REPUBLIC OF TÜRKİYE

ERCİYES UNIVERSITY

GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

COURSE SYLLABUS

COURSE INSTRUCTOR

Title, Name and Surname	Prof. Dr. Kahraman GÜRCAN
E-mail	kgurcan@erciyes.edu.tr
Office Hours and Venue	Erciyes University, Faculty of Agriculture, Department of Agricultural Biotechnology / Genome and Stem Cell Center. Office meetings are available by appointment.

COURSE INFORMATION

Department	Agricultural Sciences and Technologies
Program	Agricultural Sciences and Technologies (MSc, English)
Academic Year	2026-2027
Semester	Fall
Course Code	AGS 595
Course Title	DNA and RNA Techniques
Course Type	Elective
Local Credit	3.00 (Theoretical: 3, Practical: 0)
ECTS Credit	7.50
Instruction Mode	Face to face
Course Location	Faculty of Agriculture Classrooms
Course Schedule	At the times indicated in the weekly class schedule
Prerequisites	None
Online Platform	Zoom / Google Meet when required
Feedback	Via e-mail and face-to-face meetings during office hours
Course Content	Fundamental molecular events involving DNA and RNA; manual and kit-based DNA/RNA isolation and quality control; RNA handling and RNase-free working principles; PCR, reverse-transcription PCR and real-time PCR; cDNA synthesis and gene-expression analysis; genomic DNA and cDNA libraries; Sanger sequencing and next-generation sequencing platforms; RNA-seq and transcriptome profiling; whole-genome sequencing, genotyping-by-sequencing (GBS), reference mapping and basic sequence-variation analysis.
Course Objectives	The objective of this course is to provide students with a conceptual and methodological understanding of fundamental and current molecular techniques used in DNA and RNA research. Students are expected to select appropriate isolation, amplification, gene-expression and sequencing approaches; understand the critical steps and limitations of laboratory protocols; and evaluate molecular data according to the biological question and experimental design.

LEARNING OUTCOMES

LO1	Explains the principles of common manual DNA and RNA isolation methods and selects an appropriate method for different biological materials.
LO2	Evaluates the working principles of commercial DNA and RNA isolation kits and compares them with conventional extraction methods.
LO3	Applies the principles of RNase-free working conditions and evaluates RNA concentration, purity and integrity.
LO4	Explains the principles, applications and experimental design of PCR, reverse-transcription PCR and real-time PCR.
LO5	Explains cDNA synthesis and the construction and screening of genomic DNA and cDNA libraries.
LO6	Explains the main steps of Sanger sequencing and evaluates the quality and interpretation of sequence data.
LO7	Compares the fundamental principles of major next-generation sequencing platforms and justifies platform selection according to the research objective.
LO8	Explains the basis of transcriptome profiling and gene-expression analysis using RNA-seq and related sequencing approaches.
LO9	Evaluates the basic workflows and applications of whole-genome sequencing, GBS, reference mapping and sequence-variation analysis.
LO10	Critically evaluates current scientific studies using DNA and RNA molecular techniques in terms of method selection, experimental design, data quality and biological interpretation.

LEARNING OUTCOMES – PROGRAM OUTCOMES MAPPING MATRIX

(Contribution Level: 1 = Low, 2 = Medium, 3 = High)

	PO1	PO2	PO3	PO4	PO5	PO6
LO1	3	2	2	2	2	2

LO2	3	2	2	2	2	2
LO3	3	2	2	2	2	3
LO4	3	3	2	3	2	2
LO5	3	2	2	2	2	2
LO6	3	3	2	2	3	2
LO7	3	3	3	3	3	2
LO8	3	3	3	3	3	2
LO9	3	3	3	3	3	2
LO10	3	3	3	3	3	3

LEARNING ACTIVITIES

Activities	No.	Weight (%)
Theoretical Lecture	14	
Out-of-class Study	14	
Homework	2	
Presentation / Seminar Preparation	2	
Midterm Preparation	1	
Midterm Exam	1	40
Final Exam Preparation	1	
Final Exam	1	60
Total		100

ASSESSMENT

Assessment Methods	No.	Weight (%)
Midterm Exam	1	40
Final Exam	1	60
Total	2	100

ECTS WORKLOAD

Activities	Duration (hours)	No.	Workload (hours)
Face-to-face education	3	14	42
Out-of-class study	3	14	42
Homeworks	14	2	28
Presentation / Seminar preparation	14	2	28
Preparation for midterm exam	14	1	14
Midterm examination	1	1	1
Preparation for final exam	14	2	28
Final examination	1	1	1
Total			**184 hours (ECTS: 7.5)**

WEEKLY COURSE PLAN

Week	Topic	Outcome
Week 1	History of DNA before 1953; key experiments establishing DNA as the genetic material	LO10
Week 2	DNA replication and genome organization	LO1
Week 3	History of RNA; major RNA classes and their biological functions	LO3
Week 4	MicroRNAs: biogenesis, mechanisms and functions in gene regulation	LO3, LO10
Week 5	Small interfering RNAs, RNA interference and gene silencing	LO3, LO10
Week 6	RNA isolation, RNA quality assessment, cDNA synthesis and reverse-transcription PCR	LO1–LO4
Week 7	Determination of gene expression by real-time PCR; normalization and basic experimental design	LO4
Week 8	DNA libraries: YAC, BAC and bacteriophage libraries; comparison of genomic and cDNA libraries	LO5
Week 9	Sanger sequencing and fundamental principles and comparison of next-generation sequencing systems	LO6, LO7
Week 10	Transcriptome profiling by next-generation sequencing (RNA-seq)	LO7, LO8
Week 11	Determination and interpretation of gene-expression levels using next-generation sequencing	LO8, LO10
Week 12	Whole-genome analyses using next-generation sequencing	LO7, LO9
Week 13	Genotyping-by-sequencing (GBS): principles, library construction and applications	LO7, LO9
Week 14	Mapping with next-generation sequencing: reference alignment and basic sequence-	LO7, LO9, LO10

	variation analysis	

Note: Midterm and final examinations are administered according to the academic calendar of the Graduate School/University.

COURSE RESOURCES

Required Textbooks & Reading Materials	Brown, T. A. Genomes 4. Garland Science; Green, M. R. & Sambrook, J. Molecular Cloning: A Laboratory Manual, 4th ed., Cold Spring Harbor Laboratory Press. Relevant chapters and current methodological papers will be used throughout the course.
Course Materials	Lecture slides, laboratory protocols, example sequence datasets and academic materials distributed within the scope of the course.
Supplementary Reading Materials	Recent scientific papers and technical protocols on DNA/RNA isolation, PCR and qPCR, RNA-seq, genome sequencing, GBS, mapping and sequence-variation analysis.

REPUBLIC OF TÜRKİYE

ERCİYES UNIVERSITY

GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

COURSE SYLLABUS

COURSE INSTRUCTOR

Title, Name and Surname	Prof. Dr. Kahraman GÜRCAN
E-mail	kgurcan@erciyes.edu.tr
Office Hours and Venue	Erciyes University, Faculty of Agriculture, Department of Agricultural Biotechnology / Genome and Stem Cell Center. Office meetings are available by appointment.

COURSE INFORMATION

Department	Agricultural Sciences and Technologies
Program	Agricultural Sciences and Technologies (PhD, English)
Academic Year	2026-2027
Semester	Fall
Course Code	AGS 709
Course Title	Molecular Techniques in Research of Plant Domestication
Course Type	Elective
Local Credit	3.00 (Theoretical: 3, Practical: 0)
ECTS Credit	7.50
Instruction Mode	Face to face
Course Location	Faculty of Agriculture Classrooms
Course Schedule	At the times indicated in the weekly class schedule
Prerequisites	None
Online Platform	Zoom / Google Meet when required
Feedback	Via e-mail and face-to-face meetings during office hours
Course Content	The timing, causes, processes and geographic centers of plant and animal domestication; genetic changes associated with domestication; domestication syndrome, bottlenecks, selection, gene flow and introgression; molecular markers and SNP data; whole-genome sequencing and population-genomic approaches for reconstructing domestication history; phylogenetics, population structure and genomic selection scans; domestication case studies in wheat, apple, maize, bean, chickpea and tomato; selected examples of animal domestication; and the implications of domestication genomics for conservation of genetic resources and modern breeding.
Course Objectives	The objective of this course is to provide an advanced understanding of the genetic changes associated with plant domestication and the molecular and genomic methods used to detect and interpret these changes. The course aims to develop students' ability to critically evaluate domestication hypotheses using molecular-marker, SNP and whole-genome data and to relate knowledge of domestication history to genetic-resource conservation and modern plant breeding.

LEARNING OUTCOMES

LO1	Explains the historical, geographic and biological framework of plant domestication.
LO2	Compares the major historical and genetic features of animal domestication with plant domestication.
LO3	Evaluates morphological and genetic changes associated with domestication and the concept of the domestication syndrome.
LO4	Interprets the genomic consequences of domestication bottlenecks, artificial and natural selection, gene flow and introgression.
LO5	Explains the use of molecular markers, SNPs and genome-wide variation data in studies of domestication history.
LO6	Evaluates whole-genome sequencing and population-genomic approaches for reconstructing domestication history.
LO7	Relates phylogenetic relationships, population structure and genomic selection signals to alternative domestication hypotheses.
LO8	Compares domestication processes in wheat, apple and maize using molecular and genomic evidence.
LO9	Evaluates domestication history and changes in genetic diversity in bean, chickpea and tomato.
LO10	Critically evaluates how knowledge derived from domestication genomics can be used in genetic-resource conservation and modern plant breeding.

LEARNING OUTCOMES – PROGRAM OUTCOMES MAPPING MATRIX

(Contribution Level: 1 = Low, 2 = Medium, 3 = High)

	PO1	PO2	PO3	PO4	PO5	PO6
LO1	3	2	2	2	2	2

LO2	2	2	2	2	1	2
LO3	3	3	2	2	2	2
LO4	3	3	3	3	2	2
LO5	3	3	3	2	3	2
LO6	3	3	3	3	3	2
LO7	3	3	3	3	3	3
LO8	3	3	2	2	2	2
LO9	3	3	2	2	2	2
LO10	3	3	3	3	3	3

LEARNING ACTIVITIES

Activities	No.	Weight (%)
Theoretical Lecture	14	
Out-of-class Study	14	
Homework	2	
Presentation / Literature Analysis	2	
Midterm Preparation	1	
Midterm Exam	1	40
Final Exam Preparation	1	
Final Exam	1	60
Total		100

ASSESSMENT

Assessment Methods	No.	Weight (%)
Midterm Exam	1	40
Final Exam	1	60
Total	2	100

ECTS WORKLOAD

Activities	Duration (hours)	No.	Workload (hours)
Face-to-face education	3	14	42
Out-of-class study	3	14	42
Homeworks	14	2	28
Presentation / Literature analysis	14	2	28
Preparation for midterm exam	14	1	14
Midterm examination	1	1	1
Preparation for final exam	14	2	28
Final examination	1	1	1
Total			**184 hours (ECTS: 7.5)**

WEEKLY COURSE PLAN

Week	Topic	Outcome
Week 1	The concept of domestication; when were plants and animals domesticated?	LO1, LO2
Week 2	Why domestication occurred: transition to agriculture, human selection and environmental change	LO1, LO2
Week 3	How and where did domestication occur? Centers of origin, wild progenitors and archaeobotanical evidence	LO1
Week 4	Domestication syndrome and phenotypic and genetic changes during domestication	LO3
Week 5	Domestication bottlenecks, loss of genetic diversity, selection, gene flow and introgression	LO3, LO4
Week 6	Molecular markers and SNP data for detecting genetic changes associated with domestication	LO5
Week 7	Reconstructing domestication history using whole-genome sequencing and population genomics	LO6, LO7
Week 8	Phylogenetics, population structure, genomic selection scans and identification of domestication-related genes	LO6, LO7
Week 9	Implications of domestication genomics for modern breeding: wild relatives, lost alleles and genetic resources	LO4, LO10
Week 10	Case study I: Wheat domestication, polyploidization and genomic changes	LO8
Week 11	Case study II: Apple domestication, wild progenitors, gene flow and introgression	LO8
Week 12	Case study III: Maize domestication; teosinte, selection and domestication genes	LO8
Week 13	Case study IV: Domestication, genetic	LO9

	diversity and selection in bean, chickpea and tomato	
Week 14	Comparative examples from animal domestication (horse, cattle and chicken) and synthesis: from domestication genomics to breeding	LO2, LO10

Note: Midterm and final examinations are administered according to the academic calendar of the Graduate School/University.

