



MAGYAR AGRÁR- ÉS
ÉLETTUDOMÁNYI EGYETEM
KERTÉSZETTUDOMÁNYI INTÉZET

INSTITUTE OF HORTICULTURAL SCIENCES

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Code: KERTU029N

Medicinal plants and spices

Number of hours per semester (lecture+practical unit): 28+28

Duration of field practice: 3+1

Credits: 4

Semester (fall/spring): *spring*

Department: *Department of Medicinal and Aromatic Plants*

Course leader: *Dr. Zsuzsanna Pluhár*

Course description:

The main purpose of the course is to introduce the students into the general aspects of the medicinal plant production systems and to provide specific knowledge in the fields of wild-growing and exotic medicinal plants and spices. Beside the theoretical knowledge, practical skills are also demonstrated. The most important medicinal plant species, their drugs, active substances and application areas (phytotherapy, healing cosmetics, dietary supplements) are included as subjects of the lectures and practical parts of the course. Concerning the production systems of medicinal plants, students will get acquainted with general aspects of collection from wild habitats, cultivation, primary processing procedures, trade, quality control and quality assurance systems (GAP, GMP, etc).

Assessment / grading: *oral exam*

Biometrics (MATER011N)

General information

During the semester, students receive training in basic statistical methods, knowledge of which is essential in their agricultural studies. Students gain theoretical and practical skills to design and evaluate experiments in horticultural science. Free and open access R statistical software (RGui surface) and its complementary R package called Commander are used during the semester. Statistical methods are discussed with several applications in biometrics in a practical and interactive way. Seminars are organized in a computer laboratory.

Number of hours per semester: 13+39 (1 lecture + 3 practicals per week)

Level: basic

Credits: 3

Semester: spring

Language: English

Prerequisite: Basic mathematics and informatics

Course type: mandatory for BSc in Horticulture

Department: Dpt. of Applied Statistics, Inst. of Math. and Basic Science

Course leader: Dr. Ladányi, Márta PhD, associate professor, head of department (ladanyi.marta@uni-mate.hu); Course lecturers: Fejes Tóth, Peter (fejes.toth.peter@uni-mate.hu)

The aim of the course: The aim of the course is to provide you a concise introduction to basic statistical methods performed in RCommander which makes you able to use your knowledge in preparing your experimental thesis work.

Discussed topics: Basic concepts of statistics (statistical sampling, independence, descriptive statistics, frequency etc.); Estimations (point and interval estimations of parameters of normal distributions); Hypothesis testing (null hypothesis against alternative hypothesis, type I and type II error, statistical tests, confidence level, critical range, critical value, test power, test function and decision); Non-parametric tests of distributions: Chi-square tests of homogeneity, goodness-of-fit and independency; Parametric hypothesis tests for variances (Chi-square, Fisher's, Bartlett's tests, requirements, evaluation and interpretation); Parametric hypothesis tests for expectation (Student's, Welch's, requirements, evaluation, interpretation); One-way and two-way ANOVA models and their applications; Correlation and regression analysis, linear, linear and non-linear models, regression diagnostics

Outcomes: After having completed the course, students will be able to manage and evaluate simple experimental observations, moreover, to report the results in a suitable manner. They can apply their skills in creating their thesis as they learn how to present and reason their findings and conclusions professionally.

Requirements, evaluation and grading: To get a signature, active participation is needed on the classes with maximum 3 absents. Grades are given upon a student project report submitted at the end of the semester. The detailed requirements of the final project work will be available for the registered students in e-learning system.

Required and recommended readings: Handouts, lecture notes are regularly uploaded to the course e-learning site that is available for the registered students.

Introductory R (MATER053N)

General information

In a computer-based environment, students will learn the basics of the R statistical language and the practical usage of RStudio. The course is interactive, practice-oriented, the life science applications are derived from real research projects. Seminars are organized in a computer laboratory.

Number of hours per semester: 13+26 (1 lecture + 2 practicals per week)

Level: basic

Credits: 3

Semester: fall

Language: English

Prerequisites: no

For students with limited or no programming background. E-learning system is used for participant feedback and checking comprehension.

