1. Basic diagnostic
2. Symptomatic summary I-II.
3. Symptomatic summary I-II.
4. Classical possibilities of diagnosis: direct microscopic examination, microscopic preparations, production of pure culture (media, sterile work, plating, plate casting)
5. Classical possibilities of diagnosis: direct microscopic examination, microscopic preparations, production of pure culture (media, sterile work, plating, plate casting)
6. Examination of pure cultures by microscopic, biochemical methods (microscopic measurements, spore counting, classical and modern bacteriological methods); modern possibilities of diagnosis: Serological methods (principles, simple and complex serology, ELISA types, polyclonal and monoclonal antibody application)
7. Nucleic acid and protein based techniques (PCR, gel electrophoresis, RAPD, RFLP, dot-blot hybridization) Cultivation on live plants: reinfection, indicator plants, test plants
8. Detailed symptomatic overview: symptoms of apple and pear diseases
9. Symptoms of the disease of stone fruits, grape, berries
10. Symptoms of disease of courgette plants, cabbage, pepper, tomato
11. Symptoms of potato and legumes disease
12. Symptoms of cereal diseases
13. Symptoms of sunflower and corn diseases
14. Overview of additional diseases

**Literature**

Agrios, G.N. (2005): Plant Pathology, Fifth Edition. Academic Press.

Sambamurti A.P.S.S. (2006): A Textbook of Plant Pathology. IK International.

Dhingra, O.D. – Sinclair, J.B. (1995): Basic Plant Pathology Methods. Lewish Publishers

For practical trainings:

compulsory:

* Fox, R.T.V. (1993): Principles of Diagnostic Techniques in Plant Pathology. CAB International. pp. 213
* Dhingra, O.D. – Sinclair, J.B. (1995): Basic Plant Pathology Methods. (Second Ed.) Lewish Publishers.
* Shurtleff, M.C., Averre III, C.W. (1997): The Plant Disease Clinic and Field Diagnosis of Abiotic Diseases.

recommended:

Klement, Z., Rudolph, K., Sands, D.C. (eds.) (1990): Methods in Phytobacteriology. Akadémiai Kiadó, Budapest.

**Herbology MTMNO7006A**

Title of the subject: Herbology Credit: 5

Type of the subject: compulsory

Ratio of theory and practice: 60 /40 (credit%)

Type and number of classes per semester: 70 hours per semester (3 h lecture / 2 h practice per week)

Type of exam: exam / practical course mark

Subject in the curriculum: semester 1

Preliminary requirements: -

Summary of content - theory: The knowledge to be acquired is concise, as well as a 14 week breakdown of lectures.

Description of goal:

Definition of weeds, harms of weeds. Life types of weeds. Reproduction and

dormancy of weeds. Identification of weed species. Identification of weed seedlings and seeds.

Competition among weeds and crops. Allelopathy. Climate change and weeds.

Students can recognise significant weed species and know biological founds of weed control,

able to pretend spread of weeds.

Course objectives:

1. Life types of weeds

2. Damage of weeds

3. Allelopathy and its significance in plant protection

4. Propagation of weeds, dormancy, knowledge of generative and vegetative propagation formulas

5. Weed surveying methods

6. Physical, mechanical, agrotechnical, biology, chemical weed control methods

7. Methods of applying herbicides, spraying aids

8. Uptake and translocation of herbicides

9. Herbicide resistance, development, inheritance, possibilities of prevention development, knowledge of resistant weed biotypes

10. Herbicide groups

11. Herbicide groups

12. Seedling identifications

13. Seedling identifications

14. Seed identifications

Summary of content - practice: The knowledge to be acquired is concise, as well as a 14 week breakdown of practice.

Description of goal:

Training of plant protection, who are in possession of an appropriate economic approach, they know the cultivation of plants, knows effective ways to control weeds. They know the temporal appearance of weeds and effective and in many cases preventive protection against them.

Skills to be learnt:

1. Identification of Therophyta weed species

2. Identification of Hemitherophyta weed species

3. Identification of Hemikryptophyta weed species

4. Identification of Geophyta weed species

5. Identification of Hidrophyte and other weed species

6. Integrated weed management (IWM)

7. Field practice (Herbicides application methods)

8. Allelopathic examination with some major weeds

9. Allelopathic examination with some major weeds

10. Allelopathic examination with some invasive weeds

11. Allelopathic examination with some invasive weeds

12. Seed identification

13. Seedling identification

14. Seedling identification

Literature, handbooks in English

1. Alden S. Crafts (1975): Modern Weed Control. University of California Press. ISBN 0-520-02733-7

2. Cobb, A., Reade, J. (2010): Herbicides and Plant Physiology. Wiley Ltd. USA ISBN-13: 978-1-4051-2935-0

3. Haflinger, E., Scholz, H (1981): Grass weeds. Ciba-Geigy Ltd. Switzerland

4. Steven R. R., Jodie S. H. (1984): Weed Ecology Implications for Vegetation Management. A Wiley-Interscience Publication. USA ISBN 0-471-87674-7

Responsible lecturer: Arnold Szilágyi, assistant lecturer

Other lecturer(s): -

Terms of course completion:

Successful completion of weed detection, Completing exercises

Form of examination:

Written examination

Requirement(s) to get signature:

Attendance at the lecture is recommended, attendance at the exercises is mandatory (4 allowed absences per semester).

**Horticulture MTMNO7010A**

Title and Code of the subject: Horticulture MTMNO7010A ECTS Credit Points: 3

Type of the subject: compulsory / optional

Ratio of theory and practice: ../.. (credit%) 65 / 35

Type and number of classes per semester: 28 hour(s) lecture and 14 hour(s) practice per semester

Number of teaching hours / week : 2+1 (lecture and practice)

Type of exam: exam / practical course mark

Subject in the curriculum: semester 2

Preliminary requirements: -

Summary of content - theory:

Knowledge the modern growing technology of more considerable horticultural 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.

Characterization and development of horticultural production. Grouping of vegetables, according to a heat claim and the applied propagation methods. The characterisation of most important vegetable species. Fruit-growing in the world and directions of his development. Fruit-growing and his change of technology. New directions of the development. Grape growing, wine processing is his situation in the world, the tendencies of his change. Domestic wine-growing landscapes and wine-growing regions.

1. Importance, characterization and development of horticultural production

2. The grouping of vegetables according to a heat claim and the applied propagation methods.

3. The environmental claim of a tomato and sweet pepper their growing.

4. The characterisation of Cucurbitaceae crops – melons, cucumber, pumpkin, grafting vegetables

5. The characterisation of root vegetables - the growing of the carrot, parsley, beetroot and celery

6. The general characterisation of the onion, growing from seeds (one-year growing method) and from sets (two year method).

7. The environmental claim of a sugar pea and green beans, different types, growing.

8. The environmental claim of sweet corn, special types and growing.

9. Characterization of the major fruit species, growing regions and propagation

10. Establishment of fruit orchards, canopy formation

11. Cultivation, fertilization and irrigation of fruit orchards

12. Plant protection, harvest and storage of fruits

13. Importance of vine production, morphology, biological phases and propagation of vine

14. Establishment of vine orchards, cultivation methods

Summary of content - practice:

Skills to be learnt: They know the risk factor of plant cultivation and, if present, the possibilities of preventing and remedying economic and environmental damage.

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 covers.

6. Biodegradable mulches

7. High tunnels

8. Ventilation in freestanding high tunnels

9. Basic information for establishment of fruit orchard

10. Layout system of orchard

11. Weed management and integrated plant protection in orchard

12. The role of weather station installation in modern orchards

13. Plantation maintenance of grapes

14. Environmental problems and plant protection of grapes

 Literature, handbooks in English

1. Sánchez, E. S. (2010): Vegetable Gardening, The Pennsylvania State University, 64 p. http://www.webgrower.com/regional/pdf/PA\_Veg\_agrs115.pdf

2. 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

3. Parshant Bakshi V.K.Wali (2011): Practical manual for fruit production. https://www.researchgate.net/publication/270509577\_Practical\_manual\_of\_fruit\_production

4. Strik, B. C. (2011): Growing table grapes. https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/ec1639.pdf

Recommended literature:

5. 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

6. Tree FruitProduction Guide. Pennsylvania 2012–2013. https://polk.extension.wisc.edu/files/2014/02/Tree-Fruit-Production-Guide-Penn-State-2013.pdf

7. Hamman, R. A. et al, (1998): The Colorado grape growers' guide. Colorado State University, https://extension.colostate.edu/docs/pubs/garden/550a.pdf

Responsible lecturer: Mária Takács-Hájos CSc, associate professor

Terms of course completion:

1. Completing assignments / exercises 2. Submitting essay 3. Giving presentation

Form of examination: practical course mark

Requirement(s) to get signature:

Presentation, report. Student may skip class maximum 3 times during the semester.