COURSE RESOURCES

Required Textbooks & Reading Materials	Selected book chapters and current research articles on plant domestication, crop evolution, population genetics and domestication genomics. Primary literature will be emphasized throughout the course.
Course Materials	Lecture slides, phylogenetic and population-genetic examples, genomic-data visualizations, selected datasets and academic materials distributed during the course.
Supplementary Reading Materials	Recent scientific articles on domestication of wheat, apple, maize, bean, chickpea and tomato; molecular markers and SNPs; whole-genome sequencing; population structure; genomic selection scans; gene flow, introgression and the use of crop wild relatives in breeding.

REPUBLIC OF TÜRKİYE

ERCİYES UNIVERSITY

GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

COURSE SYLLABUS

COURSE INSTRUCTOR

Title, Name and Surname	Prof. Dr. Mehmet ARSLAN
E-mail	mehmetarslan@erciyes.edu.tr
Office Hours and Venue	08:30-17:30 Erciyes University, Faculty of Agriculture, Department of Agricultural Biotechnology

COURSE INFORMATION

Department	Agricultural Sciences and Technologies
Program	Agricultural Sciences and Technologies (MSc, English)
Academic Year	2026-2027
Semester	Fall
Course Code	AGS 520
Course Title	Experimental Design in Agriculture
Course Type	Elective
Local Credit	3.00 (Theoretical: 3, Practical: 0)
ECTS Credit	7.50
Instruction Mode	Face to face
Course Location	Faculty of Agriculture Classrooms
Course Schedule	At the times indicated in the weekly class schedule
Prerequisites	None
Online Platform	Zoom / Google Meet when required
Feedback	Via e-mail and face-to-face meetings during office hours
Course Content	This is an advanced course in experimental design in agriculture. Well-designed experiments allow us to obtain reliable and valid results with fewer resources comparing to poorly-designed experiments. In this course, both experimental design and statistical analysis issues are discussed. The course provides knowledge about experimental designs and analysis of data from experiments. Analysis of variance, randomized block designs, Latin-square designs, linear mixed models, split-plot designs, response surface methodology, mixture models and fractional experiments are studied. Applications of experimental planning and analysis of variance play a prominent part. The course content is valuable when planning and carrying through experiments. Computer literacy is essential for this course, students are expected to utilize statistical software SAS for computational purposes.
Course Objectives	The objective of this course is to provide an advanced understanding of experimental design in agriculture. The course aims to develop students' ability to understand each experimental design, and determine the best experimental design for a specific research.

LEARNING OUTCOMES

LO1	Describe some of the factors affecting reproducibility and external validity.
LO2	List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs
LO3	Explain the concept of variability, its causes and methods of reducing it
LO4	Describe possible causes of bias and ways of alleviating it
LO5	Describe the six factors affecting significance, including the meaning of statistical power and "p-values
LO6	Explain formal ways of determining sample size
LO7	Explain the fundamental principles behind the output of an ANOVA, including "blocking" and "interactions
LO8	Identifying different roles in enhancing individual abilities and skills beside taking responsibilities, participations in team works under any given conditions
LO9	Explain and apply linear models, different kinds of generalised linear models (GLM) and mixed models and know the similarities and differences between these
LO10	Develop effective communication skills for presenting research findings and results using SAS to both technical and non-technical audiences.

LEARNING OUTCOMES – PROGRAM OUTCOMES MAPPING MATRIX

(Contribution Level: 1 = Low, 2 = Medium, 3 = High)

	PO1	PO2	PO3	PO4	PO5	PO6
LO1	3	2	2	2	2	2
LO2	2	2	2	2	1	2
LO3	3	3	2	2	2	2
LO4	3	3	3	3	2	2
LO5	3	3	3	2	3	2
LO6	3	3	3	3	3	2
LO7	3	3	3	3	3	3
LO8	3	3	2	2	2	2
LO9	3	3	2	2	2	2
LO10	3	3	3	3	3	3

LEARNING ACTIVITIES

Activities	No.	Weight (%)
Theoretical Lecture	14	
Out-of-class Study	14	
Homework	2	
Presentation / Literature Analysis	2	
Midterm Preparation	1	
Midterm Exam	1	40
Final Exam Preparation	1	
Final Exam	1	60
Total		100

ASSESSMENT

Assessment Methods	No.	Weight (%)
Midterm Exam	1	40
Final Exam	1	60
Total	2	100

ECTS WORKLOAD

Activities	Duration (hours)	No.	Workload (hours)
Face-to-face education	3	14	42
Out-of-class study	3	14	42
Homeworks	14	2	28
Presentation / Literature analysis	14	2	28
Preparation for midterm exam	14	1	14
Midterm examination	1	1	1
Preparation for final exam	14	2	28
Final examination	1	1	1
Total			**184 hours (ECTS: 7.5)**

WEEKLY COURSE PLAN

Week	Topic	Outcome
Week 1	Introduction- Randomization and Design	LO1, LO2
Week 2	Completely Randomized Designs,Looking for Specific Differences—Contrasts	LO1, LO2
Week 3	Multiple Comparisons	LO1
Week 4	Checking Assumptions	LO3
Week 5	Power and Sample Size	LO3, LO4
Week 6	Factorial Treatment Structure,A Closer Look at Factorial Data	LO5
Week 7	Random Effects	LO6, LO7
Week 8	Midterm Exam	LO6, LO7
Week 9	Nesting, Mixed Effects, and Expected Mean Squares	LO4, LO10
Week 10	Complete Block Designs	LO8
Week 11	Factorials in Incomplete Blocks-Confounding	LO8
Week 12	Split-Plot Designs	LO8
Week 13	Designs with Covariates	LO9
Week 14	Fractional Factorials and Response Surface Designs	LO2, LO10

Note: Midterm and final examinations are administered according to the academic calendar of the Graduate School/University.

COURSE RESOURCES

Required Textbooks & Reading Materials	Statistical Analysis of Agricultural Experiments Part - I : Single Factor Experiments;V K Gupta Rajender Parsad Lal Mohan Bhar Baidya Nath Mandal;M/s Royal Offset Printers, A-89/1, Naraina Industrial Area, Phase-I, New Delhi-110028 Statistical Procedures for Agricultural Research,Kwanchai A.

	Gomez and Arturo A. Gomez
Course Materials	Lecture slides, phylogenetic and population-genetic examples, genomic-data visualizations, selected datasets and academic materials distributed during the course.
Supplementary Reading Materials	Recent scientific articles on experimental design in agriculture.

REPUBLIC OF TÜRKİYE

ERCİYES UNIVERSITY

GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

COURSE SYLLABUS

COURSE INSTRUCTOR

Title, Name and Surname	Prof. Dr. Mehmet ARSLAN
E-mail	mehmetarslan@erciyes.edu.tr
Office Hours and Venue	08:30-17:30 Erciyes University, Faculty of Agriculture, Department of Agricultural Biotechnology

COURSE INFORMATION

Department	Agricultural Sciences and Technologies
Program	Agricultural Sciences and Technologies (PhD, English)
Academic Year	2026-2027
Semester	Fall
Course Code	AGS653
Course Title	Biotechnology applications for plant breeding and genetics
Course Type	Elective
Local Credit	3.00 (Theoretical: 3, Practical: 0)
ECTS Credit	7.50
Instruction Mode	Face to face
Course Location	Faculty of Agriculture Classrooms
Course Schedule	At the times indicated in the weekly class schedule
Prerequisites	None
Online Platform	Zoom / Google Meet when required
Feedback	Via e-mail and face-to-face meetings during office hours
Course Content	Cell Engineering and Genetic Engineering, Usefulness of plant cell. Plant tissue culture, Protoplast isolation, plant regeneration, propagation, somaclonal variation, somatic cell hybridization, construction of plasmid vectors for gene transfer- basic structure and techniques; selection of promoters, markers and 3'noncoding sequences. DNA transfer methods–Agrobacterium mediate transformation, microinjection, electroporation, gene gun (particle bombardment) and others. Plant regeneration from transformed cell. Detection of inserted gene- protein, mRNA, and DNA assay, stability and inheritance of foreign genes, transfor-mation of organelle genomes-chloroplast transformation, targeting of gene products, application of plant bio-technology in crop improvement-insect, disease and herbicide resistance, inhibition of gene expression by antisense RNA; molecular marker assisted selection. Gene cloning and editing (e.g., CRISPR), molecular analysis (DNA/RNA Isolation, PCR), sequencing and genomic data interpretation, genetic marker and genetic map construction.
Course Objectives	The objective of this course is to provide an advanced understanding of experimental design in agriculture. The course aims to develop students' ability to understand each experimental design, and determine the best experimental design for a specific research.

LEARNING OUTCOMES

LO1	Describe fundamentals of plant biotechnology and genetic engineering
LO2	Describe the use of molecular biology in crop improvement
LO3	Explain the use of tissue culture techniques and their role in plant propagation
LO4	Analyze application of transgenic technologies in agriculture
LO5	Utilize Crispr-cas9 and advanced genome editing tools for crop improvement
LO6	Evaluate marker assisted selection in plant breeding programs
LO7	Asses the role of bioinformatics in analyzing genetic data
LO8	Develop climate and pest resistant crops
LO9	Design research and innovation project in plant biotechnology
LO10	Integrate biotechnology solutions into sustainable farming practices

LEARNING OUTCOMES – PROGRAM OUTCOMES MAPPING MATRIX

(Contribution Level: 1 = Low, 2 = Medium, 3 = High)

	PO1	PO2	PO3	PO4	PO5	PO6
LO1	3	2	2	2	2	2
LO2	2	2	2	2	1	2
LO3	3	3	2	2	2	2
LO4	3	3	3	3	2	2
LO5	3	3	3	2	3	2

LO6	3	3	3	3	3	2
LO7	3	3	3	3	3	3
LO8	3	3	2	2	2	2
LO9	3	3	2	2	2	2
LO10	3	3	3	3	3	3

LEARNING ACTIVITIES

Activities	No.	Weight (%)
Theoretical Lecture	14	
Out-of-class Study	14	
Homework	2	
Presentation / Literature Analysis	2	
Midterm Preparation	1	
Midterm Exam	1	40
Final Exam Preparation	1	
Final Exam	1	60
Total		100

ASSESSMENT

Assessment Methods	No.	Weight (%)
Midterm Exam	1	40
Final Exam	1	60
Total	2	100

ECTS WORKLOAD

Activities	Duration (hours)	No.	Workload (hours)
Face-to-face education	3	14	42
Out-of-class study	3	14	42
Homeworks	14	2	28
Presentation / Literature analysis	14	2	28
Preparation for midterm exam	14	1	14
Midterm examination	1	1	1
Preparation for final exam	14	2	28
Final examination	1	1	1
Total			**184 hours (ECTS: 7.5)**

WEEKLY COURSE PLAN

Week	Topic	Outcome
Week 1	Introduction to plant biotecnology	LO1, LO2
Week 2	Molecular biotechnology foundations	LO1, LO2
Week 3	Plant tissue culture techniques	LO1
Week 4	Genetic Engineering tools	LO3
Week 5	Transgenic crops	LO3, LO4
Week 6	Genome editing techniques	LO5
Week 7	Marker assisted breeding	LO6, LO7
Week 8	Midterm Exam	LO6, LO7
Week 9	Bioinformatics in plant biotechnology	LO4, LO10
Week 10	Plant microbe intoductions	LO8
Week 11	Climate resilient crops	LO8
Week 12	Disease resistant crops	LO8
Week 13	Case studies and applications	LO9
Week 14	Project design and future directions	LO2, LO10

Note: Midterm and final examinations are administered according to the academic calendar of the Graduate School/University.