Course type: mandatory for emPlant students/optional for others, suggested for MSc in Horticulture, MSc in Agricultural Biotechnology, MSc in Viticulture students

Department: Dpt. of Applied Statistics, Inst. of Math. and Basic Science

Course leader: Dr. Ladányi, Márta PhD, associate professor, head of department

ladanyi.marta@uni-mate.hu

The aim of the course: This course is a general introduction to RStudio with emphasis on tools used for data analysis. R has become the lingua franca in data analysis. However, R itself is a programming language and the learning curve can be steep. This course aims to help students with their very first steps with R. Further courses are based on this: Experimental design and evaluation (MATER025N); Data analysis and visualization in R (MATER051N)

Discussed topics: R data types, data management, data cleaning, sub-setting, data import, selection, filtering, outlier detection, use of software packages, interpretation, modification, use of script files, management and interpretation of outputs, use of R functions, use of R cycles, RMarkdown, simple R visualization techniques, use of stack overflow, other basic functions.

Outcomes: Upon successful completion of the course, students will be a basic level user of R. They can read and write data, handle, modify and clean them and prepare them for further statistical analysis. As a main point, they will be able to report their results in a nice and clean way using RMarkdown. The course prepares the students for the upcoming middle and higher levels statistical courses.

Requirements, evaluation and grading: To get a signature, active participation is needed on the classes with maximum 2 absents. Grades are given upon submitted weekly homework and individual final project work. The detailed requirements of the final project work will be available for the registered students in e-learning system.

Required and recommended readings: Handouts, lecture notes are regularly uploaded to the course e-learning cite that is available for the registered students.

Paul Teetor (2011) R Cookbook. O'Reilly Media, Inc. USA. ISBN: 978-0-596-80915-7

Edwin de Jonge and Mark van der Loo (2013) An introduction to data cleaning with R. Statistics Netherlands. ISSN 1572-0314

Experimental design and evaluation (MATER025N)

General information

In a computer-based environment, based on real research issues, students learn experimental design, data management and evaluation methods that directly support the analysis required for their experiment-based thesis work and or literature review. We pay special attention to the correct documentation of the methods and results required for scientific reports and publications. Seminars are organized in a computer laboratory.

Number of hours per semester: 13+39 (1 lecture + 3 practicals per week)

Level: intermediate

Credits: 3

Semester: spring

Language: English

Prerequisite: knowledge of basic statistical methods (estimation, hypothesis testing (t, F, ANOVA, cross-tabulation, linear regression) as well as basic R knowledge are not necessary but welcome.

Course type: mandatory for emPlant, MSc in Horticulture and MSc in Agricultural Biotechnology students/optional for others, suggested for MSc in Viticulture students

Department: Dpt. of Applied Statistics, Inst. of Math. and Basic Science

Course leader: Dr. Ladányi, Márta PhD, associate professor, head of department

ladanyi.marta@uni-mate.hu

The aim of the course: Some statistical methods will be introduced in a practical form with their applications in life sciences. We discuss many real-life examples with the aim of developing students' knowledge of scientific research methodology, analysis and communication. Special attention is focused to the correct documentation of the methods and results required for diploma theses and publications, as well as to the understanding of the methodological sections of scientific literature.

Discussed topics: data management (data cleaning methods, handling of outstanding, missing data, methods used in case of violation of normality and standard deviation homogeneity, data transformation); basics and pitfalls of experimental design (first and second type error, strength of the test, correct determination of the sample number); advanced univariate and multivariate ANOVA models; multivariate regression models with a collinearity problem; nonlinear regression models, data reduction and compression methods (PCA) and grouping (clustering) for similarity analysis; comparison of models; comparison of ratios; evaluation, documentation, communication and presentation of the results of the methods.

Outcomes: Upon successful completion of the course, students will be able to formulate master's level scientific questions in the language of statistics, set up basic experiments in a way suitable for statistical analysis, select the appropriate method for analysis, professionally evaluate and document data using statistical software. The practicals are based on real data from previous (already published) research of the gesturing institutes of the specializations, so the professional specificity of the course can be a special motivation for the students and also provide them with guidance in the field of professional counselling. Our pronounced goal is percept talented students and invite them to doctoral studies.