**Human hygiene and first aids MTMNO7021A**

Name and code of the subject: Human hygiene and and first aid MTMNO7021A

Name and title of the person responsible for the subject: Dr Legoza József, professor

Additional instructors involved in teaching the subject: -

Name and level of the program: Plant prióotection MSc

Subject type:

Teaching timetable of the subject, type of examination

Credit value of the subject:

**Purpose of teaching the subject:**

Content of the subject:

1. Introduction. Hazards in agriculture.
2. Pesticides in air, soil and waters
3. Prevention ot the living organismus and human health
4. Occupational safaty regulation.
5. Types of occupational diseases and work related accidents
6. Chemical safety
7. Drinking water safety in EU and Hungary.
8. Prevention at workplaces. Occupational health in agriculture
9. Fungicides, herbicides and insecticides. Main pathological effects to human health.
10. The mechanisms of the effects of various pesticides.
11. Food safety. Natural chemicals in food.
12. Possibilities in a case of the first aid.
13. Case studies.
14. Summary. Test questions.

Teaching aids: slides of the presentations

Literature: topics of the presentations in e-learning system

**Informatics and agricultural extension MTMNO7013A**

Name and code of the subject: Informatics and agricultural extension (MTMNO7013A)

Name and title of the person responsible for the subject: Dr. Péter Lengyel, Dr. Péter Horváth

Additional instructors involved in teaching the subject: -

Name and level of the program: Növényorvosi MSc

Subject type: lecture an practice

Teaching timetable of the subject, type of examination: 1 lecture + 2 practice, written mid-term exams

Credit value of the subject: 3

Purpose of teaching the subject: Understanding the structure of the spreadsheet program, using worksheet functions, and solving basic and complex worksheets. Learning how to make reports from data, which analyze tools can be used and interpretation of results.

Content of the subject (14 weeks):

1. Data input, data types, basic operations. The use of worksheets: basic formatting and data format

2. Structure of data tables, spreadsheet function semantics. References, sorting, and filtering

3. Date and time functions, text functions. The use of operators and arguments in date, time and text functions

4. Logical functions and lookup and reference functions. Learning the use of conditions in functions

5. Data features, tables as databases, database functions

6. Data analysis and reports. The use of PIVOT tables

7. Mid-term exam (Excel), Power BI basics

8. Transform databases, Create reports, visuals

9. Creating complex report

10. Mid-term exam (Power BI)

11. Agricultural extension

12. Agricultural advisory system

13. Swot analysis

14. Student presentations

**Integrated pest management, IPM MTMNO7025A**

Name and code of the subject: (IPM) Integrated plant protection, MTMNO7025A

Name and title of the person responsible for the subject: Dr. László Radócz associate professor

Additional instructors involved in teaching the subject:-

Name and level of the program: Plant Protection MSc

Subject type: obligatory

Teaching timetable of the subject, type of examination: 3+2/Oral exam

Credit value of the subject: 3

Purpose of teaching the subject:

Demonstration of integrated plant protection as an integral part of the work process of the agricultural production. It is extremely important that participants do not limit plant protection to the use of pesticide products, but consider plant protection as a combined system of different protection practices within the cultivation activity. An essential requirement is that students recognize the most important pests (know what, when, where to look); recognize the damage.

In accordance with the knowledge of Plant Protection Chemistry, detailed knowledge should

be taught and reference should be made to all possible control procedures (including plant

protection products that can be used), but there should be a reference to plant protection

knowledge when describing preparations. Pest control should be taught according to the approach and requirements of integrated pest management.

Content of the subject (14 weeks):

1. Modern plant protection of autumn cereals,

2. Modern plant protection for spring cereals

3. Modern plant protection of maize,

4. Modern plant protection of sunflowers,

5. Plant protection of winter oilseed rape

6. Modern plant protection of potatoes and tobacco,

7. Modern plant protection of peppers and tomatoes

8. Modern plant protection of cucumbers, melons, pumpkins,

9. Modern plant protection of cabbages (cabbage, cauliflower, turnips, radishes, lettuce),

10. Modern plant protection of onions

11. Modern plant protection of sugar beet,

12. Modern plant protection of peas, alfalfa, soybeans

13. Modern plant protection of nurseries,

14. Modern plant protection of greenhouses

Type of mid-term examination: mid-year audit

Method of assessment (semester examination mark - report, practical grade, colloquium,

examination): Practical colloquium

Teaching aids: lecture slides

Recommended literature:

1. Radócz L .: Modern plant protection, II-IV. (Fundamentals of Plant Protection in Major

Field and Horticultural Crops). University Publishing House, Debrecen (2010). (ISBN: 978-

606-10-0181-1).

2.http://www.tankonyvtar.hu/en/tartalom/tamop425/0010\_1A\_Book\_08\_Novenyvedelem/ada

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**Molecular biology MTMNO7012A**

Title and Code of the subject: Molecular Biology

Code: MTMNO7012A ECTS Credit Points: 3

Type of the subject: compulsory / optional

Ratio of theory and practice: 50/50 (credit%)

Type and number of classes per semester: 14 hour(s) lecture and 14 hour(s) practice per semester

Number of teaching hours / week : 1+1 (lecture and practice)

Type of exam: oarl exam / practical course mark

Subject in the curriculum: semester 1.

Preliminary requirements: -

Summary of content – theory and practice:

Course objectives:

1. Macromolecules of the cells - KE

2. Genetic elements and their characteristics - KE

3. DNA replication in the prokaryotic and in the eukaryotic cells - KE

4. Protein synthesis – transcription - KE

5. Protein synthesis – translation - KE

6. Chemical identification methods for the organisms - KE

7. Serological methods - KE

8. Basics and main types of molecular blotting techniques - PK

9. Basics of PCR and standard PCR - PK

10. Real-time PCR - PK

11. Molecular identification - KCs

12. Molecular techniques on the field of plant protection - KCs13.

Responsible lecturer: Dr. Erzsébet Karaffa

Form of examination: Oral examination

Requirement(s) to get signature:

The attendance in the class is highly recommended.

The course will end with a presentation from an article, and discussion the introduced results based on molecular methods on the field of plant protection. It is also necessary to answer for all the problen solving tasks connected to the practices.

Means of preparation: notes from class and articles provided by the lecturer

**Mycology and fungal toxicology I. MTMNO7028A**

Name and code of the subject: Mycology and fungal toxicology I, MTMNO7028A

Name and title of the person responsible for the subject: Dr. László Radócz associate professor

Additional instructors involved in teaching the subject:-

Name and level of the program: Plant Protection MSc

Subject type: optional

Teaching timetable of the subject, type of examination: 4+1/Practical

Credit value of the subject: 5

Purpose of teaching the subject:

Students should learn about the most important edible and toxic large fungi, the types of

poisoning, and how to control them. Be aware of the ecological significance of fungi, their

body composition and possible ways of forming their fruiting bodies.

Content of the subject (14 weeks):

1. The place of fungi is the living world, their body structure

2. Types of hyphae and fruiting bodies,

3. The ecological role of fungi

4. Type of production site,

5. Mycorrhizae

6. Damage caused by fungi and their recovery

7. Rules for mushroom collection

8. Qualification of mushrooms, mushroom testing

9. Cultivation of mushrooms

10. Cultivation of oyster mushrooms

11. Growing shii-take mushrooms

12. Growing of other mushroom species

13. Processing and preserving mushrooms

14. The dietary significance and nutritional value of mushrooms.

Type of mid-term examination: field report

Method of assessment (semester examination mark - report, practical grade, colloquium,

examination): Practical colloquium

Teaching aids: lecture slides

Recommended literature:

1. Ewald G. Handbook of Mushrooms. Artamira Publishing House, Budapest (2010). (ISBN

978-963-9889-13-2)

2. Rimóczi I. Mushrooms of Central-Europe. CD-ROM Kossuth Publishing House, Budapest

(2000) (ISBN: 963-09-398

**Mycology and fungal toxicology II. MTMNO7030A**

**Name and title of the person responsible for the subject:** Dr. László Radócz, associate professor

**Additional instructors involved in teaching the subject:-**

**Name and level of the program:** Plant Protection MSc

**Subject type:** optional

**Teaching timetable of the subject, type of examination:** 2+3 hours / P

**Credit value of the subject: 5**

**Purpose of teaching the subject:**

Students should learn about the most important edible and toxic large fungi, the types of poisoning, and how to cure them. The ecological significance of fungi, their body composition and possible ways of forming their fruiting bodies. Be able to examine and classify fungal fruiting bodies.