COURSE RESOURCES

Required Textbooks & Reading Materials	Gene Cloning and DNA Analysis: An Introduction, by T.A. Brown. Plant Biotechnology and Genetics: Principles, Techniques, and Applications" by C. Neal Stewart Jr. Plant Genes, Genomes and Genetics by Erich Grotewold, Joseph Chappell, Elizabeth A. Kellogg. Plant Biotechnology and Genetics: Principles, Techniques, and Applications, 3rd Edition by C. Neal Stewart Jr.
Course Materials	Lecture slides, phylogenetic and population-genetic examples, genomic-data visualizations, selected datasets and academic materials distributed during the course.
Supplementary Reading Materials	Recent scientific articles on Biotechnology applications for plant breeding and genetics.

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

DERS SORUMLUSU
(COURSE INSTRUCTOR)

Ünvan, Adı ve Soyadı *(Title, Name and Surname)*	Prof. Dr. Semih YILMAZ / *Prof.Dr.Semih YILMAZ*
Eposta *(Email)*	*semihyilmaz@erciyes.edu.tr*
Ofis Saatleri ve Yeri *(Office Hours and Venue)*	Ziraat Fakültesi, Tarım Bilimleri ve Teknolojileri, İş Telefonu :+90 352 207 6666 Dahili (Ext): 38652 *(Faculty of Agriculture, Agricultural Sciences and Technologies, Work Phone: +90 352 207 6666 Ext: 38652)*

DERS KÜNYESİ
(COURSE INFORMATION)

Ana Bilim Dalı *(Department)*	Tarım Bilimleri ve Teknolojileri / *Agricultural Sciences and Technologies*
Programı *(Program)*	Tarım Bilimleri ve Teknolojileri (Doktora) / *Agricultural Sciences and Technologies (PhD)*
Eğitim-Öğretim Yılı *(Academic Year)*	2026-2027
Dersin Dönemi *(Semester)*	Güz / *Fall*
Dersin Kodu *(Course Code)*	*AGS683*
Dersin Adı *(Course Title)*	***Protein metabolism***
Dersin Tipi *(Course Type)*	Seçmeli / *Elective*
Yerel Kredi *(Local Credit)*	3.00 (Teorik: 3, Uygulama: 0) / *Theoretical: 3, Practical: 0*
AKTS Kredisi *(ECTS Credit)*	7.50
Dersin Şekli *(Instruction Mode)*	Yüz yüze *(Face to face)*
Dersin Yeri *(Course Location)*	Ziraat Fakültesi Derslikleri /*Faculty of Agriculture Classrooms*
Dersin Zamanı *(Course Schedule)*	Haftalık ders programında belirtilen saatlerde /*At the times indicated in the weekly class schedule*
Ön Şartlar *(Prerequisites)*	Yok / *None*
Ders Çevrim İçi Platformu *(Online Platform Link)*	Zoom/googlemeeting
Geri Bildirim *(Feedback)*	E-posta, telefon, ofis saatlerinde yüz yüze görüşmeler / *Via e-mail, telephone, and face-to-face meetings during office hours*
Ders İçeriği *(Course Content)*	The structural stability of proteins Thermodynamic relationships between protein structure, stability and function Protein folding-thermodynamic relations Hydrophobic and hydrophilic relations in protein metabolism Hydrogen exchange-protein conformational stability Protein folding-conformational entropy Molecular dynamics of protein folding MIDTERM EXAM Molecular dynamics of protein denaturation

Solvent and thermal denaturation
Heat exchange-stability capacity
Surface mutations
Thermodynamic characteristics of binding sites
Proline isomerization effect
Functional protein groups
FINAL EXAM

Protein yapısının stabilizasyonu
Protein yapısı, stabilitesi ve fonksiyonu arasındaki termodinamik ilişkiler
Protein katlanması ve termodinamik ilişkiler
Protein katlanmasında hidrofobik-hidrofilik etkileşimler
Hidrojen değişimi ve protein konformasyonel stabilitesi
Protein katlanması ve konformasyonel entropi
Protein katlanması ve denatürasyonunun moleküler dinamikleri
Ara Sınav
Protein denatürasyonunun moleküler dinamikleri
Solvent ve termal denatürasyonun protein stabilitesi üzerindeki etkileri
Isı değişimi ve protein stabilite kapasitesi
Yüzey mutasyonları ve protein stabilitesi
Protein bağlanma bölgelerinin termodinamik özellikleri
Prolin izomerizasyonunun protein yapısı ve stabilitesi üzerindeki etkileri
. Fonksiyonel protein grupları
. Final Sınavı

Dersin Amacı
(Course Objectives)

This course has been prepared to help students understand the connection between the metabolic functioning of cells and proteins, the function of protein domains, the effects of mutations and thermodynamic stability.

Bu ders hücrelerin metabolik işleyişi ile proteinlerin bağlantısını, protein domainlerinin görevini, mutasyonların etkisini ve termodinamik stabilitesini kavratmak amacıyla hazırlanmıştır.

Öğrenme Çıktıları
(Learning Outcomes)

ÖĞRENME ÇIKTILARI - PROGRAM YETERLİLİKLERİ İLİŞKİSİ MATRİSİ(Katkı Düzeyi:1: Düşük, 2: Orta ve 3: Yüksek)
(LEARNING AND PROGRAM OUTCOMES MAPPING MATRIX(Contribution Level:1: Low, 2: Medium, 3: High))

	PY1 *PO1*	PY2 *PO2*	PY3 *PO3*	PY4 *PO4*	PY5 *PO5*	PY6 *PO6*	PY7 *PO7*	PY8 *PO8*	PY9 *PO9*	PY10 *PO10*
ÖÇ1 *LO1*	3	3	2	1	2	3				
ÖÇ2 *LO2*	2	3	2	1	1	2				
ÖÇ3 *LO3*	3	3	3	1	2	3				
ÖÇ4 *LO4*	2	3	2	1	1	2				
ÖÇ5 *LO5*	2	3	2	1	1	2				
ÖÇ6 *LO6*	3	3	3	1	2	3				

ÖÇ7 *LO7*	3	3	2	1	2	3				
ÖÇ8 *LO8*	3	3	3	1	2	3				
ÖÇ9 *LO9*	3	3	3	3	3	3				
	3	3	2	1	2	3				

ÖĞRENME AKTİVİTELERİ*(LEARNING ACTIVITIES)*

Aktiviteler* *(Activities*)*	**Sayısı***(No:)*	**Ağırlığı(%)***(Weight(%))*
Teorik ders anlatımı/ Theoretical lecture	14	60
Moleküler mekanizma analizi/ Molecular mechanism analysis	2	10
Bilimsel makale inceleme/ Scientific article review / Research paper review	3	15
Grup çalışması ve tartışma, Öğrenci sunumu/ Group work and discussion, Student presentation	3	15
Toplam (Total):		**100**

Aktivitelerin türü ve sayısı ihtiyaç halinde değiştirilebilir.(*The type and number of activities may be modified as needed.)*

DEĞERLENDİRME *(ASSESSMENT)*

Değerlendirme Yöntemleri* *(Assessment Methods*)*	**Sayısı** *(No:)*	**Ağırlığı(%)***(Weight(%))*
Ara sınav	1	25
Final sınavı	1	35
Ödev/makale analizi	1	15
Sunum	1	15
Toplam (Total):	**2**	**100**

Değerlendirme yöntemlerinin türü ve sayısı ihtiyaç halinde değiştirilebilir.(*The type and number of assessment methods may be modified as needed.)*

AKTS DERS YÜKÜ*(ECTSWORKLOAD)*

Aktiviteler *(Activities)*	**Süresi** (saat)*(Duration (hours))*	**Sayısı***(No)*	**İş Yükü** (saat)*(Workload (hours))*
Ders ve anlatım	3	14	42
Moleküler mekanizma incelemeleri	3	2	6
Soru-cevap çalışmaları	1	5	5
Bilimsel makale inceleme	4	2	8
Ara sınav	3	1	3
Grup çalışmaları ve tartışma	3	2	6
Öğrenci sunumları	3	1	3
Proje/ödev çalışmaları	1	1	1
Yarıyıl Sonu Sınavı	3	1	3

Toplam *(Total)*: 24 **(AKTS:7.5)**

HAFTALIK DERS PLANI *(WEEKLY COURSE PLAN)*

H*(W)*	**Konu*(Topic)***	**Çıktı*(Outcome)***
Hafta 1 / *Week 1*	Protein yapısının stabilizasyonu/ The structural stability of proteins	ÖÇ 1, 3 / LO 1, 3
Hafta 2 / *Week 2*	Protein yapısı, stabilitesi ve fonksiyonu arasındaki termodinamik ilişkiler/ Thermodynamic relationships between protein structure, stability and function	ÖÇ 2, 4 / LO 2, 4
Hafta 3 / *Week 3*	Protein katlanması ve termodinamik ilişkiler/ Protein folding-thermodynamic relations	ÖÇ 1, 5 / LO 1, 5
Hafta 4 / *Week 4*	Protein katlanmasında hidrofobik-hidrofilik etkileşimler/ Hydrophobic and hydrophilic relations in protein metabolism	ÖÇ 1, 6 / LO 1, 6
Hafta 5 / *Week 5*	Hidrojen değişimi ve protein konformasyonel stabilitesi/ Hydrogen exchange-protein conformational stability	ÖÇ 1, 6 / LO 1, 6
Hafta 6 / *Week 6*	Protein katlanması ve konformasyonel entropi/ Protein folding-conformational entropy	ÖÇ 3, 8 / LO 3, 8
Hafta 7 / *Week 7*	Protein katlanması moleküler dinamikleri/ Molecular dynamics of protein folding	ÖÇ 3, 6 / LO 3, 6
Hafta 8 / *Week 8*	Protein denatürasyonu moleküler dinamikleri/Molecular dynamics of protein denaturation	ÖÇ 1-6 / LO 1-6
Hafta 9 / *Week 9*	Solvent ve termal denatürasyon/ Solvent and thermal denaturation	ÖÇ 3, 6 / LO 3, 6
Hafta 10 / *Week 10*	Isı değişimi ve protein stabilite kapasitesi/ Heat exchange-stability capacity	ÖÇ 5, 6 / LO 5, 6
Hafta 11 / *Week 11*	Yüzey mutasyonları/ Surface mutations	ÖÇ 7 / LO 7
Hafta 12 / *Week 12*	Protein bağlanma bölgelerinin termodinamik özellikleri/ Thermodynamic characteristics of binding sites	ÖÇ 3, 8 / LO 3, 8
Hafta 13 / *Week 13*	Prolin izomerizasyon etkisi/ Proline isomerization effect	ÖÇ 8 / LO 8
Hafta 14 / *Week 14*	Fonksiyonel protein grupları/ Functional protein groups	ÖÇ 3, 8, 9 / LO 3, 8, 9

DERS KAYNAKLARI*(COURSE RESOURCES)*

Ders Kitapları / Okuma Materyalleri / *Required Textbooks & Reading Materials*	Kenneth P. Murphy (auth.), Kenneth P. Murphy (eds.) - Protein Structure, Stability, and Folding-Humana Press (2001)
Ders Materyalleri /	

Course Materials	
Yardımcı Okuma Materyalleri / *Supplementary Reading Materials*	Johannes Buchner, Thomas Kiefhaber - Protein Folding Handbook. 5-volume set-Wiley-VCH (2005)

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

DERS SORUMLUSU
(COURSE INSTRUCTOR)