Requirements, evaluation and grading: To get a signature, active participation is needed on the classes with maximum 2 absents. Grades are given upon submitted weekly homework and individual final project work. The detailed requirements of the final project work will be available for the registered students in e-learning system.

Required and recommended readings: Handouts, lecture notes are regularly uploaded to the course e-learning cite that is available for the registered students.

Andy Field, Jeremy Miles, Zoë Field (2012): Discovering statistics using R. SAGE Publications. ISBN 978-1-4462-0045-2, ISBN 978-1-4462-0046-9Rice W virtual Lab in Statistics:
<http://onlinestatbook.com/rvls.html>

Data analysis and visualization in R (MATER051N)

General information

In our rapid improving digital world, we face tons of data to analyse. One of the fastest and most convincing way to data perception is data visualization. R is one of the most rapidly growing tools in the fields of data science and statistics that provides all necessary tools for visualization. This course provides you a concise introduction to publication-ready visualization techniques in R, using ggplot2. Seminars are organized in a computer laboratory.

Number of hours per semester: 13+26 (1 lecture + 2 practicals per week)

Level: advanced

Credits: 3

Semester: spring

Language: English

Prerequisite: It is not an introduction course to R, so knowledge of basic statistical methods (estimation, hypothesis testing (t, F, ANOVA, cross-tabulation, linear regression) as well as basic R knowledge are essential.

Course type: mandatory for emPlant, students/optional for others, suggested for MSc in Horticulture, MSc in Agricultural Biotechnology, MSc in Viticulture students

Department: Dpt. of Applied Statistics, Inst. of Math. and Basic Science

Course leader: Dr. Ladányi, Márta PhD, associate professor, head of department

ladanyi.marta@uni-mate.hu

The aim of the course: The aim of the course is to give you quick and proper practical introduction for creating publication-ready statistical plots using R (ggplot2) in order to be able to show as much information of your data as possible.

Discussed topics: grammar of graphics (ggplot2), exploring two or more variables, distribution plots, combining ggplot2 with RMarkdown, comparison plots, weather plots, multivariate plots, weather plots, correlation visualization, regression plots, smoothing, heat map, response surface method with plots, PCA with biplots, population genetic (AMOVA), cluster plots, customizing the plots themes and settings, sub-plotting, faceting etc.

Outcomes: Upon successful completion of the course, students will be able to create nice and publication-ready plots visualising their data and statistical analysis results.

Requirements, evaluation and grading: To get a signature, active participation is needed on the classes with maximum 2 absents. Grades are given upon submitted weekly homework.

Required and recommended readings: Handouts, lecture notes are regularly uploaded to the course e-learning cite that is available for the registered students.

Donato Teutonico (2015) ggplot2 Essentials. Packt Publishing ISBN 978-1-78528-352-9

Biological and Phytotechnical Resources of Viticulture

SZBOR004N

Aim of the course is to analyze the possibilities of quality enhancement, sustainability and production development in different vineyards and farms through Hungarian and international examples. Special notice is given to the possibilities of automation and modernization. The theory and practice concerning quality, and its assurance during production development in viticulture is also discussed. Demand for quality wine is increasing, while consumption of bulk wine is significantly decreasing. High

quality fruit is the alpha of quality wine production. To achieve proper fruit quality, well designed and physiologically grounded phytotechnical management (pruning and canopy management) has to be carried out. The course handles essential knowledge of the background and recent trends of the grape and wine sectors and practical viticulture based on solid knowledge of grapevine biology.

Tantárgy magyar neve: Díszkertészeti növényalkalmazás

Ornamental Plant Application

Tantárgy NEPTUN kódja: TETTD028N

Tantárgyfelelős neve: Tillyné dr. Mándy Andrea Edit

Félév: őszi

Leírás: Within the framework of the course students learn the basic knowledge of outdoor and indoor plant application. They get to know the fundamentals of plant association, and with the concept of garden as artificial plant association. They learn about the possibilities of establishment and sustainability of plant arrangements, and the traditional and innovative methods of tree valuation. They get to know the specialities of establishment and plant use in garden types for special application. They will have some information about the climatic capability of indoor surfaces as places for plants, the design principles and the tolerance of foliage pot plants used for indoor decoration.