**Content of the subject (14 weeks):**

1. Detailed knowledge of fungal species,

2. Detailed knowledge of fungal species,

3. Detailed knowledge of fungal species,

4. Detailed knowledge of fungal species,

5. Detailed knowledge of fungal species,

6. Detailed knowledge of fungal species,

7. Detailed knowledge of fungal species

8. Detailed knowledge of fungal species

9. Detailed knowledge of fungal species

10. Detailed knowledge of fungal species

11. Mushroom preparation

12. Fungal poisonings with long latency

13. Fungal poisonings with short latency

14. Other fungal poisonings.

**Type of mid-term examination:** Participation in the exercises is mandatory. Attendance at 70% of lectures is also mandatory.

Semester mid-term ZH report

**Method of assessment (semester examination mark - report, practical grade, colloquium, examination):** Colloquium

**Teaching aids:** the slide series of the presentations

**Recommended literature:**

1. Ewald G. Practical manual of mushroom pickers. Artamira Kiadó, Budapest (2010). (ISBN 978-963-9889-13-2)

2. Jakucs E. (szerk.): Gombaszakértői praktikum. Flaccus Kiadó, Budapest (2008). (ISBN: 978-963-9412-51-4).

3. Albert L., Locsmándi Cs. Vasas G.: Ismerjük fel a gombákat I-II. Gabo Kiadó, Miskolc. (1995). (ISBN 963-8009-08).

4. Radócz L. (szerk): Gyakorlati gombaismeret és termesztés. MILROL Kiadó, Kecskemét. (2015). (ISBN 978-615-5602-11-5)

5. Rimóczi I. Magyarország gombái. CD-ROM Kossuth Kiadó, Budapest (2000) (ISBN: 963-09-3986

**Outlines of plant pathology I. MTMNO7017A**

Title and Code of the subject: Outlines of plant pathology I.

Code: MTMNO7017A ECTS Credit Points: 3

Type of the subject: compulsory / optional

Ratio of theory and practice: 50/50 (credit%)

Type and number of classes per semester: 14 hour(s) lecture and 14 hour(s) practice per semester

Number of teaching hours / week : 1+1 (lecture and practice)

Type of exam: oarl exam / practical course mark

Subject in the curriculum: semester 3.

Preliminary requirements: -

Summary of content:

Description and means of identification of the diseases (abiotic diseases, viruses, bacteria, phythoplasms, fungi) main cultivated field crops and vegetables in Hungary and the European Union. Integrated management technologies against the diseases of the field crops and vegetables.

Theory:

Course objectives:

1. Wheat diseases

2. Wheat diseases

3. Diseases of other cereals (barlyey, rye, oat)

4. Diseases of corn maize

5. Sunflower diseases

6. Sugarbeet diseases

7. Soybean diseases

8. Diseases of peas and beans

9. Diseases of peas and beans

10. Diseases of Cucurbitaceae crops (pumpkin, squash, gourds, cucumber and melons)

11. Diseases of Cruciferaceae crops (oilseed rape and cabbages)

12. Diseases of peppers

13. Tomato diseases

14. Potato diseases

Practice:

1. Pest management of wheat diseases

2. Pest management of wheat diseases

3. Pest management of diseases of other cereals (barlyey, rye, oat)

4. Pest management of diseases of corn maize

5. Pest management of sunflower diseases

6. Pest management of sugarbeet diseases

7. Pest management of soybean diseases

8. Pest management of diseases of peas and beans

9. Pest management of diseases of peas and beans

10. Pest management of diseases of Cucurbitaceae crops (pumpkin, squash, gourds, cucumber and melons)

11. Pest management of diseases of Cruciferaceae crops (oilseed rape and cabbages)

12. Pest management of diseases of peppers

13. Pest management of tomato diseases

14. Pest management of potato diseases

Literature:

Agrios, G.N. (2005): Plant Pathology, Fifth Edition. Academic Press.

Sambamurti A.P.S.S. (2006): A Textbook of Plant Pathology. IK International.

Responsible lecturer: Dr. Gábor Tarcali

Form of examination: Oral examination

Requirement(s) to get signature: Attendance to the courses.

**Outlines of plant pathology II. MTMNO7022A**

Name and code of the subject: Outlines of plant pathology II., MTMNO7022A
Name and title of the person responsible for the subject: Gábor Tarcali; senior research fellow
Additional instructors involved in teaching the subject: András Csótó
Name and level of the program: plant doctor MSc
Subject type: mandatory
Teaching timetable of the subject, type of examination: 2+2 C
Credit value of the subject: 3

Purpose of teaching the subject: The aim of teaching the course is to acquaint students
with the biology, means of identification of the diseases (abiotic diseases, viruses, bacteria,
phythoplasms, fungi) of main cultivated fruits in Hungary and the European Union and
their integrated management technologies.

Content of the subject (14 weeks):
1. Apple diseases/I.;
2. Apple diseases/II.;
3. Pear diseases;
4. Quince diseases;
5. Peach diseases;
6. Apricot diseases;
7. Plum diseases;

8. Cherry and sour cherry diseases
9. Diseases of currants and gooseberry;
10. Raspberry diseases;
11. Strawberry diseases;
12-13. Grape diseases;
14. Diseases of nuts

Type of mid-term examination: Attendance at lectures is recommended. Attendance at
the practical lessons is mandatory. The condition for signature is 70% attendance at the
practical lessons.
Method of assessment (semester examination mark - colloquium): Oral examination.
Teaching aids: slideshows of the course

Recommended literature: Plant Pathology 5th ediion George Agrios No. of pages: 952
Academic Press 2005 Hardcover ISBN: 9780120445653

**PCR in microbiology MTMNO7034A**

Credit: 3

Type of the subject: optional

Ratio of theory and practice: 50 / 50 (credit%)

Type and number of classes per semester: 9 hour(s) lecture and 9 hour(s) practice per semester

Type of exam: practical course mark

Subject in the curriculum: semester 4

Preliminary requirements: Molecular Biology

**Summary of content - theory:**

Course objectives: The basic concept of standard PCR will be overviewed, and different PCR techniques will be introduced to the students. Practical information about the design and run of PCR as well as the possibilities for the usage of the different PCR techniques for plant protection problems will be discussed. The aim is that students will be able to choose the appropriate PCR techniques for plant protection questions, and able to make, run and interpret the results.

1. The basic concept of polymerase chain reaction (PCR), and the standard PCR

2. Basic concept and application of real time PCR.

3. Application of PCR for cloning of genes

4. PCR methods for identification of taxons.

5. PCR methods for the identification of phylogenetic connections.

6. PCR applications in biotechnology.

7. PCR applications in the plant-pathogen interactions.

8. Detection of plant pathogens with different PCR techniques.

9. Setup and optimization of the PCR reactions.

**Summary of content - practice:**

Skills to be learnt: How to design and run o PCR reaction, how to those or design primers for the PCR reaction. Finally how to interpret the result of the PCR reaction.

 1 – 2. Design primers with restriction endonuclease cleavage site.

 3 – 5. Primer design for a given gene based on BankIT information. Order of primers, and design the PCR reaction for amplification.

 6 – 9. Introduction of different PCR machines. Basic concept, and practice of writing a PCR program. Put and run a PCR. Check the reactions on agarose geles. Interpret the results.

**Literature, handbooks in English**

1. Bridge, P. D., Arora, D. K., Reddy, C.A., Elander., R.P (1998): Applications of PCR in Mycology, CABI New York,

2. Stryer; et al. (2019). Biochemistry (9th ed.). Palgrave Macmillan. ISBN 978-1319114657.

3. Madigan, M. T, Martinko, J. M., Bender K., Buckley, D., Stahl, D (2015): Brock Biology of Microorganisms, Benjamin Cumming, 14th edition pp1061, ISBN 978-1-292-01831-7

4. Recent publications from Phytopathology, Plant Diseases, Crop protection, Mycology, Weed Science, Agricultural and Forest Entomology etc.

