

BIOTECHNOLOGY

THESIS AND NON-THESIS

MASTER'S PROGRAM 2018-2019

COURSE CONTENTS

CODE	COURSE CONTENTS
BYT 501	INTRODUCTION TO BIOTECHNOLOGY: The history of biotechnology and its main application areas, Biological systems used in biotechnology: prokaryotes, eukaryotes. Traditional biotechnology applications, microorganisms important in terms of microbial biotechnology, fermentation. Technical principles of fermentation. Industrial fermentation, scale-up, application areas. Bioenergy: Energy production by biotechnological methods. Environmental biotechnology and its applications: Waste water treatment, biomining, bioremediation. Pharmaceutical biotechnology. Animal cell culture and biotechnology. Agricultural biotechnology. Plant tissue culture. Bioinformatics and Bioelectronics. Biotechnology and ethics.
BYT 502	MICROBIOLOGY AND MICROBIOLOGICAL TECHNIQUES: In this context, nucleic acid structure and function, mutations and variations, regulation of gene expression, bacteriophage genetics, plasmids, gene transfer, genomic plasticity, genomic modification, DNA repair, genetic methods in the study of microorganisms, gene mapping and genomics, bacterial cell compartmentation and sporulation, immobilization of microorganisms and microbiological techniques will be taught.
ENS501	ARAŐTIRMA VE YAYIN : Bilim, bilgi, bilimsel araŐtırma, paradigmlar, Nicel araŐtırma yaklaŐımı, Nitel araŐtırma yaklaŐımı, yaklaŐımların eđitim araŐtırmalarına etkisi, araŐtırma sũreci, etik ve bilimsel etik, araŐtırmanın yazımı, hipotez ũretme ve tez, makale ve tez bũlũmlerinin ierikleri gibi, bilimsel araŐtırma yũntemlerine iliŐkin bilgilerin verilmesi, tez aŐaması iin ũn hazırlıđın tamamlanması, proje olanakları ve proje yazımı.
BYT 504	. SEMINAR : The aim of this course is to examine, research, present and discuss current biotechnology issues. Seminars; presented by lecturers, invited speakers, and students enrolled in the course. Thesis work can be presented as part of student presentations.

BYT 510	ADVANCED ANALYTICAL METHODS: Introduction to separation methods, mixtures, separation of physical and chemical mixtures, Thin layer paper and column chromatography, Application, Adsorption and dispersion chromatography, Ion exchange, gel permeation and affinity chromatography, High performance liquid chromatography (HPLC). HPLC application, Gas Chromatography, Gas Chromatography application, Metal determination (Atomic absorption-ICP)
BYT 511	Purification Techniques of Biomolecules: In this course, the techniques used in the purification of biomolecules, especially enzymes and other proteins, will be discussed in detail. The following topics will be covered in the course: An overview of biodegradation; characteristics of purification techniques; removal of insoluble substances; centrifugation techniques; product isolation; cell lysis; extraction; product purification; principles of chromatographic separations; ion exchange chromatography; gel permeation chromatography; hydrophobic interaction chromatography; adsorption chromatography; affinity chromatography; high performance liquid chromatography; ultrafiltration; electrophoresis; analysis of protein purity.
BYT 512	IMMOBILIZED ENZYME AND CELL TECHNOLOGY : Enzyme and cell immobilization methods and applications of immobilized catalysts will be discussed extensively in this course. The following topics will be covered in the course: Classification of immobilized enzymes; matrices for enzyme immobilization; enzyme immobilization methods; enzymes immobilized in soluble form; effects of immobilization methods on the kinetic properties of enzymes; immobilized cell fermentation versus conventional fermentation; cell immobilization techniques; activities of immobilized cells; applications of immobilized cells; Reactor types and kinetics for immobilized biocatalysts.
BYT 513	ADVANCED CELL CULTURE TECHNIQUES: In this course; cell culture conditions, cell lines, in vitro cytotoxicity tests, gene transfer (transfection) in cell culture, Design of reporter plasmids, use of RNA technologies in cell culture, retroviral infection, reporter retrovirus design, single cell colony formation, RNA isolation from cells, RNA quality analysis methods , Analysis methods in Flow Cytometry, RT-PCR and Microarray analysis methods will be explained practically.
BYT 514	BIOMATERIALS: The concept of biomedical materials, definition, classification and principles of biomaterials. Biomaterial production techniques, characterization and structural analysis of biomaterials. Biopolymers, Medical Biomaterials and Biopolymers. The concept of biocompatibility. Investigation of biocompatibility of biomaterials. Interaction of implant biomaterials with cell and tissue and immune response, polymeric biomedical materials, recent developments in the field of biomedical materials.
BYT 516	NANOBIO TECHNOLOGY: General Subjects Related to Nanobiotechnology and Fundamental Concepts in Bionanotechnology, Introduction to Nanotechnology, Micro Dimensions and Limitations, Definition and Importance of Nanosize, Materials Produced by Nanotechnology, Biological Conjugation in Nature, Application of Biological Conjugation in Nanotechnology
BYT 517	BIoinformatic : The aim of this course is to assist students in using bioinformatics tools to evaluate data obtained from biological systems. Course topics include analysis of biological sequences, biological databases and their use, structural and functional genomics and gene expression studies, protein structure, folding and protein-protein interactions.

BYT 518	<p>ADVANCED CHEMICAL COMPUTATIONS: Hartree-Fock Models, Hartree-Fock Self Consistent Field Method (HF-SCF), Ab Initio Molecular Orbital Theory, Fundamental Sets, Basis Function/Basis Sets, Hartree-Fock Transactional Functional Methods, Density Experimental Molecular Orbital Methods, What Can Be Done with Hespial Methods? How Do Programs Work? Introducing the Molecule to the Program, Energy Calculations, Conformational Equilibrium, Conformations of Cyclohexane Derivatives, Substituent Effect, Conformational Effects, Potential Energy Surfaces (PES), Global Minimum Problem, Reaction Thermochemistry, Kinetics and Thermodynamics Control, Hammond Postulate, Finding and Identifying Transition Positions</p>
BYT 519	<p>ADVANCED PLANT BIOTECHNOLOGY: Plant Molecular Biology: Organization and function of the Plant nuclear genome of <i>Arabidopsis thaliana</i>. Gene delivery system: Particle gun bombardment, microinjection, electroporation. Plant Viruses, Agrobacterium-mediated gene transfer. Genetic organization of Ti plasmids Functions encoded by integrated T-DNA. Molecular mechanism involved in the transformation of plants by <i>Agrobacterium tumefaciens</i>. Genetic engineering of plants for insect resistance: Bt toxins, use of protease inhibitors Transgenic plants for disease resistance. Transgenic ornamental and fruit plants. Engineering facilities for abiotic stress tolerance. Biopolymer production by transgenic plants. Fatty acid modification and oleosine technology. Gene silencing, PTGS, RNAi, Antisense technology, Applications. Plant micropropagation: Plant tissue culture: - History, Laboratory organization, Sterilization methods, Media preparation, Plant Growth Regulators, Micropropagation, Callus culture, Cell Culture, Protoplast Culture and Fusion, Organogenesis and Somatic embryogenesis. Application of tissue culture in product development in agriculture, horticulture and forestry. Plant Protection Methods, Haploid production: - Anther, Pollen, Embryo and ovule culture and applications.</p>