Ünvan, Adı ve Soyadı *(Title, Name and Surname)*	Prof. Dr. Semih YILMAZ / *Prof.Dr.Semih YILMAZ*
Eposta *(Email)*	*semihyilmaz@erciyes.edu.tr*
Ofis Saatleri ve Yeri *(Office Hours and Venue)*	Ziraat Fakültesi, Tarım Bilimleri ve Teknolojileri, İş Telefonu :+90 352 207 6666 Dahili (Ext): 38652 *(Faculty of Agriculture, Agricultural Sciences and Technologies, Work Phone: +90 352 207 6666 Ext: 38652)*

DERS KÜNYESİ
(COURSE INFORMATION)

Ana Bilim Dalı *(Department)*	Tarım Bilimleri ve Teknolojileri / *Agricultural Sciences and Technologies*
Programı *(Program)*	Tarım Bilimleri ve Teknolojileri (Doktora) / *Agricultural Sciences and Technologies (PhD)*
Eğitim-Öğretim Yılı *(Academic Year)*	2026-2027
Dersin Dönemi *(Semester)*	Güz / *Fall*
Dersin Kodu *(Course Code)*	*AGS657*
Dersin Adı *(Course Title)*	***Bacterial genetics and physiology***
Dersin Tipi *(Course Type)*	Seçmeli / *Elective*
Yerel Kredi *(Local Credit)*	3.00 (Teorik: 3, Uygulama: 0) / *Theoretical: 3, Practical: 0*
AKTS Kredisi *(ECTS Credit)*	7.50
Dersin Şekli *(Instruction Mode)*	Yüz yüze *(Face to face)*
Dersin Yeri *(Course Location)*	Ziraat Fakültesi Derslikleri /*Faculty of Agriculture Classrooms*
Dersin Zamanı *(Course Schedule)*	Haftalık ders programında belirtilen saatlerde /*At the times indicated in the weekly class schedule*
Ön Şartlar *(Prerequisites)*	Yok / *None*
Ders Çevrim İçi Platformu *(Online Platform Link)*	Zoom/googlemeeting
Geri Bildirim *(Feedback)*	E-posta, telefon, ofis saatlerinde yüz yüze görüşmeler / *Via e-mail, telephone, and face-to-face meetings during office hours*

Ders İçeriği *(Course Content)*	Bakteriyel hücre yapisi ve fizyolojik organizasyon Bakteriyel genom organizasyonu ve dna replikasyonu Bakterilerde gen ifadesinin düzenlenmesi Operonlar ve transkripsiyonel düzenleme Bakteriyel mutasyonlar ve dna onarim mekanizmalari Yatay gen transferi mekanizmalari Plazmidler, transpozonlar ve hareketli genetik elementler Bakteriyel rekombinasyon ve genetik haritalama Bakteriyel büyüme ve hücre bölünmesi Bakteriyel metabolizma ve enerji üretimi Karbon, azot ve diğer besin maddelerinin kullanimi Çevresel streslere bakteriyel adaptasyon Quorum sensing, biyofilm oluşumu ve hücresel iletişim Antibiyotiklere direnç: genetik ve fizyolojik mekanizmalar Bacterial cell structure and physiological organization Bacterial genome organization and dna replication Regulation of gene expression in bacteria Operons and transcriptional regulation Bacterial mutations and dna repair mechanisms Mechanisms of horizontal gene transfer Plasmids, transposons, and mobile genetic elements Bacterial recombination and genetic mapping Bacterial growth and cell division Bacterial metabolism and energy production Utilization of carbon, nitrogen, and other nutrients Bacterial adaptation to environmental stress Quorum sensing, biofilm formation, and cellular communication Genetic and physiological mechanisms of antibiotic resistance
Dersin Amacı *(Course Objectives)*	Bu dersin amacı, bakterilerin genetik yapısı ve fizyolojik özellikleri hakkında lisansüstü düzeyde bilgi kazandırmaktır. Bakteriyel genom organizasyonu, gen ifadesinin düzenlenmesi, genetik değişim mekanizmaları, büyüme, metabolizma, çevresel adaptasyon, biyofilm oluşumu ve antibiyotik direnci konularının moleküler ve fizyolojik açıdan kavratılması hedeflenmektedir. The aim of this course is to provide graduate-level knowledge of the genetic structure and physiological characteristics of bacteria. The course aims to develop an understanding of bacterial genome organization, regulation of gene expression, mechanisms of genetic variation, growth, metabolism, environmental adaptation, biofilm formation, and antibiotic resistance from molecular and physiological perspectives.
Öğrenme Çıktıları *(Learning Outcomes)*	Bakteriyel hücre yapısını, genom organizasyonunu ve temel fizyolojik süreçleri açıklayabilir. Bakterilerde DNA replikasyonu, gen ifadesi ve gen düzenleme mekanizmalarını değerlendirebilir. Mutasyon, DNA onarımı, rekombinasyon ve yatay gen transferi mekanizmalarını açıklayabilir. Bakteriyel büyüme, metabolizma ve enerji üretim süreçlerini analiz edebilir. Bakterilerin çevresel streslere adaptasyonu, quorum sensing ve biyofilm oluşumu mekanizmalarını değerlendirebilir. Antibiyotik direncinin genetik ve fizyolojik mekanizmalarını açıklayabilir ve değerlendirebilir.

Explain bacterial cell structure, genome organization, and basic physiological processes.
Evaluate the mechanisms of DNA replication, gene expression, and gene regulation in bacteria.
Explain the mechanisms of mutation, DNA repair, recombination, and horizontal gene transfer.
Analyze bacterial growth, metabolism, and energy production processes.
Evaluate the mechanisms of bacterial adaptation to environmental stresses, quorum sensing, and biofilm formation.
Explain and evaluate the genetic and physiological mechanisms of antibiotic resistance.

ÖĞRENME ÇIKTILARI - PROGRAM YETERLİLİKLERİ İLİŞKİSİ MATRİSİ(Katkı Düzeyi:1: Düşük, 2: Orta ve 3: Yüksek)
(LEARNING AND PROGRAM OUTCOMES MAPPING MATRIX(Contribution Level:1: Low, 2: Medium, 3: High))

	PY1 *PO1*	PY2 *PO2*	PY3 *PO3*	PY4 *PO4*	PY5 *PO5*	PY6 *PO6*	PY7 *PO7*	PY8 *PO8*	PY9 *PO9*	PY10 *PO10*
ÖÇ1 *LO1*	3	3	2	1	2	3				
ÖÇ2 *LO2*	2	3	2	1	1	2				
ÖÇ3 *LO3*	3	3	3	1	2	3				
ÖÇ4 *LO4*	2	3	2	1	1	2				
ÖÇ5 *LO5*	2	3	2	1	1	2				
ÖÇ6 *LO6*	3	3	3	1	2	3				
ÖÇ7 *LO7*	3	3	2	1	2	3				
ÖÇ8 *LO8*	3	3	3	1	2	3				
ÖÇ9 *LO9*	3	3	3	3	3	3				
	3	3	2	1	2	3				

ÖĞRENME AKTİVİTELERİ*(LEARNING ACTIVITIES)*

Aktiviteler* *(Activities*)*	**Sayısı***(No:)*	**Ağırlığı(%)***(Weight(%))*
Teorik ders anlatımı/ Theoretical lecture	14	60
Bakteriyel Büyüme ve Fizyolojik Parametre Analizi/ Bacterial growth and physiological parameter analysis	2	10
Bilimsel makale inceleme/ Scientific article review / Research paper review	3	15
Grup çalışması ve tartışma, Öğrenci sunumu/ Group work and discussion, Student presentation	3	15
Toplam (Total):		**100**

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

*Aktivitelerin türü ve sayısı ihtiyaç halinde değiştirilebilir.(*The type and number of activities may be modified as needed.)*

DEĞERLENDİRME *(ASSESSMENT)*

Değerlendirme Yöntemleri* *(Assessment Methods*)*	**Sayısı** *(No:)*	**Ağırlığı(%)***(Weight(%))*
Ara sınav	1	25
Final sınavı	1	35
Ödev/makale analizi	1	15
Sunum	1	15
Toplam (Total):	**2**	**100**

**Değerlendirme yöntemlerinin türü ve sayısı ihtiyaç halinde değiştirilebilir.(*The type and number of assessment methods may be modified as needed.)*

AKTS DERS YÜKÜ*(ECTSWORKLOAD)*

Aktiviteler *(Activities)*	**Süresi** (saat)*(Duration (hours))*	**Sayısı***(No)*	**İş Yükü** (saat)*(Workload (hours))*
Ders ve anlatım	3	14	42
Fizyolojik ve genomic parameter incelemeleri	3	2	6
Soru-cevap çalışmaları	1	5	5
Bilimsel makale inceleme	4	2	8
Ara sınav	3	1	3
Grup çalışmaları ve tartışma	3	2	6
Öğrenci sunumları	3	1	3
Proje/ödev çalışmaları	1	1	1
Yarıyıl Sonu Sınavı	3	1	3
	Toplam *(Total)*: **24**		**(AKTS:7.5)**

HAFTALIK DERS PLANI *(WEEKLY COURSE PLAN)*

H*(W)*	**Konu***(Topic)*	**Çıktı***(Outcome)*
Hafta 1 / *Week 1*	Bakteriyel hücre yapisi ve fizyolojik organizasyon/ Bacterial cell structure and physiological organization	ÖÇ 1, 3 / LO 1, 3
Hafta 2 / *Week 2*	Bakteriyel genom organizasyonu ve dna replikasyonu/ Bacterial genome organization and dna replication	ÖÇ 2, 4 / LO 2, 4
Hafta 3 / *Week 3*	Bakterilerde gen ifadesinin düzenlenmesi/ Regulation of gene expression in bacteria	ÖÇ 1, 5 / LO 1, 5
Hafta 4 / *Week 4*	Operonlar ve transkripsiyonel düzenleme/ Operons and transcriptional regulation	ÖÇ 1, 6 / LO 1, 6
Hafta 5 / *Week 5*	Bakteriyel mutasyonlar ve dna onarim mekanizmalari/ Bacterial mutations and dna repair mechanisms	ÖÇ 1, 6 / LO 1, 6
Hafta 6 / *Week 6*	Yatay gen transferi mekanizmalari/ Mechanisms of horizontal gene transfer	ÖÇ 3, 8 / LO 3, 8
Hafta 7 / *Week 7*	Plazmidler, transpozonlar ve hareketli genetik elementler/ Plasmids, transposons, and mobile genetic elements	ÖÇ 3, 6 / LO 3, 6

Hafta 8 / *Week 8*	Bakteriyel rekombinasyon ve genetik haritalama/ Bacterial recombination and genetic mapping	ÖÇ 1-6 / LO 1-6
Hafta 9 / *Week 9*	Bakteriyel büyüme ve hücre bölünmesi/ Bacterial growth and cell division	ÖÇ 3, 6 / LO 3, 6
Hafta 10 / *Week 10*	Bakteriyel metabolizma ve enerji üretimi/ Bacterial metabolism and energy production	ÖÇ 5, 6 / LO 5, 6
Hafta 11 / *Week 11*	Karbon, azot ve diğer besin maddelerinin kullanimi/ Utilization of carbon, nitrogen, and other nutrients	ÖÇ 7 / LO 7
Hafta 12 / *Week 12*	Çevresel streslere bakteriyel adaptasyon/ Bacterial adaptation to environmental stress	ÖÇ 3, 8 / LO 3, 8
Hafta 13 / *Week 13*	Quorum sensing, biyofilm oluşumu ve hücresel iletişim/ Quorum sensing, biofilm formation, and cellular communication	ÖÇ 8 / LO 8
Hafta 14 / *Week 14*	Antibiyotiklere direnç: genetik ve fizyolojik mekanizmalar/ Genetic and physiological mechanisms of antibiotic resistance	ÖÇ 3, 8, 9 / LO 3, 8, 9