**Responsible lecturer: Erzsébet Karaffa, PhD**

Terms of course completion: Completing exercises

Form of examination: Written

Requirement(s) to get signature: Participate in the practice and accepted lab notes.

**Pest management in eco farms** MTMNO7020A

**Name and title of the person responsible for the subject:** Dr. Gabor Tarcali senior research fellow

**Additional instructors involved in teaching the subject:** Dr. Antal Nagy associate professor, Dóra Arnóczkyné Jakab

**Name and level of the program:** Expert of plant protection, MSc

**Subject type:** obligatory

**Teaching timetable of the subject, type of examination:** 1 + 0 P

**Credit value of the subject:** 3

**Purpose of teaching the subject:**

The student should get acquainted with the possibilities and limitations of plant protection in organic farming. Be aware of the organizational system of organic farming, the conditions and planning for the transition to organic production.

**Content of the subject (14 weeks)**

1. Agriculture, environment and organic farming;

2. Organic farming in Hungary. Conditions for cultivation and certification. Eco garden design. Plants of the organic garden, plant association. Conditions and planning for the transition to organic cultivation;

3. Living soil, soil life. Nutrient supply and healthy plant. Agrotechnical and physical methods. Soil improvement, composting, nutrient replenishment, plant care;

4. Biological protection against plant pathogens. Antagonist organisms: mycoviruses, bacteria, fungi. Biological buffering with resident antagonists; use of hypovirulent strains to reduce pathogenicity. Tolerant and resistant varieties;

5. The concept, peculiarities and methods of biological plant protection;

6. Fungicides of natural origin. Preparation of organic juices. Conditions and planning for the transition to organic production;

7. Some plants are recommended for organic production. Ecological protection against their pests;

8. Methods of biological control against pest species: range of beneficial organisms used in control methods;

9. Microorganisms in the biological control against animal pests: insect pathogen viruses, bacterias, (Bacillus thuringiensis and Bt toxins), fungi and nematodes;

10. Macroorganisms in the biological control agains animal pests: predators and parasitoids widely used in biological control methods;

11. Use of sex pheromones and volatiles in mass-trapping, lure-and-kill, push-and-pull and mate distruption methods;

12. Use of sex pheromones and volatiles in mass-trapping, lure-and-kill, push-and-pull and mate distruption methods;

13. Conservation and augmentation of beneficial organisms in agricultural ecosystems;

14. Importation of beneficial organism: advantages and disadvantages of a widely used biological control method..

**Type of mid-term examination:**

Mid-term and end-of-semester practical report (test).

**Method of assessment (semester examination mark - report, practical grade, colloquium, examination):**

Exam in written in a pre-arranged time.

**Teaching aids:**

Slide PPTs at presentations are available in advance.

**Recommended literature:**

Anne Larkin Hansen (2010): The Organic Farming Manual. Storey Publishing LLC**. ISBN** 1603424792. 437 pp.

[Sean Clark](https://www.amazon.co.uk/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Sean+Clark&text=Sean+Clark&sort=relevancerank&search-alias=books-uk) (Ed.) 2016): Sustainable Agriculture-Beyond Organic Farming. MDPI AG. ISBN-10: 3038423041; ISBN-13: 978-3038423041. 356 pp.

[Darryl Benjamin](https://www.amazon.co.uk/Darryl-Benjamin/e/B00IZPKH8C/ref%3Ddp_byline_cont_book_1) - [Lyndon Virkler](https://www.amazon.co.uk/Lyndon-Virkler/e/B01D40RF5U/ref%3Ddp_byline_cont_book_2) (2016): Farm to Table: The Essential Guide to Sustainable Food Systems for Students, Professionals, and Consumers

**Planning and evaluating of plant protection trials MTMNO7026A**

Plant protection entomology I. MTMNO7008A

Name and code of the subject: Plant protection entomology I, MTMNO7008A

Name and title of the person responsible for the subject: Dr. Antal Nagy, associate professor

Additional instructors involved in teaching the subject: Eszter Szilágyi

Name and level of the program: Plant protection MSc

Subject type: applied natural sciences

Teaching timetable of the subject, type of examination: 2+1, E

Credit value of the subject: 3

Purpose of teaching the subject: Characterisation of the most important pest species of Lepidoptera

and Hymenoptera orders considering their biology, economic importance, control and monitoring

methods (especially cultural and biological methods).

Content of the subject (14 weeks):

Lepidoptera in general. Most important pests of Mandibulata, Exoporia, Monotrysia

2. Most important pests of Lionetiidae, Gracilariidae

3. Most important pests of Coleophoridae, Plutellidae, Acrolepiidae, Argyresthiidae,

Ypsolophidae, Tineidae

4. Most important pests of Gelechiidae, Depressariidae, Oecophoridae, Agonoxenidae,

Yponomeutidae

5. Most important pests of Tortricidae 1.

6. Most important pests of Tortricidae 2.

7. Most important pests of Pyralidae, Choreutidae

8. Most important pests of Cossidae, Sesiidae, Zygenidae, Geometridae,

9. Most important pests of Lasiocampidae, Lymantriidae, Arctiidae, Noctuidae 1.

10. Most important pests of Noctuidae 2.

11. Most important pests of Saturniidae, Shingifdae, Pieridae, Papilionidae, Nymphalidae

12. Hymenoptera in general. Most important pests of Tentredinidae 1.

13. Most important pests of Tenthredinidae 2.

14. Most important pests and beneficial species of Vespidae, Ischneumonidae

Type of mid-term examination: lectures are suggested, the attendance of practices (at least

70%) is obligatory

Method of assessment (semester examination mark - report, practical grade, colloquium,

examination): damage and pest recognition, test (exam)

Teaching aids: slides of presentations

Recommended literature:

Marczali Zs. (2020): Modul of applied entomology: Field pests in temperate zone of Europe

http://dtk.tankonyvtar.hu/xmlui/handle/1234567892953

**Plant protection entomology I. MTMNO7008A**

**Plant protection entomology II. MTMNO7018A**

**Name and code of the subject:** Plant protection entomology II, MTMNO7018A

**Name and title of the person responsible for the subject:** Dr. Antal Nagy,associate professor

**Additional instructors involved in teaching the subject:** Kálmán Szanyi, guest lecturer (UD, Faculty of Sciences)

**Name and level of the program:** Plant protection MSc

**Subject type:** obligatory special plant protection subject

**Teaching timetable of the subject, type of examination:** 2+1, E

**Credit value of the subject:** 3

**Purpose of teaching the subject:** Characterisation of the most important pest species of Diptera, Hemiptera, Thysanoptera, Acari and Vertebrata considering their biology, economic importance, control, and monitoring methods (especially cultural and biological methods).

**Content of the subject (14 weeks):**

1. Diptera in general. Economically important Diptera species 1.

2. Economically important Diptera species 2.

3. Economically important Diptera species 3 and Heteroptera species 1.

4. Economically important Heteroptera species 2.

5. Economically important Auchenorrhyncha species 1.

6. Economically important Auchenorrhyncha species 2.

7. Economically important Sternorrhyncha species 1.

8. Economically important Sternorrhyncha species 2.

9. Economically important Sternorrhyncha species 3.

10. Economically important Thysanoptera species.

11. Acari in general and Economically important Acari species 1

12. Economically important Acari species 2.

13. Economically important Aves species.

14. Economically important Mammalia species.

**Type of mid-term examination:** lectures are suggested, the attendance of practices (at least 70%) is obligatory

**Method of assessment (semester examination mark - report, practical grade, colloquium, examination):** damage and pest recognition, test (exam)

**Teaching aids:** slidesof presentations and materials uploaded to e-learning system

**Recommended literature:**

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

**Plant protection entomology III. MTMNO7023A**

Name and code of the subject: Plant protection entomology III, MTMNO7023A

Name and title of the person responsible for the subject: Dr. Antal Nagy, associate

professor

Additional instructors involved in teaching the subject: Eszter Szilágyi

Name and level of the program: Plant protection MSc

Subject type: applied natural sciences

Teaching timetable of the subject, type of examination: 2+2, E

Credit value of the subject: 3

Purpose of teaching the subject: Characterisation of the animal pest assemblages of the main crops,

vegetables and fruits grown in Hungary and Europe. Appearance of pest in consecutive phenological

stages of the host plant(s). IPM against the most important pest of the main cultures.