Tantárgy magyar neve: Dísznövények szaporításbiológiája

Propagation Biology of Ornamental Plants

Tantárgy NEPTUN kódja: TETTD029N

Tantárgyfelelős neve: Dr. Szabó Veronika

Félév: őszi

Leírás: The course provides general training in key areas of propagation of ornamental plants. Main topics: seed biology, germination, vegetative propagation, adventitious root formations, rooting of cuttings, modified stems, grafting.

Tantárgy magyar neve: Faiskolai termesztés

Woody Plant Nursery

Tantárgy NEPTUN kódja: TETTD043N

Tantárgyfelelős neve: Dr. Szabó Veronika

Félév: őszi

Leírás: Introduction to propagation and raising of trees and shrubs. Stockplant management, virus-free nuclear stock of fruit trees and vinegrape. Seed orchard and seedling production. Technology of rooting of cuttings, layering, stoolbed management. Budding and grafting methods, raising of grafts.

Rootstocks. Container growing systems. Tree production. Bush rose and shrub production. Conifer production. Fruit tree and soft fruit planting material. Lifting and storing of hardy nursery stock.

Tantárgy magyar neve: Modern dísznövénytermesztés

Modern Systems in Floriculture

Tantárgy NEPTUN kódja: TETTD079N

Tantárgyfelelős neve: Dr. Honfi Péter

Félév: tavasz

Leírás: Students get global knowledge about the greenhouse and open ground ornamental plant production. They meet with the basis of plant growth regulation, the possibilities of growth regulation of ornamental plants and the timing methods. They meet with the main trends of ornamental breeding, the specialities of postharvest and trade. The subject negotiates the Hungarian, regional and European trends, changes and possibilities.

Tantárgy magyar neve: Növényházi dísznövénytermesztés

Cultivation of Greenhouse Ornamentals

Tantárgy NEPTUN kódja: 3DD02NAK02B (2022. őszén utoljára ezen a kódon)

Tantárgyfelelős neve: Dr. Honfi Péter

Félév: ősz

Leírás: The subject provides general training on the most important areas of ornamentals growing in a greenhouse. Provides general knowledge on growing media, nutrient supply, growth regulators, and timing of cultivation. It details the cultivation technology of the most important greenhouse ornamental plants.

Tantárgy magyar neve: Szabadföldi dísznövénytermesztés

Outdoor Cultivation of Ornamental Plants

Tantárgy NEPTUN kódja: TETTD102N

Tantárgyfelelős neve: Sütöriné dr. Diószegi Magdolna

Félév: tavasz

Leírás The aim of course is to provide knowledge about morphological and physiological specialities, ecological requirements and growing of open ground woody ornamentals and perennials.

Tantárgy magyar neve: Virágágyi és balkonnövények

Bedding and Balcony Plants

Tantárgy NEPTUN kódja: TETTD241N

Tantárgyfelelős neve: Tillyné dr. Mándy Andrea Edit

Félév: őszi

Leírás: During the course students will be introduced to the climatic features of public gardens, balconies and terraces and the resulting plant application specialties. They learn the basics of design, the most important basics of flower beds and outdoor plant decoration. They form an understanding of the tolerance of flowerbeds and balconies, and the potential applications of each species and variety. They individually evaluate and critically analyse a self chosen public flowerbed as a custom design task.

Organic Farming FFGAZ136N (BA and MA)

Organic farming is a sustainable farming method that is controlled and certified from farm to fork.

During the semester students get information about the principles, regulation and certification of organic farming. They will get knowledge about transition a conventional farm to an organic one. Get skills about practice methods of farming, like sustainable soil management, organic plant protection.

Mixed cropping in Organic Farming 3OG55NCS52B (BA and MA)

Plant companion or mixed cropping is an old-new technology in sustainable farming systems. Different species and varieties associated with each other could have positive effect on yield, plant health, water management. During the semester students get information and examples about possible interactions by cultivated plants.