DERS KAYNAKLARI*(COURSE RESOURCES)*

Ders Kitapları / Okuma Materyalleri / *Required Textbooks & Reading Materials*	**Henkin, T. M. & Peters, J. E. — *Snyder and Champness Molecular Genetics of Bacteria*, 5th Edition.**
Ders Materyalleri / *Course Materials*	
Yardımcı Okuma Materyalleri / *Supplementary Reading Materials*	**Madigan, M. T. et al. — *Brock Biology of Microorganisms*, 16th Edition**

Prof. Dr. Kahraman GÜRCAN .....Üye

Prof. Dr. Özhan ŞİMŞEK .....Üye

Doç. Dr. Abdullah ULAŞ ..... Üye

Prof. Dr. Semih YILMAZ .....Üye

Doç. Dr. Sümer HORUZ ..... Üye

Doç. Dr. Fatih HANCI ..... Üye

Prof. Dr. Ebru ÇETİN .....Katılamadı.....Üye

Doç. Dr. Kevser KARAMAN.....Katılamadı..... Üye

Doç. Dr. Ebubekir YÜKSEL .....Katılamadı..... Üye

Doç. Dr. Osman İBİŞ ..... Üye

Dr. Öğr. Üyesi M. Alper ALTINOK..... ....Katılamadı..... Üye

Dr. Öğr. Üyesi Asiye YILMAZ ADKİNSON .....Üye

Dr. Öğr. Üyesi Sema KAPLAN .....Üye

Dr. Öğr. Üyesi Mahmut KALİBER ..... Üye

Dr. Öğr. Üyesi Evrim KARAÇETİN BELL....Katılamadı.... Üye

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

DERS SORUMLUSU
(COURSE INSTRUCTOR)

Ünvan, Adı ve Soyadı *(Title, Name and Surname)*	**Prof. Dr. Mehmet Ulaş Çınar**
Eposta *(Email)*	**mucinar@erciyes.edu.tr**
Ofis Saatleri ve Yeri *(Office Hours and Venue)*	Erciyes Üniversitesi Ziraat Fakültesi

DERS KÜNYESİ
(COURSE INFORMATION)

Ana Bilim Dalı *(Department)*	Tarım Bilimleri ve Teknolojileri
Programı *(Program)*	Tarım Bilimleri ve Teknolojileri
Eğitim-Öğretim Yılı *(Academic Year)*	2026-2027
Dersin Dönemi *(Semester)*	Güz
Dersin Kodu *(Course Code)*	AGS539
Dersin Adı *(Course Title)*	Biotechnology in Agriculture
Dersin Tipi *(Course Type)*	Yüksek Lisans / Seçmeli
Yerel Kredi *(Local Credit)*	3+0
AKTS Kredisi *(ECTS Credit)*	7,5
Dersin Şekli *(Instruction Mode)*	Yüz Yüze
Dersin Yeri *(Course Location)*	Erciyes Üniversitesi Ziraat Fakültesi Derslikleri
Dersin Zamanı *(Course Schedule)*	
Ön Şartlar *(Prerequisites)*	Yok
Ders Çevrim İçi Platformu *(Online Platform Link)*	
Geri Bildirim *(Feedback)*	
Ders İçeriği *(Course Content)*	The Biotechnology in Agriculture course covers the principles and advanced applications of biotechnology in plant and animal production, agricultural microbiology, and sustainable agriculture. The course includes molecular biology techniques, DNA and RNA isolation, PCR and quantitative PCR, molecular markers, DNA sequencing technologies, genetic diversity analysis, gene mapping, QTL analysis, genome-wide association studies (GWAS), marker-assisted selection, and genomic selection. Modern approaches such as genetic engineering, transgenic organisms, genome editing technologies including CRISPR/Cas systems, transcriptomics, proteomics, metabolomics, and epigenomics are also addressed. The course examines the use of biotechnology

	for improving crop and livestock productivity, disease resistance, stress tolerance, product quality, and conservation of genetic resources. In addition, applications of microbial biotechnology, biofertilizers, biopesticides, tissue culture, embryo technologies, and bioinformatics in agriculture are discussed. Ethical, biosafety, regulatory, environmental, and socioeconomic aspects of agricultural biotechnology, as well as recent developments and future perspectives in sustainable agricultural production, are also evaluated.
Dersin Amacı *(Course Objectives)*	The aim of this course is to provide students with advanced knowledge of the principles and applications of biotechnology in agriculture and to develop their ability to evaluate modern biotechnological approaches used in plant, animal, and microbial production systems. The course also aims to enable students to understand and apply molecular, genomic, and bioinformatic tools for improving productivity, quality, disease resistance, stress tolerance, and sustainability in agriculture, while considering ethical, biosafety, environmental, and socioeconomic aspects.
Öğrenme Çıktıları *(Learning Outcomes)*	1 Will be able to interpret the applications of biotechnology in agriculture. 2 Will be able to interpret the importance of biotechnology in agricultural production. 3 Will be able to understand and interpret plant biotechnology and its application areas. 4 Will be able to interpret the use of biotechnology in the production of vegetables, fruits and oilseeds and in the production of plants containing biologically active substances. 5 Will be able to interpret the use of biotechnology in the production of vegetables, fruits and oilseeds and in the production of plants containing biologically active substances. 6 Will be able to interpret biotechnological methods applied in food industry production. 7 Interpret industrial waste and wastewater treatment by biotechnological methods. 8 Will be able to interpret the future applications of biotechnology.

ÖĞRENME ÇIKTILARI - PROGRAM YETERLİLİKLERİ İLİŞKİSİ MATRİSİ (Katkı Düzeyi: 1: Düşük, 2: Orta ve 3: Yüksek)
(LEARNING AND PROGRAM OUTCOMES MAPPING MATRIX (Contribution Level: 1: Low, 2: Medium, 3: High))

	PY1 PO1	PY2 PO2	PY3 PO3	PY4 PO4	PY5 PO5	PY6 PO6	PY7 PO7	PY8 PO8	PY9 PO9	PY10 PO10
ÖÇ1 LO1	3	3	3	3	3	3	3	3	3	3
ÖÇ2 LO2	3	3	3	3	2	3	3	3	3	3
ÖÇ3 LO3	3	3	3	2	3	2	3	3	3	3
ÖÇ4 LO4	3	3	3	3	3	3	3	3	3	3
ÖÇ5 LO5	3	3	3	3	3	3	3	2	3	3
ÖÇ6 LO6	3	3	3	3	3	3	3	3	3	3
ÖÇ7 LO7	3	3	3	3	3	3	3	2	3	3
ÖÇ8 LO8	3	3	3	3	3	3	3	2	3	3
ÖÇ9 LO9										

ÖĞRENME AKTİVİTELERİ *(LEARNING ACTIVITIES)*

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

Aktiviteler* *(Activities*)*	**Sayısı** *(No:)*	**Ağırlığı(%)** *(Weight(%))*
Yüz yüze eğitim	14	38
Sınıf dışı ders çalışma süresi (ön çalışma, pekiştirme)	14	38
Ödevler	4	11
Sunum / Seminer hazırlama	2	5
Proje (Yarıyıl ödevi)	2	5
Laboratuvar	1	3
Toplam *(Total)*:	37	100

Aktivitelerin türü ve sayısı ihtiyaç halinde değiştirilebilir. *(*The type and number of activities may be modified as needed.)*

DEĞERLENDİRME *(ASSESSMENT)*

Değerlendirme Yöntemleri* *(Assessment Methods*)*	**Sayısı** *(No:)*	**Ağırlığı(%)** *(Weight(%))*
Ara Sınav	1	40
Yarıyıl Sınavı	1	60
Toplam *(Total)*:	2	100

Değerlendirme yöntemlerinin türü ve sayısı ihtiyaç halinde değiştirilebilir. *(*The type and number of assessment methods may be modified as needed.)*

AKTS DERS YÜKÜ *(ECTS WORKLOAD)*

Aktiviteler *(Activities)*	**Süresi** (saat) *(Duration (hours))*	**Sayısı** *(No)*	**İş Yükü** (saat) *(Workload (hours))*
Yüz yüze eğitim	14	2	28
Sınıf dışı ders çalışma süresi (ön çalışma, pekiştirme)	14	3	42
Ödevler	0	0	0
Sunum / Seminer hazırlama	1	2	2
Kısa sınavlar	0	0	0
Ara sınavlara hazırlık	7	5	35
Ara sınavlar	1	2	2
	Toplam *(Total)*:	**191**	**(AKTS: 7.5)**

HAFTALIK DERS PLANI *(WEEKLY COURSE PLAN)*

H *(W)*	**Konu** *(Topic)*	**Çıktı** *(Outcome)*
1	Introduction to Biotechnology	ÖÇ1
2	Genetics and Genetic Engineering	ÖÇ2,3
3	Application of Genetics and Genetic Engineering in Agriculture	ÖÇ2,3
4	Impacts of Biotechnology	ÖÇ2,3
5	Biotechnology in Plant Science	ÖÇ2,3
6	Application of Biotechnology in Plant Science	ÖÇ2,3
7	Midterm Exam	ÖÇ2,3

8	Biotechnology in Soil Science	
9	Application of Biotechnology in Soil Science	ÖÇ3
10	Biotechnology in Animal Science	ÖÇ3
11	Application of Biotechnology in Animal Science	ÖÇ3, 4, 5, 6, 7, 8
12	Microbial Biotechnology in Agriculture	ÖÇ3, 4, 5, 6, 7, 8
13	Application of Microbial Biotechnology in Agriculture	ÖÇ3, 4, 5, 6, 7, 8
14	Final Exam	ÖÇ3, 4, 5, 6, 7, 8

DERS KAYNAKLARI *(COURSE RESOURCES)*

Ders Kitabı	**Agricultural Biotechnology (Books in Soils, Plants, and the Environment) 1st Edition. CRC Press; 1st edition (November 6, 1997) ISBN-10: 0824794397 Handbook on Agriculture, Biotechnology and Development. Edited by Stuart J. Smyth, Peter W.B. Phillips, David Castle. Publication Date: 2014 ISBN: 978 0 85793 834 3**
Ders Materyalleri	
Yardımcı Kaynaklar	

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

DERS SORUMLUSU
(COURSE INSTRUCTOR)

Ünvan, Adı ve Soyadı *(Title, Name and Surname)*	**Prof. Dr. Mehmet Ulaş Çınar**
Eposta *(Email)*	**mucinar@erciyes.edu.tr**
Ofis Saatleri ve Yeri *(Office Hours and Venue)*	Erciyes Üniversitesi Ziraat Fakültesi

DERS KÜNYESİ
(COURSE INFORMATION)

Ana Bilim Dalı *(Department)*	Tarım Bilimleri ve Teknolojileri
Programı *(Program)*	Tarım Bilimleri ve Teknolojileri
Eğitim-Öğretim Yılı *(Academic Year)*	2026-2027
Dersin Dönemi *(Semester)*	Güz
Dersin Kodu *(Course Code)*	AGS569
Dersin Adı *(Course Title)*	Res Met Pub Eth
Dersin Tipi *(Course Type)*	Yüksek Lisans / Zorunlu
Yerel Kredi *(Local Credit)*	3+0
AKTS Kredisi *(ECTS Credit)*	7,5
Dersin Şekli *(Instruction Mode)*	Yüz Yüze
Dersin Yeri *(Course Location)*	Erciyes Üniversitesi Ziraat Fakültesi Derslikleri
Dersin Zamanı *(Course Schedule)*	
Ön Şartlar *(Prerequisites)*	Yok
Ders Çevrim İçi Platformu *(Online Platform Link)*	
Geri Bildirim *(Feedback)*	
Ders İçeriği *(Course Content)*	The Research Methods and Publication Ethics course covers the fundamental principles and advanced approaches of scientific research, including the formulation of research questions and hypotheses, literature review, research design, sampling methods, data collection, experimental planning, qualitative and quantitative research methods, statistical analysis, interpretation of results, and scientific reporting. The course also addresses the preparation of research proposals, theses, scientific articles, conference papers, and other academic outputs. Particular emphasis is placed on academic integrity and publication ethics, including plagiarism, fabrication, falsification, duplicate publication, salami slicing, authorship criteria, conflicts of interest, peer-review ethics, data

	management, research involving humans and animals, and responsible use of artificial intelligence in academic work. In addition, students are introduced to citation and reference management, journal selection, manuscript submission, responding to reviewers, open science, research transparency, reproducibility, intellectual property rights, and current national and international standards of research and publication ethics.
Dersin Amacı *(Course Objectives)*	The aim of this course is to provide graduate students with the knowledge and skills required to plan, conduct, analyze, and report scientific research in accordance with accepted methodological and ethical principles. The course also aims to develop students' competencies in research design, literature evaluation, data interpretation, scientific writing, and publication processes, while promoting awareness of academic integrity, responsible authorship, plagiarism prevention, data transparency, peer-review ethics, and other principles of research and publication ethics.
Öğrenme Çıktıları *(Learning Outcomes)*	1 Explain the fundamental principles and stages of scientific research. 2 Formulate research questions and hypotheses and design appropriate research methodologies. 3 Conduct literature reviews, collect and analyze data, and interpret research findings. 4 Prepare scientific reports, theses, research proposals, and manuscripts according to academic standards. 5 Apply the principles of research and publication ethics, including academic integrity, authorship, plagiarism prevention, data transparency, and responsible publication practices.