Content of the subject (14 weeks):

1. Poliphagous pest of crops (in arable lands)

2. Pest assemblages of cereals and their IPM

3. Pest assemblages of potato and sugar beet and their IPM

4. Pest assemblages of tobacco and sunflower and their IPM

5. Pest assemblages of lucerne and legumes (pea, bean and soy) and their IPM

6. Pest assemblages of tomato, green pepper and onion and their IPM

7. Pest assemblages of cucumber, watermelon, marrow and Brassica sp. (rapeseed) and their

IPM

8. Poliphagous pests of fruit trees (in orchards)

9. Pest assemblages of apple and pear and their IPM

10. Pest assemblages of peach, apricot and plum and their IPM

11. Pest assemblages of grape, goosberry and currant and their IPM

12. Pest assemblages of raspberry and strowberry and their IPM

13. Pest assemblages of small cultures (wallnut, root crops, horse radish and asparagus) and

their IPM

14. Pest assemblages of tored products

Type of mid-term examination: lectures are suggested, the attendance of practices (at least

70%) is obligatory

Method of assessment (semester examination mark - report, practical grade, colloquium,

examination): damage and pest recognition, test (exam)

Teaching aids: slides of presentations

Recommended literature: collected articles

**Plant protection in greenhouses MTMNO7033A**

ECTS Credit Points: 2

Type of the subject: compulsory / optional

Ratio of theory and practice: 1/1 (credit%)

Type and number of classes per semester: 14 hour(s) lecture and 14 hour(s) practice per semester

Number of teaching hours / week : 1+1 (lecture and practice)

Type of exam: exam / practical course mark

Subject in the curriculum: semester 1

Preliminary requirements: -

Summary of content – theory

**lectures:**

1. Introduction to plant protection in greenhouses

2. The role of greenhouses, plant hygiene peculiarities

3. Integrated pest management solutions for greenhouses

4. Biological protection options in greenhouses

5. Damage during seedling growing and options for plant protection

6. Major diseases of vegetable crops (lettuce species, peppers, tomatoes, cucumbers, etc.) in greenhouses

7. Major diseases of vegetable crops (lettuce species, peppers, tomatoes, cucumbers, etc.) in greenhouses

8. Major animal pests of vegetable crops (lettuce species, sorrel, spinach, peppers, tomatoes, cucumbers, etc.) in greenhouses

9. Major animal pests of vegetable crops (lettuce species, sorrel, spinach, peppers, tomatoes, cucumbers, etc.) in greenhouses

10. Major diseases of ornamental plants produced in greenhouses (azalea, gerbera, carnation, cyclamen, geraniums, petals, chrysanthemums)

11. Major animal pests of ornamental plants produced in greenhouses (azalea, gerbera, carnation, cyclamen, geraniums, irises, chrysanthemums)

12. Modern cultivation technology of tobacco seedlings

13. Phytopathological and animal pest problems of cultivated mushroom species (champignons, oyster mushrooms, etc.)

14. Knowledge summary

**practices:**

1. Greenhouses in practice

2. Practical aspects of integrated plant protection in greenhouses

3. Practical aspects of integrated plant protection in greenhouses

4. Practical aspects of biological plant protection in greenhouses

5. Practical aspects of biological plant protection in greenhouses

6. Practical aspects of plant protection against the major diseases of vegetable crops (lettuce species, sorrel, spinach, peppers, tomatoes, cucumbers, etc.) in greenhouses

7. Practical aspects of plant protection against the major animal pests of vegetable crops (lettuce species, sorrel, spinach, peppers, tomatoes, cucumbers, etc.) in greenhouses

8. Practical aspects of plant protection against the major diseases of ornamental plants produced in greenhouses (azalea, gerbera, carnation, cyclamen, geraniums, petals, chrysanthemums)

9. Practical aspects of plant protection against the major animal pests of ornamental plants produced in greenhouses (azalea, gerbera, carnation, cyclamen, geraniums, irises, chrysanthemums)

10. Practical aspects of plant protection against the major pests of cultivated mushroom species (champignons, oyster mushrooms, etc.)

11. Practical aspects of tobacco seedling growing

12. Practical visit to vegetable growing greenhouses

13. Practical visit to ornamental plant producing greenhouses

14. Practical visit to other greenhouses

**Literature, handbooks in English**

1. The materials of the lectures in PDF format

2. Agrios, G.N. (2005): Plant Pathology, Fifth Edition. Academic Press

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

**Terms of course completion:**  Take a written exam at the end of the semester

**Form of examination:** writing test

**Requirement(s) to get signature:** Take part in practice

**Plant protection law and administration, food safety MTMNO7016A**

Name and code of the subject: Plant protection law and administration MTMNO7016A

Name and title of the person responsible for the subject: Dr. Gabor Tarcali senior research fellow

Additional instructors involved in teaching the subject:

Name and level of the program: Expert of plant protection, MSc

Subject type: obligatory

Teaching timetable of the subject, type of examination: 3 + 0 C

Credit value of the subject: 3

Purpose of teaching the subject:

The student should get acquainted with the Hungarian plant protection organization and the

current administration. The student should get acquainted with the Hungarian plant protection

legislation. At the skill level, the student should master the rules for the use of plant protection

products and be able to apply them in practice.

Content of the subject (14 weeks)

1. Introduction, historical overview

2. Organization of the plant protection administration, plant protection authorities

3. Plant protection legislation

4. Obligation to protect against pests

5. Regulations for quarantine and dangerous pests, quarantine rules

6. Plant protection regulations in the European Union

7. Plant health rules, plant passport

8. Phytosanitary inspection of propagating material

9. Authorization of active substances and plant protection products

10. Rules for the use of plant protection products

11. Rules for the use of plant protection products

12. Rules for the use of plant protection products

13. Environmental regulations, protection of bees and living waters

14. Legal consequences, administrative procedure

Type of mid-term examination:

Participation in the lectures.

Method of assessment (semester examination mark - report, practical grade, colloquium, examination):

Written examination at the end of the semester.

Teaching aids:

Slide presentations of the knowledge to be submitted and the disease lists are available in

advance in PDF files.

Recommended literature:

- Current legislation on plant protection (XLVI of 2008 Act, 43/2010. (IV. 26.) FVM Decree,

Directive 2009/128 / EC of the EU Parliament and the Council),

- Gabor Tarcali: Plant Protection Law and Administration, Educational Handbook, 2020

**Plant protection zoology and ecology MTMNO7005A**

Title and Code of the subject: MTMNO7005A Plant protection zoology and ecology ECTS Credit Points: 3

Type of the subject: compulsory / optional

Ratio of theory and practice: 3/0 (credit%)

Type and number of classes per semester: 56 hour(s) lecture and 28 hour(s) practice per semester

Number of teaching hours / week : 4+2 (lecture and practice)

Type of exam: exam / practical course mark

Subject in the curriculum: semester 1

Preliminary requirements: -

Summary of content - theory: Basic and applied insect ecology: structure, dynamic and growth of population, characteristics of natural and agricultural landscapes and ecosystems, basic production biology, basic chemical ecology, population interaction especially (insect-plant, host-pray and host-parasite interactions), types of dormancy. Basic biogeography and invasion biology. General biology (anatomy and physiology, reproduction biology etc.) of Nematodes, Gastropoda, Myriapoda, Diplopoda and Insects.

Characterisation of the most important pest species of Nematode, Gastropod, Myriopode and some Insect order: Saltatoria and Coleoptera. Characterisation of beneficial organisms belonging to the studied groups.

Course objectives:

1. Introduction

2. Nematoda, Mollusca, Myriapoda, Diplopoda

3. Insect morphology, physiology and reproduction biology

4. Lepismatidea, Blattoptera, Orthoptera

5. Coleoptera in general: Carabidae, Melolonthidae

6. Elateridae, Tenebrionidae

7. Mordellidae, Coccinellidae, Bituridae, Nitidulidae, Silvanidae, Laemopphloidae, Trogositidae, Cryptophagidae, Anobyidae, Bostrichidae

8. Chrysomelidae

9. Cerambycidae, Buprestidae, Bruchidae

10. Curculionidae

11. Scolitidae, Attelabidae, Apionidae, Sylphidae

12. Plant protection ecology I.

13. Plant protection ecology II.

14. Plant protection ecology III.

Summary of content - practice: Characterisation and identification practices of studied invertebrate taxa and species and damages caused by the economically most important species.