Organic seed production 3OG55NAK80M (BA and MA)

Organic farming requires the use of propagation materials origin from organic farming system. During the semester students get information about the regulation of organic seed, necessary seed quality parameters, about seed processing and seed treatment methods. Organic seed production technology will be presented by vegetable, field crop species.

Code: KERTU060N

Name: *Up-to-date technologies of medicinal plant production MSc course*

Number of hours per semester (lecture+practical unit): 28+28

Credits: 4

Semester (fall/spring): *spring*

Department: *Department of Medicinal and Aromatic Plants*

Course leader: *Dr. Zsuzsanna Pluhár*

Course description:

Biological bases of medicinal plant production, effective forms of small and large scale production are demonstrated. Intensive and extensive growing systems as well as climatic and soil conditions, agroecological potential of growing sites, influencing medicinal crop production are also part of the teaching program. Propagation and other elements of growing technologies specified for medicinal plant production, new fertilizers, growth regulators and pesticides licensed for medicinal plant cultures are also presented. Modern harvesting technologies and post harvest treatments, quality assurance and standards of medicinal plant production are included as well. Based on the lectures, own experiences and literature review, the students prepare a homework on certain technology elements (cultivation, processing, etc.) of a medicinal plant or a growing area of their home countries. The homework is to be submitted in electronic form and presented at the end of the semester.

Assessment / grading: *written exam, project presentation*

Tantárgy neve: **Gyümölcsfajta-értékelés / Evaluation of fruit cultivars**

Neptun kód: BUD-EN-N-3MNHORT-LE00

The course covers the temperate zone fruit species and cultivars of commercial orchards. An introduction to the methodology of cultivar evaluation. Topics include the various gene sources, trends, and most new results of the international and Hungarian breeding work. Students learn about the biological and technological basis of mixing cultivars for proper cross-pollination. They get a picture about the currently dominant fruit cultivars, and about the possibilities of renewing the cultivar assortment.

Keywords: pomology, fruit breeding, cross-pollination, consumers preferences, processing cultivars

Title	Plant Biochemistry and Plant Physiology		
Code	NOVTR072N		
Prerequisites			
Description	The course aims at explaining properties and roles of life processes in plants at the cellular and whole plant levels. Main areas studied are: proteins and enzymes, roles of the organelles, photosynthesis, biological oxidation, plant lipids, N and S assimilation, water relations of plants, mineral nutrition, phloem transport, plant hormones, flowering, fruit- and seed physiology. The course provides laboratory practice where protein and enzyme properties are studied, centrifugation, spectroscopy, micropropagation are performed, analysis of plant pigments is done, photosynthesis and osmotic potential measurements, viability studies and other experiments about seeds are also included.		
Lecturer	Dr. István Papp DSc, Kissné Dr. Erzsébet Bába PhD, Dr. Anita Szegő PhD, Dr. Iman Mirmazloum PhD		
Semester	Spring	Contact hours/week	3+2
Level	BSc	ECTS	4

Title	Plant Physiology and Molecular Biology		
Code	NOVTR067N		
Prerequisites	BSc level Plant Biochemistry and Plant Physiology		
Description	The interactions of plant and its abiotic environment are highlighted by treating the following subject areas: General overview of interactions between plants and their abiotic environment. Water and mineral nutrient transport in the changing environment. Sensing of internal and external signals, transduction pathways and networks, role of plant hormones. Non-photosynthetic effects of light, consequences of extreme temperature and salt exposure. Levels and types of adjustments to external conditions, tolerance strategies. Molecular background and regulation of circadian and photoperiodic rhythms. Description of processes leading to flowering, seed and fruit development in the molecular level in the light of external and internal regulators.		
Lecturer	Dr. István Papp DSc, Kissné Dr. Erzsébet Bába PhD, Dr. Anita Szegő PhD, Dr. Iman Mirmazloum PhD		
Semester	Fall	Contact hours/week	2+1
Level	MSc	ECTS	3

Neptun kód: 3RT07NAK01B

Kurzuskód: BUD-EN-N=KERTM=LE00

Leírás:

Students will learn about the most important arthropod pests of horticultural crops and their damage in Hungary. During the seminars, they can acquire the ability to diagnose some pests. During the lectures, they will acquire basic knowledge of entomology and become acquainted with the principles of integrated pest management. They can learn about plant protection options against major pests in several horticultural crops, including grapevine, fruit, vegetable and ornamental plants.