ÖĞRENME ÇIKTILARI - PROGRAM YETERLİLİKLERİ İLİŞKİSİ MATRİSİ (**Katkı Düzeyi:** **1**: Düşük, **2**: Orta ve **3**: Yüksek)
(LEARNING AND PROGRAM OUTCOMES MAPPING MATRIX (Contribution Level: 1: Low, 2: Medium, 3: High))

	PY1 *PO1*	PY2 *PO2*	PY3 *PO3*	PY4 *PO4*	PY5 *PO5*	PY6 *PO6*	PY7 *PO7*	PY8 *PO8*	PY9 *PO9*	PY10 *PO10*
ÖÇ1 *LO1*	3	3	3	3	3	3	3	3	3	3
ÖÇ2 *LO2*	3	3	3	3	2	3	3	3	3	3
ÖÇ3 *LO3*	3	3	3	2	3	2	3	3	3	3
ÖÇ4 *LO4*	3	3	3	3	3	3	3	3	3	3
ÖÇ5 *LO5*	3	3	3	3	3	3	3	2	3	3
ÖÇ6 *LO6*										
ÖÇ7 *LO7*										
ÖÇ8 *LO8*										
ÖÇ9 *LO9*										

ÖĞRENME AKTİVİTELERİ *(LEARNING ACTIVITIES)*

Aktiviteler* *(Activities*)*	**Sayısı** *(No:)*	**Ağırlığı(%)** *(Weight(%))*
Yüz yüze eğitim	14	38
Sınıf dışı ders çalışma süresi (ön çalışma, pekiştirme)	14	38
Ödevler	4	11
Sunum / Seminer hazırlama	2	5
Proje (Yarıyıl ödevi)	2	5
Laboratuvar	1	3

Toplam *(Total)*:	37	100

*Aktivitelerin türü ve sayısı ihtiyaç halinde değiştirilebilir. (*The type and number of activities may be modified as needed.)*

DEĞERLENDİRME *(ASSESSMENT)*

Değerlendirme Yöntemleri* *(Assessment Methods*)*	**Sayısı** *(No:)*	**Ağırlığı(%)** *(Weight(%))*
Ara Sınav	1	40
Yarıyıl Sınavı	1	60
Toplam *(Total)*:	2	100

*Değerlendirme yöntemlerinin türü ve sayısı ihtiyaç halinde değiştirilebilir. (*The type and number of assessment methods may be modified as needed.)*

AKTS DERS YÜKÜ *(ECTS WORKLOAD)*

Aktiviteler *(Activities)*	**Süresi** (saat) *(Duration (hours))*	**Sayısı** *(No)*	**İş Yükü** (saat) *(Workload (hours))*
Yüz yüze eğitim	14	2	28
Sınıf dışı ders çalışma süresi (ön çalışma, pekiştirme)	14	3	42
Ödevler	0	0	0
Sunum / Seminer hazırlama	1	2	2
Kısa sınavlar	0	0	0
Ara sınavlara hazırlık	7	5	35
Ara sınavlar	1	2	2
		Toplam *(Total)*:	**191** **(AKTS: 7.5)**

HAFTALIK DERS PLANI *(WEEKLY COURSE PLAN)*

H *(W)*	**Konu** *(Topic)*	**Çıktı** *(Outcome)*
1	Introduction to scientific research and basic research concepts	ÖÇ1
2	Research problems, research questions, objectives, and hypotheses	ÖÇ2,3
3	Literature review, scientific databases, and source evaluation	ÖÇ2,3
4	Research design: qualitative, quantitative, and mixed methods	ÖÇ2,3
5	Sampling methods, data collection techniques, and experimental planning	ÖÇ2,3
6	Data analysis, basic statistical approaches, and interpretation of results	ÖÇ2,3
7	Midterm Exam	ÖÇ2,3
8	Scientific writing, citation, referencing, and reference management	

9	Research proposals, thesis preparation, and scientific reporting	ÖÇ3, 4
10	Scientific article structure, journal selection, and manuscript submission	ÖÇ3, 4
11	Publication ethics: plagiarism, fabrication, falsification, duplicate publication, and salami slicing	ÖÇ3, 4, 5
12	Authorship, conflict of interest, peer-review ethics, and ethical approvals	ÖÇ3, 4, 5
13	Open science, research transparency, reproducibility, data management, and responsible use of AI	ÖÇ3, 4, 5
14	Final Exam	ÖÇ3, 4, 5

DERS KAYNAKLARI *(COURSE RESOURCES)*

Ders Kitabı	**Kumar, R. (2014). *Research Methodology: A Step-by-Step Guide for Beginners* (4th ed.). SAGE Publications.**
Ders Materyalleri	
Yardımcı Kaynaklar	

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

DERS SORUMLUSU
(COURSE INSTRUCTOR)

Ünvan, Adı ve Soyadı *(Title, Name and Surname)*	**Prof. Dr. Ali İrfan İLBAŞ**
Eposta *(Email)*	**iilbas@erciyes.edu.tr**
Ofis Saatleri ve Yeri *(Office Hours and Venue)*	**10:00-16:00 Ziraat Fakültesi**

DERS KÜNYESİ
(COURSE INFORMATION)

Ana Bilim Dalı *(Department)*	**Tarım Bilimleri ve Teknolojileri (Agricultural Science and Technologies)**
Programı *(Program)*	**Doctorate (Joint Program)**
Eğitim-Öğretim Yılı *(Academic Year)*	**2026-2027**
Dersin Dönemi *(Semester)*	**Autumn (GÜZ)**
Dersin Kodu *(Course Code)*	**AGS 619**
Dersin Adı *(Course Title)*	**CROPPING SYSTEMS**
Dersin Tipi *(Course Type)*	**DOCTORATE (THEORETICAL)**
Yerel Kredi *(Local Credit)*	**3**
AKTS Kredisi *(ECTS Credit)*	**7.5**
Dersin Şekli *(Instruction Mode)*	**THEORETICAL**
Dersin Yeri *(Course Location)*	**ZİRAAT FAKÜLTESİ DERSLİKLERİ**
Dersin Zamanı *(Course Schedule)*	**Çarşamaba, 09:00-12:00**
Ön Şartlar *(Prerequisites)*	**Yok (no need)**
Ders Çevrim İçi Platformu *(Online Platform Link)*	**YÜZ YÜZE (FACE TO FACE)**
Geri Bildirim *(Feedback)*	**YÜZ YÜZE (FACE TO FACE)**
Ders İçeriği *(Course Content)*	**Determining cropping system under the dry, semi-dray and humid and other climatic conditions. Determining cropping system under the sandy, loamy, clayey, salty, acidic, basic e.g soil conditions. Determining cropping system under the low, medium and high soil organic matter conditions Determining cropping system under the available technological, ecological, economical and social conditions.**
Dersin Amacı *(Course Objectives)*	**Teaching cropping systems under the different climatic, edaphic, topographic, ecological, technological, economical and social conditions.**

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

Öğrenme Çıktıları *(Learning Outcomes)*	**Knows cropping systems** **Knows tillage systems and residue management** **Knows water saving, irrigation and water harvesting systems** **Know Erosion Control** **Knows new approach in cropping systems such as organic farming, good agricultural practices etc.**

ÖĞRENME ÇIKTILARI - PROGRAM YETERLİLİKLERİ İLİŞKİSİ MATRİSİ (Katkı Düzeyi: 1: Düşük, 2: Orta ve 3: Yüksek)
(LEARNING AND PROGRAM OUTCOMES MAPPING MATRIX (Contribution Level: 1: Low, 2: Medium, 3: High))

	PY1 *PO1*	PY2 *PO2*	PY3 *PO3*	PY4 *PO4*	PY5 *PO5*	PY6 *PO6*	PY7 *PO7*	PY8 *PO8*	PY9 *PO9*	PY10 *PO10*
ÖÇ1 *LO1*			3							
ÖÇ2 *LO2*		2								
ÖÇ3 *LO3*					3					
ÖÇ4 *LO4*										
ÖÇ5 *LO5*				3						
ÖÇ6 *LO6*			2							
ÖÇ7 *LO7*					3					
ÖÇ8 *LO8*			2							
ÖÇ9 *LO9*		1								

ÖĞRENME AKTİVİTELERİ *(LEARNING ACTIVITIES)*

Aktiviteler* *(Activities*)*	**Sayısı** *(No:)*	**Ağırlığı(%)** *(Weight(%))*
Lectures (face to face teaching)	10	25
Study hours out of classroom (study before and after the class)	8	16
Homework	6	12
Presentation / seminar	6	12
Quiz	0	0
Preparation for midterm exams	5	10
Midterm exams	2	4
Project (term paper)	4	8
Laboratuar	0	0
Field study	0	0
Preparation for final exam	7	14
Final exam	2	4
Research	0	0
Toplam *(Total)*: 100		

**Aktivitelerin türü ve sayısı ihtiyaç halinde değiştirilebilir.* (*The type and number of activities may be modified as needed.)*

DEĞERLENDİRME *(ASSESSMENT)*

Değerlendirme Yöntemleri* *(Assessment Methods*)*	**Sayısı** *(No:)*	**Ağırlığı(%)** *(Weight(%))*
Midterm exam	1	50
Quiz	0	0
Homework	1	50

Semester total	100
Contribution ratio of evaluation during semester to success	40
Contribution ratio of final exam to success	60
General total	100

Toplam *(Total)*: 100

**Değerlendirme yöntemlerinin türü ve sayısı ihtiyaç halinde değiştirilebilir. (*The type and number of assessment methods may be modified as needed.)*

AKTS DERS YÜKÜ *(ECTS WORKLOAD)*

Aktiviteler *(Activities)*	**Süresi** (saat) *(Duration (hours))*	**Sayısı** *(No)*	**İş Yükü** (saat) *(Workload (hours))*
Lectures (face to face teaching)	14	3	42
Study hours out of classroom (study before and after the class)	14	3	42
Homework	10	5	50
Presentation / seminar	10	4	40
Quiz	0	0	0
Preparation for midterm exams	1	5	5
Midterm exams	1	2	2
Project (term paper)	0	0	0
Laboratuar	0	0	0
Field study	0	0	0
Preparation for final exam	1	7	7
Final exam	1	2	2
Research	0	0	0
	Toplam *(Total)*:	**190**	**(AKTS: 7.5**