Skills to be learnt: Use of identification keys of studied taxa. Recognition of symptoms caused by the economically most important Nematoda, Gastropoda, Orthoptera and Coleoptera pests and recognition (identification) of the most important species of the studied taxa.

1. Introduction, use of equipment and laboratory

2. Nematoda, Mollusca, Myriapoda, Diplopoda

3. different types of insect larvae, and symptoms caused by Coleoptera pests

4. Lepismatidea, Blattoptera, Orthoptera

5. Coleoptera in general: Carabidae, Melolonthidae

6. Elateridae, Tenebrionidae

7. Mordellidae, Coccinellidae, Bituridae, Nitidulidae

8. Silvanidae, Laemopphloidae, Trogositidae, Cryptophagidae,, Anobyidae, Bostrichidae

9. Chrysomelidae I

10. Chrysomelidae II

11. Cerambycidae, Buprestidae, Bruchidae

12. Curculionidae

13. Scolitidae, Attelabidae, Apionidae, Sylphidae

14. Beneficial species: Nematoda, Coleoptera

Literature, handbooks in English

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

2. 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

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

4. Marczali Zs. (2020): Insect Physiology https://dtk.tankonyvtar.hu/handle /123456789/3205

Responsible lecturer: Dr. Antal Nagy (associate professor)

Other lecturer(s): Dr. Szabolcs Szanyi (assistant lecturer)

Terms of course completion:

1. Make symptom and pest recognition (identification) based on processed materials

2. Take an exam at the end of the semester

Form of examination:

writing test

Requirement(s) to get signature:

symptom and pest recognition (identification) based on processed materials

Exam questions:

Equal to the course objectives

**Plant protectional application technology MTMNO7009A**

Title of the subject: Plant protectional application technology MTMNO7009A Credit: 2

Type of the subject: compulsory

Ratio of theory and practice: 33 /66 (credit%)

Type and number of classes per semester: 42 hours per semester (1 h lecture / 2 h practice per week)

Type of exam: exam / practical course mark

Subject in the curriculum: semester 2

Preliminary requirements: -

Summary of content - theory: The knowledge to be acquired is concise, as well as a 14 week breakdown of lectures.

Description of goal:

Students will learn the main types of sprayers and the main structural parts. Students able to use the equipment’s of crop protection. Students able to use the equipment’s of orchard protection.

Course objectives:

1. Main types of the sprayers

2. The flow system of the sprayers

3. Sprayer pumps

4. Field sprayer structures

5. Sprayer Nozzles

6. Orchard sprayers I.

7. Orchard sprayers II.

8. Application Control of the sprayers and it’s Equipment

9. Electronic Control of the sprayers and GPS Guidance system

10. Sprayer aircraft

11. Environmentally friendly pest control methods

12. Plant protection equipment’s

13. Operating of the sprayers

14. Operating of the sprayers

Summary of content - practice: The knowledge to be acquired is concise, as well as a 14 week breakdown of practice.

Description of goal:

Training the skill of plant protection machine and adjusting the plant protection sprayer.

Training the skill of orchard protection machine and adjusting the orchard protection sprayer.

Skills to be learnt:

1. Training the flow system of the sprayers

2. Training the flow system of the sprayers

3. Training the Sprayer pumps

4. Training the Field sprayer structures

5. Training the Sprayer Nozzles

6. Training the Orchard sprayers I.

7. Training the Orchard sprayers II.

8. Training the Application Control of the sprayers and it’s Equipment

9. Training the Electronic Control of the sprayers and GPS Guidance system

10. Field practice

11. Field practice

12. Field practice

13. Operating of the sprayers

14. Operating of the sprayers

Literature, handbooks in English

1. Erich-Christian Oerke, Roland Gerhards, Gunter Menz, Richard A. Sikora: Precision Crop Protection, ISBN-10: 1892769646

2. Csizmazia Zoltán: A növényvédelem gépei, DE MTK

Responsible lecturer: Zoltán Hagymássy associate professor

Other lecturer(s): - Árpád Illés assistant lecturer

Terms of course completion:

Completing exercises

Form of examination:

Written and oral examination

Requirement(s) to get signature:

Attendance at the lecture is recommended, attendance at the exercises is mandatory (4 allowed absences per semester).

**Plant protectional mycology MTMNO7007A**

Name and code of the subject: Plant protection mycology MTMNO7007A

Name and title of the person responsible for the subject: Dr. Gabor Tarcali senior research fellow

Additional instructors involved in teaching the subject: Csüllög Kitti

Name and level of the program: Expert of plant protection, MSc

Subject type: obligatory

Teaching timetable of the subject, type of examination: 2 + 1 C

Credit value of the subject: 3

Purpose of teaching the subject:

The student should be familiar with the system of plant pathogenic fungi. Through their most

important morphological and taxonomic characteristics, the life cycle and biology the student

can develop an integrated approach to plant protection against fungal diseases. Fungi, in a

broader sense, are responsible for 40-65% of plant diseases. The topic is one of the defining

parts of plant protection. In detailed plant pathology (per plant), knowledge of these is essential.

Content of the subject (14 weeks)

Lectures:

1. Introduction to mycology

2. Protozoa

3. Chromista (Oomycota)

4. Chromista (Oomycota), Mycorrhizae

5. Fungi (Chytridiomycota; Zygomycota)

6. Ascomycota

7. Ascomycota

8. Ascomycota

9. Ascomycota

10. Ascomycota

11. Basidiomycota

12. Basidiomycota

13. Basidiomycota

14. Summary

Practices:

1. Introduction to mycology

2. Life cycles and biology of Protozoa

3. Life cycles and biology of Chromista (Oomycota)

4. Life cycles and biology of Chromista (Oomycota), Mycorrhizae

5. Life cycles and biology of Chytridiomycota and Zygomycota fungi

6. Life cycles and biology of Acomycota fungi

7. Life cycles and biology of Acomycota fungi

8. Life cycles and biology of Acomycota fungi

9. Life cycles and biology of Acomycota fungi

10. Life cycles and biology of Acomycota fungi

11. Life cycles and biology of Basidiomycota fungi

12. Life cycles and biology of Basidiomycota fungi

13. Life cycles and biology of Basidiomycota fungi

14. Life cycles and biology of Basidiomycota fungi

Type of mid-term examination:

Participation in lectures and practices.

Regular theoretical and practical preparation with periodic inspections.

Method of assessment (semester examination mark - report, practical grade, colloquium,

examination):

Oral examination at the end of the semester.

Teaching aids: Slide presentations of the knowledge to be submitted and the disease lists are available in advance in PDF files.

Recommended literature:

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

**Poisonous and prickly weeds MTMNO7041A**

Credit: 3

Type of the subject: facultative subject

Ratio of theory and practice: 50 / 50 (credit%)

Type and number of classes per semester: 28 hours per semester (1 h lecture / 1 h practice per week)

Type of exam: exam / practical course mark

Subject in the curriculum: semester 3

Preliminary requirements: Herbology

Summary of content – theory and practice: The knowledge to be acquired is concise, as well as a 14 week breakdown of lectures.

Some common weed species in the wild can all contain substances poisonous to humans or animals. The "Poisonous and prickly weeds" lecture help for identifies potentially dangerous and prikly plants, giving information on their distribution, kind and degree of toxicity, symptoms of their poisoning.

Course objectives:

1. The concept of poisonous and prickly weeds, their importance, and their damage.

2. Habitats of poisonous and prickly weed species, factors influencing their occurrence.

3. Recognizing poisonous weeds in their habitat.

4. Recognition of prickly weeds in their habitat.

5. Recognition of poisonous weed species in the dried state.

6. Recognition of prickly weeds in the dried state.

7. Seedlings identification.

8. Recognition of poisonous plant seeds and fruits.

9. Control against poisonous and prickly weeds I.

10. Control against poisonous and prickly weeds II.

11. Poisons of plant origin, mode of action, symptoms I.

12. Poisons of plant origin, mode of action, symptoms II.

13. Treatment of animal poisoning I.

14. Treatment of animal poisoning II.

Literature, handbooks in English

1. Alden S. Crafts (1975): Modern Weed Control. University of California Press. ISBN 0-520-02733-7

2. Azamal Husen (2013): Exploring Poisonous Plants. Taylor and Francis Ltd.

3. Pammel L. H. (2021): A Manual of Poisonous Plants. Maven Books.

Competencies gained (acc. to the Regulation on training and outcome requirements)

a) Knowledge:

 Knows, integrates, synthesizes and broader cultivation and management, development also places the disciplinary knowledge of plant protection in systems

b) Skills:

 They will be able of integrated weed management against that pose a threat to plants planning and implementation.

c) Attitude:

 Has the necessary knowledge to perform engineering and managerial duties.