Fruit species and varieties (Pomology) BSc

3GY15NAK04B (új kód: KERTU040L)

The aim of the course is to learn about the most important temperate zone fruit species and varieties of them. We deal with the main characteristics of the variety use around the world and Europe, and learn about the morphological, growing, biological characteristics, the conditions of production, pomological characteristics, usage, commercial value of fruits. The students learn the practical use of the knowledge. With the completion of the course the students know the traits and features of the most important temperate zone fruit varieties, with these competences they will be able to plan the fruit production in practice.

Modern Fruit growing based on physiology MSc

KERTU061N

The aim of course is to acquisition of applied plant physiological knowledge from the point of view of fruit growing. To get acquainted with the modern growing systems and cultivation technological elements of environmentally friendly and economical fruit production. Students acquire the theoretical foundations that justify each cultivation intervention. They are able to modernize and develop technological processes in the fruit growing and related sectors. The knowledge is in a complex way related to the physiological, biochemical and technical curriculum. The course deals with the details of the orchard planning process, the characteristics of the growing systems, the cultivation technology operations, and the situation and development possibilities of the cultivation of temperate fruit species. The study of methods of precision farming in fruit production promises to be an exciting and forward-looking topic. Upon successful completion of the course, students will have the most important knowledge needed to plan and operate orchards. They are able to plan and manage the phytotechnical and agrotechnical operations, plant protection and harvesting of each species. Spring semester

Integrált növényvédelem, herbológia Integrated/Pest Management, Herbology (NVVED020N):

The task of the education of integrated pest management is to show the harmonized system of protection against the most important pests of horticultural plants, to present the risk of the applicable methods and to shed light on the plant protection procedures to be introduced in the near future. A further aim of the subject is to present the legal regulations of Hungarian plant protection, as this knowledge is essential for horticultural engineers to perform everyday tasks.

Növénykórtani alapismeretek/Principles of Plant Pathology (NVVED29N)

In this course, students will learn about the the pathogens groups that infect crops, their taxonomy, characteristics and properties. They will learn about the symptoms caused by pathogens, their biology, the favourable conditions leading to infection and the basics of epidemiology. The agrotechnical, biological and chemical possibilities available to prevent and control pathogens are also detailed.

Növénykórtan/Plant Pathology (NVVED028N)

The course presents diseases of horticultural plants. It deals with the causes of diseases, the course of diseases and the methods of disease control. The aims of the course is to provide students with a practical knowledge of the major diseases of horticultural plants. Students will learn to identify and recognize diseases of horticultural plants based on the knowledge gained during the lectures and laboratory practices.

Plant Virology (INTKT NK001):

The aim of the course is to give students a detailed overview about the present knowledge of traditional and molecular aspects of plant virology. Learn about the history of plant virology, the discovery of viruses, the structure of virus particles, the principles of genome organization, the replication of the viral genome, and the movement of plant viruses. Get to know with the most important plant viruses, symptoms they cause, and the methods for detecting and for control plant viruses.

Production of medicinal and aromatic plants

B-BUD-N-EN-KERTM

In the frame of the course « Medicinal plant production » the integrated, sustainable technologies and special characteristics of the sector are demonstrated. Student would get know the appr. 30 medicinal, spice and essential oil plants showing economic significance. Biological, phytochemical properties of the species, their utilisation, ecological requirements are presented. Based on these, the technological steps of the drug production are presented like cultivar use, plantation establishment, maintenance, harvest and primary processing in a GAP aspect.

Biologically active substances in horticultural crops

M-BUD-N-EN-KERTM

In the course the most important biogenetic groups of secondary metabolites are discussed which accumulate in horticultural crops. Their role in the plant life, their biosynthesis, chemical features, human physiological effects, possible utilisation areas are presented. Beside theoretical lectures, lab practices are delivered as block course. The requirements include a project work during the semester.