HAFTALIK DERS PLANI *(WEEKLY COURSE PLAN)*

H *(W)*	**Konu** *(Topic)*	**Çıktı** *(Outcome)*
1	Dray, Semidray and Humid Farming, and Monoculture and Multiple Cropping Systems	Desribe the general coprehansive of Cropping systems
2	Strip, Contour, Mixed and Inter Cropping Systems	Express main Corpping systems
3	Crop rotation, cover crops, organic and Sustainable farming	Eplain the relatinships between cropping syetem and sustainability
4	Consersational Farming including No-till, Strip tillage, Mulch tillage and chisel tillage	Decribe the main conservational cropping systems
5	Agricultural residue management, removing, burning and converting amendments	Explain the management of agricultural residue
6	Water harvesting, Irrigation, drainage and fallow practices	Express water management in the crop systems
7	Enhance soil organic matters	Explain the importance of

		soil organic matter in the cropping systems
8	Midterm Exam.	Evaluate the learning levels
9	Organic and organo-mineral fertilizers and amendments	Explain organic and organomineral fertilizers in the cropping system
10	Microbiol fertilizers, moss and guano	Describe the biological fertilizers and moss and guano
11	Good Farming Practices	Express good farming practices method and applications
12	Erosion control practices	Knows erosion control practices
13	Eco-villages and Eco-truism	Describe Eco-frendly cropping systems
14	Cropping system and sustainability	Express the relationships between Cropping system and sustainability

DERS KAYNAKLARI *(COURSE RESOURCES)*

Ders Kitabı	- Innovative Biological Technologies For Lesser Developed Countries : Workshop Proceedings. ; Year: · 2018 ; Language: · Eng ; Publish Date: · 1985 ; Pages: · 258. Chapter V. Chapter V Multiple Cropping Systems: A Basis for Developing an Alternative Agriculture Dr. Stephen R. Gliessman Environmental Studies University of California.
Ders Materyalleri	"MYCORRHIZA"; "Rural Development Policy and Agricultural Sustainablity"; "Organic Agriculture in Turkey" - https://avesis.erciyes.edu.tr/iilbas -"Duyurular ve Dökümanlar"
Yardımcı Kaynaklar	- Rana S S and M C Rana. 2011. Cropping System. Department of Agronomy, College of Agriculture, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, 80 pages.

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

DERS SORUMLUSU
(COURSE INSTRUCTOR)

Ünvan, Adı ve Soyadı *(Title, Name and Surname)*	Assoc. Prof. Dr. Kevser Karaman
Eposta *(Email)*	kevserkaraman@erciyes.edu.tr
Ofis Saatleri ve Yeri *(Office Hours and Venue)*	Faculty of Agriculture - Friday 13:00-17:00

DERS KÜNYESİ
(COURSE INFORMATION)

Ana Bilim Dalı *(Department)*	Agricultural Sciences and Technologies
Programı *(Program)*	M.Sc. (English)
Eğitim-Öğretim Yılı *(Academic Year)*	2026-2027
Dersin Dönemi *(Semester)*	1st Semester
Dersin Kodu *(Course Code)*	AGS 584
Dersin Adı *(Course Title)*	LABORATORY ANALYSIS TECHNIQUES
Dersin Tipi *(Course Type)*	Elective
Yerel Kredi *(Local Credit)*	7.50
AKTS Kredisi *(ECTS Credit)*	7.50
Dersin Şekli *(Instruction Mode)*	Face-to-face
Dersin Yeri *(Course Location)*	Faculty of Agriculture
Dersin Zamanı *(Course Schedule)*	-
Ön Şartlar *(Prerequisites)*	None
Ders Çevrim İçi Platformu *(Online Platform Link)*	-
Geri Bildirim *(Feedback)*	Via e-mail and office meetings with the course instructor.
Ders İçeriği *(Course Content)*	Principles of laboratory analysis; sampling and sample preparation; laboratory safety and quality assurance; spectroscopic, chromatographic, electrochemical and electrophoretic techniques; thermal analysis; molecular analysis techniques; method validation, calibration, data quality, interpretation and reporting of analytical results in agricultural, food and biotechnology samples.

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

Dersin Amacı *(Course Objectives)*	The aim of this course is to provide graduate students with advanced knowledge and practical understanding of laboratory analysis techniques used in agricultural sciences, food science and biotechnology; to develop their ability to select appropriate analytical methods, evaluate method performance, interpret experimental data critically, and report analytical results according to scientific quality principles.
Öğrenme Çıktıları *(Learning Outcomes)*	LO1. Explain the fundamental principles of laboratory analysis and appropriate sample preparation procedures. LO2. Describe and compare the operating principles of major instrumental analysis techniques. LO3. Select appropriate analytical techniques for agricultural, food and biotechnology samples. LO4. Evaluate calibration, validation, quality assurance and sources of analytical error. LO5. Interpret, critically evaluate and scientifically report laboratory analysis data.

ÖĞRENME ÇIKTILARI - PROGRAM YETERLİLİKLERİ İLİŞKİSİ MATRİSİ (Katkı Düzeyi: **1**: Düşük, **2**: Orta ve **3**: Yüksek)
*(LEARNING AND PROGRAM OUTCOMES MAPPING MATRIX (Contribution Level: **1**: Low, **2**: Medium, **3**: High))*

	PY1 *PO1*	PY2 *PO2*	PY3 *PO3*	PY4 *PO4*	PY5 *PO5*	PY6 *PO6*	PY7 *PO7*	PY8 *PO8*	PY9 *PO9*	PY10 *PO10*
ÖÇ1 *LO1*	3	2	2	2	2	1				
ÖÇ2 *LO2*	3	3	2	2	3	1				
ÖÇ3 *LO3*	3	3	3	2	2	2				
ÖÇ4 *LO4*	3	2	3	3	3	2				
ÖÇ5 *LO5*	3	3	3	3	3	2				
ÖÇ6 *LO6*										
ÖÇ7 *LO7*										
ÖÇ8 *LO8*										
ÖÇ9 *LO9*										

ÖĞRENME AKTİVİTELERİ *(LEARNING ACTIVITIES)*

Aktiviteler* *(Activities*)*	**Sayısı** *(No:)*	**Ağırlığı(%)** *(Weight(%))*
Face-to-face education	14	-
Project / literature assignment	2	-
Laboratory / case study	4	-
Research	1	-
Toplam *(Total)*:	21	

**Aktivitelerin türü ve sayısı ihtiyaç halinde değiştirilebilir.* (*The type and number of activities may be modified as needed.)*

DEĞERLENDİRME *(ASSESSMENT)*

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

Değerlendirme Yöntemleri* *(Assessment Methods*)*	**Sayısı** *(No:)*	**Ağırlığı(%)** *(Weight(%))*
Midterm exam	1	25
Assignment / article evaluation	1	25
Final exam	1	50
Toplam *(Total)*:	3	100

Değerlendirme yöntemlerinin türü ve sayısı ihtiyaç halinde değiştirilebilir. *(*The type and number of assessment methods may be modified as needed.)*

AKTS DERS YÜKÜ *(ECTS WORKLOAD)*

Aktiviteler *(Activities)*	**Süresi** (saat) *(Duration (hours))*	**Sayısı** *(No)*	**İş Yükü** (saat) *(Workload (hours))*
Face-to-face education	3	14	42
Individual study / preparation	5	14	70
Midterm exam preparation and exam	15	1	15
Project / literature assignment	25	2	50
Laboratory / case study	5	4	20
Final exam preparation and exam	20	1	20
Research	8	1	8
		Toplam *(Total)*:	225 (ECTS: 7.50)

HAFTALIK DERS PLANI *(WEEKLY COURSE PLAN)*

H *(W)*	**Konu** *(Topic)*	**Çıktı** *(Outcome)*
1	Introduction to Laboratory Analysis Techniques and Laboratory Safety	LO1
2	Sampling, Sample Preparation and Sources of Analytical Error	LO1, LO4
3	Quality Assurance, Calibration and Method Validation	LO1, LO4
4	Fundamentals of Spectroscopic Analysis	LO2, LO3
5	UV-Visible and Fluorescence Spectroscopy and Applications	LO2, LO3
6	Infrared Spectroscopy and Applications	LO2, LO3
7	Midterm Exam	LO1-LO3
8	Fundamentals of Chromatographic Separations	LO2, LO3
9	High-Performance Liquid Chromatography (HPLC)	LO2, LO3
10	Gas Chromatography (GC) and Mass Spectrometric Detection	LO2, LO3

11	Electrochemical and Electrophoretic Analysis Techniques	LO2, LO3
12	Thermal Analysis and Selected Advanced Laboratory Techniques	LO2, LO3
13	Molecular Analysis Techniques and Critical Evaluation of Analytical Data	LO3-LO5
14	Final Exam	LO1-LO5

DERS KAYNAKLARI ***(COURSE RESOURCES)***

Ders Kitabı	Nielsen, S. S. (Ed.). Food Analysis. Springer.
Ders Materyalleri	Course presentations, laboratory notes, instrument manuals, scientific articles and selected analytical protocols.
Yardımcı Kaynaklar	Skoog, D. A., Holler, F. J., Crouch, S. R. Principles of Instrumental Analysis. Cengage Learning. Harris, D. C. Quantitative Chemical Analysis. W. H. Freeman. Selected current peer-reviewed research and review articles.

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

DERS SORUMLUSU
(COURSE INSTRUCTOR)

Ünvan, Adı ve Soyadı *(Title, Name and Surname)*	Doç. Dr. Fatih HANCI
Eposta *(Email)*	fatihhanci©erciyes.edu.tr
Ofis Saatleri ve Yeri *(Office Hours and Venue)*	8.30:17.30 - Ziraat Fakültesi Faculty of Agriculture

DERS KÜNYESİ
(COURSE INFORMATION)

Ana Bilim Dalı *(Department)*	Tarım Bilimleri Ve Teknolojileri Agricultural Science and Technolgy
Programı *(Program)*	
Eğitim-Öğretim Yılı *(Academic Year)*	2026-2027
Dersin Dönemi *(Semester)*	GÜZ Fall
Dersin Kodu *(Course Code)*	AGS 611
Dersin Adı *(Course Title)*	Advances in Horticultural Research
Dersin Tipi *(Course Type)*	Yüz yüze face to face
Yerel Kredi *(Local Credit)*	7,5
AKTS Kredisi *(ECTS Credit)*	7,5
Dersin Şekli *(Instruction Mode)*	Teorik
Dersin Yeri *(Course Location)*	Öğretim üyesi ofisi
Dersin Zamanı *(Course Schedule)*	Cuma 13:00-15:50 Friday 13:00/15:50
Ön Şartlar *(Prerequisites)*	x
Ders Çevrim İçi Platformu *(Online Platform Link)*	
Geri Bildirim *(Feedback)*	
Ders İçeriği *(Course Content)*	Modern bahçe bitkileri araştırmalarında genetik, biyoteknoloji, ıslah, yetiştiricilik, kalite kontrol ve sürdürülebilir üretim alanlarındaki güncel gelişmeleri kapsar. Covers current developments in genetics, biotechnology, breeding, cultivation, quality control, and sustainable production in modern horticultural research.
Dersin Amacı *(Course Objectives)*	Öğrencilere bahçe bitkileri alanındaki en yeni bilimsel yaklaşımları, araştırma yöntemlerini ve teknolojik uygulamaları kazandırmaktır. To equip students with the latest scientific approaches, research methods, and technological applications in horticultural science.