 Their work is characterized by high standard.

d) Autonomy and responsibility:

 They can recognize the risks and boundaries of their decisions.

Responsible lecturer: Arnold Szilágyi, assistant lecturer

Other lecturer(s): -

Terms of course completion:

- basic weed, seedling, seed and fruit identification

Form of examination:

Written examination

Requirement(s) to get signature:

Attendance at the lecture is recommended.

Exam questions:

1. List the habitats of prickly and poisonous weeds!

2. Describe the mode of action of different plant poisons!

3. How would you treat animal poisoning?

**Weed biology MTMNO7019A**

Credit: 3

Ratio of theory and practice: 66 /33 (credit%)

Type and number of classes per semester: 42 hours per semester (2 h lecture / 1 h practice per week)

Type of exam: exam / practical course mark

Subject in the curriculum: semester 3

Preliminary requirements: Herbology

**Purpose of teaching the subject:** Acquisition of basic weed control. Description of weeds and weed control technologies of the most important field and horticultural crops.

**Content of the subject (14 weeks):**

1. Weed control of cereals (wheat),
2. Weed control of cereals (barley),
3. Weed control of cereals (rye),
4. Weed control of cereals (rice),
5. Weed control of corn,
6. Weed control of sweetcorn,
7. Weed control of potatoes,
8. Weed control of sunflower,
9. Weed control of Express sunflower,
10. Weed control of Pulsar and Pulsar Plus sunflower,
11. Weed control of tobacco,
12. Weed control of sugar beet,
13. Seedling identifications
14. Seedling identifications

**Type of mid-term examination:**

Successful completion of Seedling identifications

**Method of assessment (semester examination mark - report, practical grade, colloquium, examination):** examination

**Summary of content - practice:** The knowledge to be acquired is concise, as well as a 14 week breakdown of practice.

Description of goal:

Training of plant protection, who are in possession of an appropriate economic approach, they know the cultivation of plants, knows effective ways to control weeds. They know the temporal appearance of weeds and effective and in many cases preventive protection against them.

**Literature, handbooks in English**

1. Alden S. Crafts (1975): Modern Weed Control. University of California Press. ISBN 0-520-02733-7

2. Cobb, A., Reade, J. (2010): Herbicides and Plant Physiology. Wiley Ltd. USA ISBN-13: 978-1-4051-2935-0

3. Steven R. R., Jodie S. H. (1984): Weed Ecology Implications for Vegetation Management. A Wiley-Interscience Publication. USA ISBN 0-471-87674-7

Responsible lecturer: Arnold Szilágyi, assistant lecturer

Terms of course completion: Successful completion of seedling identification

Form of examination: Written and oral examination

Requirement(s) to get signature: Attendance at the lecture is recommended.

**Weed ecology, weed competition MTMNO7032A**

Credit: 3

Type of the subject: optional

Ratio of theory and practice: 100 / 0(credit%)

Type and number of classes per semester: 14 hours per semester (1 h lecture / 0 h practice per week)

Type of exam: exam / practical course mark

Subject in the curriculum: semester 2 , Preliminary requirements: -

**Summary of content - theory:** The knowledge to be acquired is concise, as well as a 14 week breakdown of lectures.

Definition of harms of weeds. Life types of weeds. Reproduction of weeds. Competition among weeds and crops (allelopathy).

Students can know biological founds of weed control, able to pretend spread of weeds.

**Course objectives:**

1. Definition of Weed

2. Weed ecology and biology

3. Plant life forms

4. Plant life forms

5. Weed reproduction (sexual and asexual propagation)

6. Weed competition

7. Allelopathy

8. Allelopathy

9. Allelochemicals as bioherbicides

10. Invasive weed species

11. Economic impacts of invasive weeds

12. Managing invasive species

13. Common invasive plants in Hungary

14. Common invasive plants in Hungary

**Literature, handbooks in English**

1. Alden S. Crafts (1975): Modern Weed Control. University of California Press. ISBN 0-520-02733-7

2. Cobb, A., Reade, J. (2010): Herbicides and Plant Physiology. Wiley Ltd. USA ISBN-13: 978-1-4051-2935-0

3. Steven R. R., Jodie S. H. (1984): Weed Ecology Implications for Vegetation Management. A Wiley-Interscience Publication. USA ISBN 0-471-87674-7

**Responsible lecturer**: Arnold Szilágyi, assistant lecturer

Terms of course completion: Successful completion of invasive weeds identification

Form of examination: Written or oral examination

Requirement(s) to get signature: Attendance at the lecture is recommended.

**Weed management MTMNO7024A**

Name and code of the subject: Weed management (MTMNO7024A)

Name and title of the person responsible for the subject: Arnold Szilágyi, assistant lecturer

Additional instructors involved in teaching the subject: -

Name and level of the program: Plant Protection MSc

Subject type: compulsory

Teaching timetable of the subject, type of examination: 1+2 P: Practical examination

Credit value of the subject: 3

Purpose of teaching the subject: Description of weeds and weed control technologies of the

most important field and horticultural crops.

Content of the subject (14 weeks):

1. Weed control of tobacco

2. Weed control of alfalfa

3. Weed control of root vegetables

4. Weed control of legume (pea, bean, soybean)

5. Weed control of onion

6. Weed control of cucumber, melon (water melon), pumpkin

7. Weed control of tomato, paprika (pepper)

8. Weed control of apple

9. Weed control of pear

10. Weed control of drupes or stone fruits (plum, sour cherry, cherry)

11. Weed control of drupes or stone fruits (appricot, peach)

12. Weed control of grape

13. Weed control of strawberry

14. Weed control of ACC inhibitors

Type of mid-term examination:

Attendance at the lecture is recommended.

Method of assessment (semester examination mark - report, practical grade, colloquium,

examination):

Practical examination

Teaching aids:

1. Alden S. Crafts (1975): Modern Weed Control. University of California Press. ISBN 0-520-

02733-7

2. Cobb, A., Reade, J. (2010): Herbicides and Plant Physiology. Wiley Ltd. USA ISBN-13: 978-

1-4051-2935-0

3. Steven R. R., Jodie S. H. (1984): Weed Ecology Implications for Vegetation Management. A

Wiley-Interscience Publication. USA ISBN 0-471-87674-7

# **Internship**

Students have to carry out a 4-week internship involved in the model curriculum. The internship course must be signed up for previously via the NEPTUN study registration system in the fall semester (3rd semester). Its execution is the criteria requirement of getting the pre-degree certificate (absolutorium).

# **Work and Fire Safety Course**

According to the Rules and Regulations of University of Debrecen a student has to complete the online course for work and fire safety. Registration for the course and completion are necessary for graduation. For MSc students the course is only necessary only if BSc diploma has been awarded outside of the University of Debrecen.

Registration in the Neptun system by the subject: MUNKAVEDELEM

Students have to read an online material until the end to get the signature on Neptun for the completion of the course. The link of the online course is available on webpage of the Faculty.

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

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

Thesis topics are announced by the departments for the students in each semester. A thesis topic can be suggested by the student as well and the head of department shall decide on its acceptance.

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

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

# **Final examination (Final Exam)**

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

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

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

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

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

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

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

*Improving failed final exam*

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

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

*Final exam board*

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

# **DIPLOMA**

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

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

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

Calculation of a diploma grade according to this formula:

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

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

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

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

Excellent 4,51 – 4,80

Good 3,51 – 4,50

Satisfactory 2,51 – 3,50

Pass 2,00 – 2,50

Award with Honour

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

**MODEL CURRICULUM OF PLANT PROTECTION MSC**

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

(https://mek.unideb.hu/en/plant-protection).