Doç. Dr. Fatih HANCI

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

Öğrenme Çıktıları
(Learning Outcomes)

ÖĞRENME ÇIKTILARI - PROGRAM YETERLİLİKLERİ İLİŞKİSİ MATRİSİ (Katkı Düzeyi: 1: Düşük, 2: Orta ve 3: Yüksek)
(LEARNING AND PROGRAM OUTCOMES MAPPING MATRIX (Contribution Level: 1: Low, 2: Medium, 3: High))

	PY1 PO1	PY2 PO2	PY3 PO3	PY4 PO4	PY5 PO5	PY6 PO6	PY7 PO7	PY8 PO8	PY9 PO9	PY10 PO10
ÖÇ1 LO1	3	2					1			
ÖÇ2 LO2	2	3	2							
ÖÇ3 LO3	2	2	3	2						
ÖÇ4 LO4	1	2	3		2			3		
ÖÇ5 LO5										
ÖÇ6 LO6										
ÖÇ7 LO7										
ÖÇ8 LO8										
ÖÇ9 LO9										

ÖĞRENME AKTİVİTELERİ *(LEARNING ACTIVITIES)*

Aktiviteler* *(Activities*)*		**Sayısı** *(No:)*	**Ağırlığı(%)** *(Weight(%))*
Yüz yüze eğitim	Face to face	14	60
Ödevler	HomeWorks	4	25
Sunum	Presentation	3	15
	Toplam *(Total)*:		100

**Aktivitelerin türü ve sayısı ihtiyaç halinde değiştirilebilir.* (*The type and number of activities may be modified as needed.*)

DEĞERLENDİRME *(ASSESSMENT)*

Değerlendirme Yöntemleri* *(Assessment Methods*)*		**Sayısı** *(No:)*	**Ağırlığı(%)** *(Weight(%))*
Ara sınav	First exam	1	40
Ödev	HomeWorks	1	60
	Toplam *(Total)*:		100

**Değerlendirme yöntemlerinin türü ve sayısı ihtiyaç halinde değiştirilebilir.* (*The type and number of assessment methods may be modified as needed.*)

AKTS DERS YÜKÜ *(ECTS WORKLOAD)*

Aktiviteler *(Activities)*		**Süresi** (saat) *(Duration (hours))*	**Sayısı** *(No)*	**İş Yükü** (saat) *(Workload (hours))*
Yüz yüze eğitim	Face to face	3	14	42
Ödevler	HomeWorks	1	4	4
Sunum	Presentation	6	3	18
Araştırma	Research	5	2	10
		Toplam *(Total)*:	74	(AKTS: 7.5)

Doç. Dr. Fatih HANCI

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

HAFTALIK DERS PLANI *(WEEKLY COURSE PLAN)*

H *(W)*	Konu *(Topic)*	Çıktı *(Outcome)*
1	Bahçe bitkileri araştırmalarında modern yönelimler. Modern trends in horticultural research.	Bahçe bitkileri araştırmalarındaki güncel teknolojik ve bilimsel gelişmeleri tanımlar. Defines current technological and scientific developments in horticultural research.
2	Küresel bahçe bitkileri üretim istatistikleri. Global horticultural crop production statistics.	
3	Moleküler biyoloji ve genetik araçlara giriş. Introduction to molecular biology and genetic tools	
4	Moleküler markörler ve ıslah stratejileri. Molecular markers and breeding strategies.	
5	Genetik mühendisliği ve transgenik yaklaşımlar. Genetic engineering and transgenic approaches.	
6	Gen düzenleme teknolojileri (CRISPR/Cas9). Gene editing technologies (CRISPR/Cas9).	Moleküler ıslah ve gen düzenleme yöntemlerini karşılaştırarak değerlendirir. Compares and evaluates molecular breeding and gene editing methods.
7	Fizyolojik süreçler ve büyüme düzenleyiciler. Physiological processes and growth regulators.	
8	Biyotik stres yönetimi ve dayanıklılık. Mechanisms of abiotic stress tolerance.	
9	Ürün kalitesi ve hasat sonrası biyolojisi. Product quality and postharvest biology.	
10	Sürdürülebilir üretim sistemleri ve organik yaklaşımlar. Sustainable production systems and organic approaches.	Bahçe bitkilerinde stres toleransı ve kalite oluşum mekanizmalarını analiz eder. Analyzes mechanisms of stress tolerance and quality formation in horticultural crops. Sürdürülebilir üretim ve dijital tarım uygulamalarını örneklerle açıklar. Explains sustainable production and digital agriculture applications with examples.
11	Dijital tarım ve hassas bahçecilik uygulamaları. Digital agriculture and precision horticulture.	
12	Bahçe ürünlerinde biyoaktif bileşenler. Bioactive compounds in horticultural products.	
13	Dünya genelinde organik sertifikasyon sistemleri. Organic certification systems around the world.	
14	Dönem proje sunumları ve değerlendirme Final project presentations and evaluation.	

DERS KAYNAKLARI *(COURSE RESOURCES)*

Ders Kitabı	**Arora, C. (2009). Advances in Horticulture Science Research. New India Publishing Agency**
Ders Materyalleri	**Ders sunuları**
Yardımcı Kaynaklar	**Wiley, Springer, MDPI journals (Q1-Q2)**

Doç. Dr. Fatih HANCI

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

DERS SORUMLUSU
(COURSE INSTRUCTOR)

Ünvan, Adı ve Soyadı *(Title, Name and Surname)*	Doç. Dr. Fatih HANCI
Eposta *(Email)*	fatihhanci©erciyes.edu.tr
Ofis Saatleri ve Yeri *(Office Hours and Venue)*	8.30:17.30 - Ziraat Fakültesi Faculty of Agriculture

DERS KÜNYESİ
(COURSE INFORMATION)

Ana Bilim Dalı *(Department)*	Tarım Bilimleri Ve Teknolojileri Agricultural Science and Technology
Programı *(Program)*	
Eğitim-Öğretim Yılı *(Academic Year)*	2026-2027
Dersin Dönemi *(Semester)*	GÜZ Fall
Dersin Kodu *(Course Code)*	AGS 511
Dersin Adı *(Course Title)*	World Vegetable Crops
Dersin Tipi *(Course Type)*	Yüz yüze Face to Face
Yerel Kredi *(Local Credit)*	7,5
AKTS Kredisi *(ECTS Credit)*	7,5
Dersin Şekli *(Instruction Mode)*	Teorik
Dersin Yeri *(Course Location)*	Öğretim üyesi ofisi / Office of the Lecturer
Dersin Zamanı *(Course Schedule)*	Pazartesi 13:00-15:50 Monday 13:00-15:50
Ön Şartlar *(Prerequisites)*	Yok
Ders Çevrim İçi Platformu *(Online Platform Link)*	
Geri Bildirim *(Feedback)*	
Ders İçeriği *(Course Content)*	Dünya sebze üretim sistemleri, ekolojik gereksinimleri ve küresel ticaret dinamiklerini kapsar. Covers world vegetable production systems, ecological requirements, and global trade dynamics
Dersin Amacı *(Course Objectives)*	Küresel sebze yetiştiriciliğindeki ekolojik, ekonomik ve teknolojik yaklaşımları kazandırmaktır. To provide knowledge on ecological, economic, and technological approaches in global vegetable cultivation.
Öğrenme Çıktıları *(Learning Outcomes)*	

Doç. Dr. Fatih HANCI

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

ÖĞRENME ÇIKTILARI - PROGRAM YETERLİLİKLERİ İLİŞKİSİ MATRİSİ (Katkı Düzeyi: 1: Düşük, 2: Orta ve 3: Yüksek)
(LEARNING AND PROGRAM OUTCOMES MAPPING MATRIX (Contribution Level: 1: Low, 2: Medium, 3: High))

	PY1 PO1	PY2 PO2	PY3 PO3	PY4 PO4	PY5 PO5	PY6 PO6	PY7 PO7	PY8 PO8	PY9 PO9	PY10 PO10
ÖÇ1 LO1	3	2					1			
ÖÇ2 LO2	2	3	2							
ÖÇ3 LO3	2	2	3	2						
ÖÇ4 LO4	1	2	3		2			3		
ÖÇ5 LO5										
ÖÇ6 LO6										
ÖÇ7 LO7										
ÖÇ8 LO8										
ÖÇ9 LO9										

ÖĞRENME AKTİVİTELERİ *(LEARNING ACTIVITIES)*

Aktiviteler* *(Activities*)*	**Sayısı** *(No:)*	**Ağırlığı(%)** *(Weight(%))*
Yüz yüze eğitim Face to face	14	60
Ödevler Homeworks	4	25
Sunum Presentation	3	15
Toplam *(Total)*:		100

**Aktivitelerin türü ve sayısı ihtiyaç halinde değiştirilebilir.* (*The type and number of activities may be modified as needed.)*

DEĞERLENDİRME *(ASSESSMENT)*

Değerlendirme Yöntemleri* *(Assessment Methods*)*	**Sayısı** *(No:)*	**Ağırlığı(%)** *(Weight(%))*
Ara sınav First exam	1	40
Ödev Homeworks	1	60
Toplam *(Total)*:		100

**Değerlendirme yöntemlerinin türü ve sayısı ihtiyaç halinde değiştirilebilir.* (*The type and number of assessment methods may be modified as needed.)*

AKTS DERS YÜKÜ *(ECTS WORKLOAD)*

Aktiviteler *(Activities)*	**Süresi** (saat) *(Duration (hours))*	**Sayısı** *(No)*	**İş Yükü** (saat) *(Workload (hours))*
Yüz yüze eğitim Face to face	3	14	42
Ödevler Homeworks	1	4	4
Sunum Presentation	6	3	18
Araştırma Reserach	5	2	10
Toplam *(Total)*:		74	**(AKTS: 7.5)**

Doç. Dr. Fatih HANCI

T. C.
ERCİYES ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ
DERS İZLENCESİ
(COURSE SYLLABUS)

HAFTALIK DERS PLANI *(WEEKLY COURSE PLAN)*

H *(W)*	Konu *(Topic)*	Çıktı *(Outcome)*
1	Sebzelerin sınıflandırılması ve dünyadaki üretim istatistikleri. Classification of vegetables and world production statistics.	Dünyanın farklı iklim kuşaklarındaki sebze üretim sistemlerini karşılaştırır. Compares vegetable production systems in different climatic zones of the world.
2	Tropikal ve ılıman iklim sebze türleri. Tropical and temperate climate vegetable species.	
3	Sebze yetiştiriciliğinde toprak ve iklim faktörleri Soil and climate factors in vegetable cultivation.	
4	Akdeniz havzasının geleneksel sebze yetiştiriciliği. Traditional vegetable cultivation in the Mediterranean basin.	
5	Asya'da pirinç-sebze sistemleri ve kültürel pratikler. Rice-vegetable systems and cultural practices in Asia.	
6	Kıtalara göre öne çıkan sebze türleri. Prominent vegetable species by continent.	Kıtalar arasındaki ticaret akışları ve ekonomik ilişkileri analiz eder. Analyzes trade flows and economic relationships between continents.
7	Latin Amerika'nın biyoçeşitlilik merkezleri. Biodiversity centers of Latin America.	
8	Afrika'da yerel sebze türleri ve gıda güvenliği. Indigenous vegetable species and food security in Africa.	
9	Dünya sebze ticareti ve ihracat-ithalat akışları. World vegetable trade and export-import flows.	
10	Küresel iklim değişikliğinin sebze alanlarına etkisi. Global climate change impacts on vegetable-growing areas.	Küresel iklim değişikliğinin bölgesel sebze desenlerine etkisini değerlendirir. Evaluates the impact of global climate change on regional vegetable patterns.
11	Farklı kültürlerde tüketim alışkanlıkları ve mutfaklar. Consumption habits and cuisines across different cultures.	Farklı kültürlerdeki üretim-tüketim pratiklerini örneklerle açıklar. Explains production-consumption practices in different cultures with examples.
12	Uluslararası tohum şirketleri ve çeşit dağılımı. International seed companies and varietal distribution.	
13	Dünya genelinde organik sertifikasyon sistemleri. Organic certification systems around the world.	
14	Ülkeler arası hasat takvimleri ve karşılaştırmalı analiz. Harvest calendars across countries and comparative analysis.	

DERS KAYNAKLARI *(COURSE RESOURCES)*

Ders Kitabı	**Rubatzky, V. E., & Yamaguchi, M. (1997). World Vegetables: Principles, Production, and Nutritive Values (2nd ed.). Springer US.**
Ders Materyalleri	**Ders sunuları**
Yardımcı Kaynaklar	**Kays, S. J. (2011). *Cultivated Vegetables of the World: A Multilingual Onomasticon.* Wageningen Academic Publishers.**

Doç. Dr. Fatih HANCI