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Head of the program: Dr. habil. László Radócz PhD** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **1st September, 2023** |
| **Code** | **Subjects** | **1st Semester** | **2nd Semester**  | **3rd Semester**  | **4th Semester** |  |
| 14 wks | 14 wks | 14 wks | 14 wks | **Head of Subject** |
| lecture | practice | evaluation | credit | lecture | practice | evaluation | credit | lecture | practice | evaluation | credit | lecture | practice | evaluation | credit |   |
|   | **Applied Natural Sciences** | hrs/week (lecture, practice, evaluation form, credits) |   |
| MTMNO7001A | Chemistry of plant protection | 3 | 1 | P | 3 |  |  |  |   |  |  |  |   |  |  |  |   | Mrs. Andrea Balla-Kovács PhD |
| MTMNO7002A | Environmental protection and ecotoxicology | 1 | 1 | E | 3 |   |   |   |   |   |   |   |   |   |   |   |   | Antal Nagy PhD |
| MTMNO7003A | Crop production | 2 | 1 | E | 3 |   |   |   |   |   |   |   |   |   |   |   |   | József Csajbók PhD |
| MTMNO7004A | General plant pathology and diagnostics | 3 | 3 | E | 3 |   |   |   |   |   |   |   |   |   |   |   |   | Gábor Tarcali, PhD |
| MTMNO7005A | Plant protection zoology and ecology | 4 | 2 | E | 3 |   |   |   |   |   |   |   |   |   |   |   |   | Antal Nagy PhD |
| MTMNO7006A | Herbology | 3 | 2 | P | 3 |   |   |   |   |   |   |   |   |   |   |   |   | Arnold Szilágyi  |
| MTMNO7012A | Molecular biology | 1 | 1 | P | 3 |   |   |   |   |   |   |   |   |   |   |   |   | Károly Pál PhD  |
| MTMNO7007A | Plant protectional mycology |   |   |   |   | 2 | 1 | E | 3 |   |   |   |   |   |   |   |   | Gábor Tarcali PhD |
| MTMNO7008A | Plant protection entomology I. |   |   |   |   | 2 | 1 | E | 3 |   |   |   |   |   |   |   |   | Antal Nagy PhD |
| MTMNO7009A | Plant protectional application technology |   |   |   |   | 1 | 2 | P | 3 |   |   |   |   |   |   |   |   | Zoltán Hagymássy PhD |
| MTMNO7010A | Horticulture |   |   |   |   | 2 | 1 | P | 3 |   |   |   |   |   |   |   |   | Mrs. Mária Takács-Hájos PhD |
| MTMNO7039A | Biological plant protection and biotechnology I. |   |   |   |   | 2 | 0 | P | 3 |   |   |   |   |  |  |  |  | László Radócz PhD |
| MTMNO7040A | Biological plant protection and biotechnology II. |   |   |   |   |   |   |   |   | 2 | 0 | P | 3 |   |   |   |   | Antal Nagy /Gábor Tarcali PhD |
| MTMNO7038A | Precision plant protection and nutrient replenishment |   |   |   |   |   |   |   |   |  |  |  |  | 1 | 2 | P | 3 | László Hadászi |
| MTMNO7014A | Applied plant biology, biotechnology and resistance  |   |   |   |   |   |   |   |   | 1 | 1 | E | 3 |   |   |   |   | Prof. Miklós Fári DSc |
| MTMNO7015A | Forecasting and integrated pest management |   |   |   |   |   |   |   |   | 3 | 2 | E | 3 |   |   |   |   | László Radócz PhD |
| MTMNO7016A | Plant protection law and administration, food safety |   |   |   |   |   |   |   |   |   |   |   |   | 3 | 0 | E | 3 | Gábor Tarcali PhD |
|   | **Sum total for Applied Natural Sciences:** | 17 | 11 |   | 21 | 9 | 5 |   | 15 | 6 | 3 |   | 9 | 4 | 2 |   | 6 |   |
|   | **Obligatory special plant protection subjects** |   |   |
| MTMNO7017A | Outlines of plant pathology I.  |   |   |   |   |   |   |   |   | 2 | 1 | E | 3 |   |   |   |   | Gábor Tarcali PhD |
| MTMNO7018A | Plant protection entomology II. |   |   |   |   |   |   |   |   | 2 | 1 | E | 3 |   |   |   |   | Antal Nagy PhD |
| MTMNO7019A | Weed biology |   |   |   |   |   |   |   |   | 2 | 1 | P | 3 |   |   |   |   | Arnold Szilágyi  |
| MTMNO7021A | Human hygiene and first aids |   |   |   |   | 1 | 1 | P | 3 |   |   |   |   |   |   |   |   | József Legoza Dr med.univ. |
| MTMNO7022A | Outlines of plant pathology II.  |   |   |   |   |   |   |   |   |   |   |   |   | 2 | 2 | E | 3 | Gábor Tarcali, PhD |
| MTMNO7023A | Plant protection entomology III. |   |   |   |   |   |   |   |   |   |   |   |   | 2 | 2 | E | 3 | Antal Nagy PhD |
| MTMNO7024A | Weed management |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 2 | P | 3 | Arnold Szilágyi |
| MTMNO7025A | Integrated pest management, IPM |   |   |   |   |   |   |   |   |   |   |   |   | 3 | 2 | E | 3 | László Radócz PhD |
|   | **Sum total for Obligatory special plant protection subjects:** |   |   |   |   |   | 2 |   | 3 | 6 | 3 |   | 9 | 8 | 8 |   | 12 |   |
|  | **Optional subjects** | **(Select minimum 12 credits)** |   |
| MTMNO7026A | Planning and evaluating of plant protection trials | 1 | 0 | P | 3 |   |   |   |   |   |   |   |   |   |   |   |   | Antal Nagy PhD |
| MTMNO7029A | Collection and preparation of insects and plants  | 0 | 2 | P | 3 |   |   |   |   |   |   |   |   |   |   |   |   | Antal Nagy PhD |
| MTMNO7028A | Mycology and fungal toxicology I. |   |   |   |   | 4 | 1 | P | 5 |   |   |   |   |   |   |   |   | László Radócz PhD |
| MTMNO7032A | Weed ecology, weed competition |   |   |   |   | 1 | 0 | P | 3 |   |   |   |   |   |   |   |   | Arnold Szzilágyi |
| MTMNO7033A | Plant protection in greenhouses |   |   |   |   | 1 | 1 | P | 3 |   |   |   |   |   |   |   |   | Gábor Tarcali PhD |
| MTMNO7030A | Mycology and fungal toxicology II. |   |   |   |   |   |   |   |   | 2 | 3 | P | 5 |   |   |   |   | László Radócz PhD |
| MTMNO7034A | PCR in microbiology |   |   |   |   |   |   |   |   |   |   |   |   | 1 | 1 | P | 3 | Károly Pál PhD |
| MTMNO7041A | Poisonous and prickly weeds (project work) |   |   |   |   |   |   |   |   | 1 | 1 | P | 3 |   |   |   |   | Arnold Szilágyi |
| MTMNO7011A | Alternative plant production and rural development |   |   |   |   | 3 | 0 | E | 3 |   |   |   |   |   |   |   |   | Prof. Attila Bai PhD |
| MTMNO7013A | Informatics and agricultural extension |   |   |   |   | 1 | 2 | E | 3 |   |   |   |   |   |   |   |   | Péter Lengyel PhD |
|   | **Thesis preparation** |  |   |
| MTMNO7D1A | Thesis project work I. |   |   |   |   | 0 | 2 | P | 5 |   |   |   |   |   |  |  |   | Supervisor |
| MTMNO7D2A | Thesis project work II. |   |   |   |   |   |   |   |   | 0 | 2 | P | 10 |   |  |  |   | Supervisor |
| MTMNO7D3A | Thesis project work III. |   |   |   |   |   |   |   |   |   |   |   |   | 0 | 2 | P | 15 | Supervisor |
| MTMNO7GYA | ***Summer practice***  |   |   |   |   | 0 | 160 | P | 3 |   |   |   |   |   |   |   |   | László Radócz PhD |
| SI-001A | Physical education |   |   |   |   | 0 | 2 | A | 0 |   |   |   |   |   |   |   |   |   |
|   | Total number of credits for compulsory subjects | 21 | 18 | 18 | 18 | **75** |
|   | Total number of credits for optional subjects | 3 | 3 | 3 | 3 | **12** |
|   | Summer practice credits (4 weeks) |   | 3 |   |   | **3** |
|   | Thesis credits |   | 5 | 10 | 15 | **30** |
|   | Total credits: | 24 | 29 | 31 | 36 | **120** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Summer practice: 2 weeks international agricultural extension course (MTMNO7GYA) and 2 weeks of field visits  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | E = Oral examination |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | E = Written examination |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | P = Practical examination |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | A = Acceptance |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |