

Course contents

Courses		Syllabus	Pre-requisite	Hours/Week		
Code	Title			L	P/T	C
B100	General Botany	<u>Theoretical part:</u> Classification of plant kingdom- general aspects of virus, bacteria, algae & fungi- Cell structure– plant tissues- anatomy of primary plant organs- flower structure, inflorescences & fruits–selected families of flowering plants. <u>Practical part:</u> Living and nonliving contents in plant cell- sections in stem, root, flowers of monocot and dicot plants- different shapes of bacteria, algae, fungi and virus.	-	2	2/-	3
BT201	Introduction to Biotechnology	<u>Theoretical part:</u> Historical background about the development of biotechnology- major components of the biotechnological process used to produce certain beneficial products- microbial biocatalysts (wild and genetically modified strains)- methods for producing efficient microbial biocatalysts through recent molecular biology techniques- various raw materials used as carbon and energy sources and producing final product(s)- some applications in biotechnology- Ethics, safety and future of Biotechnology. <u>Practical part:</u> No	B100	2	-/-	2
BT202	Virology	<u>Theoretical part:</u> Historic view- definition- origin- characteristics of viruses- nomenclature & classification– composition & structure-effects of viruses on their hosts- transmission- pathogens confused with viruses- ways of control. <u>Practical part:</u> Different structures of plant viruses – study of different plant virus infections & symptoms- plant virus vectors- serological studies of plant virus infections.	B100	2	2/-	3

BT203	Bacteriology	<u>Theoretical part:</u> Morphology and functional anatomy of bacterial cells- structures and chemistry of bacterial cell wall- nutrition of bacteria- control of bacterial growth- classification of bacteria- bacterial metabolism: control and regulation of bacterial metabolism- energy generating metabolism- respiration- autotrophic metabolism- nitrogen fixation. <u>Practical part:</u> Sterilization- preparation of culture medium- isolation of bacteria from different sources- purification of bacteria- staining of bacteria- some biochemical tests- estimation of nitrogen fixation.	B100	2	2/-	3
BT204	Phycology	<u>Theoretical part:</u> Introduction - taxonomic criteria of algae- representative examples of algae: habitats, and evolution of algae. Economic important- some algal metabolites. <u>Practical part:</u> Morphological structure of algae- Definition of fresh water algae: Cyanophyta, Euglenophyta, Chlorophyta, Xanthophyta, Chrysophyta, Pyrrophyta)- Definitions of soil algae- Seaweeds (Chlorophyta, Phaeophyta, Rhodophyta)	B100	2	2/-	3
BT206	Molecular Biology	<u>Theoretical part:</u> Structure and function of nucleic acids- replication of double stranded DNA- nature of genes and genetic code- prokaryotic and eukaryotic gene structure and functions- transcription in prokaryotes and eukaryotes- post transcription- translation (RNA ribosome, initiation, elongation and termination)- control of gene activity in prokaryotes and eukaryotes- DNA vectors which includes plasmids, cosmids, phages and other types of vectors- DNA cloning, restriction enzymes and maps- PCR- DNA sequencing. <u>Practical part:</u> Laboratory safety techniques- DNA structure model- extraction of DNA from different organisms- extraction of plasmid DNA from bacteria- gel electrophoresis- PCR- model of gene cloning- restriction analysis of chromosome and plasmids DNA and determination of the sizes of the resulting restriction fragments- DNA ligation- elution of DNA fragments from agarose gel.	B100	2	2/-	3

BT207	Mycology	<u>Theoretical part:</u> Characteristics of fungi- ecology and distribution- mode of nutrition- reproduction- isolation and preservation techniques for fungi- Fungal classification (Myxomycota, Oomycota, Chytridiomycota, Zygomycota, Glomeromycota, Ascomycota, Basidiomycota) and representatives for each division and their life cycles. <u>Practical part:</u> Classification of fungi- isolation of fungi from different sources- representatives for Myxomycota, Mastigomycota, Zygomycota, Ascomycota and Basidiomycota.	B100	2	2/-	3
BT208	Plant Physiology	<u>Theoretical part:</u> Solutions– plant water relationship– enzymes-photosynthesis– respiration– fat metabolism- nitrogen metabolism- factors affecting plant growth- function of some elements- plant hormones. <u>Practical part:</u> Experiments for solutions characters- osmosis- permeability- photosynthesis- respiration.	B100	2	2/-	3
BT209	Cytology	<u>Theoretical part:</u> Cell wall– cell membrane– cytoplasm– Golgi apparatus– mitochondria & enzyme system– plastids– ribosomes– nucleus– chromosomes- cell division- phases of mitosis and meiosis. <u>Practical part:</u> Cell contents- phases of mitosis and meiosis.	B100	1	2/-	3
BT210	Taxonomy of Flowering Plants	<u>Theoretical part:</u> Historical review- plant nomenclature– basis of plant classification– Angiosperms characters- flower structure- function of each part of the flower- inflorescence types- life cycle of Angiosperms- pollination- fertilization- fruit types- different taxonomic systems- representative families of Monocots and Dicots- economic values of some plants of each family including ethno-pharmacology. <u>Practical part:</u> Floral structure: parianth, calyx corolla, androecium, gynoecium- inflorescence- pollination- fertilization- fruits- monocots families- dicots families.	B100	2	2/-	3

BT211	Plant Morphology and Anatomy	<u>Theoretical part:</u> Historical review- cell theory- cell structure and cell contents, Cell walls - medical values of cell contents-, economical values of cell walls- tissues, simple and compound tissues- epidermal characters- conductive tissue, Function and its economical values- secretory tissues, economical values of secretory tissues- function of each tissue, anatomy of organs in different plants and ecological adaptation in different organs. <u>Practical part:</u> Cell structure- cell contents- cell wall types-Tissue: simple tissues, compound tissues- primary and secondary plant body- secretory tissues- stem anatomy- root anatomy- leaf anatomy- ecological groups.	B100	2	2/-	3
BT301	Bacterial Biotechnology	<u>Theoretical part:</u> Genetic recombination in bacteria- genetic approaches for improving bacterial strains- selective isolation of mutants- Kinetics of bacterial cell growth- role of bacteria in production of milk products, antibiotics, enzymes, vitamins and biofuel- role of the genetic engineering in production of insulin, interferon, vaccines and growth hormones in bacterial cells- Biosynthesis of bioplastic and Indigo dye- Bioremediation- biofertilizers. <u>Practical part:</u> Isolation and characterization of economic bacteria such as bacterial milk flora, crude oil degrading bacteria, antibiotic producing bacteria, nitrogen fixing bacteria- test the effect of <i>Rhizobium</i> on the plant germination- test the ability of bacteria to produce biofuel.	BT203	2	2/-	3
BT302	Enzymology	<u>Theoretical part:</u> Introduction (what are enzymes- sources of enzymes)- enzymes as biological catalysts- enzyme classes- enzyme specificity- co-enzymes- enzyme inhibitors- regulators- structure and properties of enzymes- mechanism of action- reaction and kinetics of enzymes- factors affecting enzymes activity- isolation, production and separation of enzymes- immobilized enzyme systems- enzyme reactor design and optimization- application of enzymes in foods, feed, detergents, textiles, paper making and several others- application of enzymes in genetic engineering related biotechnology.	BT208	2	2/-	3

		<u>Practical part:</u> Screening for sucrose, α-amylase, cellulose, protease and lipase on solid medium- assay of glucose dehydrogenase produce by yeast- assay of catalase enzyme production- assay of lipase enzyme activity on liquid medium - factors affecting lipase enzyme activity – production, separation and purification of enzymes - immobilized enzyme systems- study the enzyme kinetics.				
BT303	Fungal Biotechnology	<u>Theoretical part:</u> Biotechnological applications of fungi and yeasts- recombinant technology in yeasts and fungi: composition of the different types of fungal vectors, selection markers, transformation strategies, gene replacement or inactivation- <i>Saccharomyces cerevisiae</i> as model and screening organism- Heterologous gene expression/protein production: description of the yeast secretion pathway, increase gene expression, applications and production of foods from fungi (mushrooms, truffles, cheeses, protein from <i>Fusarium venenatum</i>). microbial and biological preparation used as biological pesticides and biofertilizers- microbial preparation used to clean-up various environments from harmful contaminants- future perspectives. <u>Practical part:</u> Production of enzymes, antibiotics, food production (mushroom cultivation), Biodegradation of agro-industrial wastes- detection of phosphate solubilization- production of Indole acetic acid- fungal preparations as biofertilizers agents.	BT207	2	2/-	3
BT304	Algal Biotechnology	<u>Theoretical part:</u> Introduction to algal biotechnology- application of algae- bioactive algal products- algae as a source for energy- natural products from algae and their biological activities- algae as a biofertilizers- purification of waste water using algae. <u>Practical part:</u> Different techniques for algal cultivation- determination of algal pigments- estimation of hydrogen, biodiesel and ethanol production by algae- isolation and identification of some algae use in purification of waste water- algal toxins.	BT204	2	2/-	3
BT306	Environmental Bioremediation	<u>Theoretical part:</u> Introduction- soil remediation methods- advantages and disadvantages of phytoremediation- factors affecting the use of bioremediation-	B100	2	-/-	2

		inorganic pollutants (or metal phytoremediation)- strategies involved in phytoremediation-phytoextraction (concentration, accumulation, hyperaccumulation)- phytovolatilization- Phytostabilization- Phytofiltration- Phytodegradation (or detoxification)- biosorption- biotechnology and transformation- organic pollutants (xenobiotics; organophosphates; chlorinated aromatics and other problematic compounds)- mechanisms of action (phytodegradation, rhizodegradation, phytovolatilization)- uptake and metabolism- oxygenation- increasing biodegradation- removal of radionuclides. <u>Practical part:</u> No				
BT307	Biological Control and Antimicrobial Agents	<u>Theoretical part:</u> Microorganisms used in biological control and its mechanisms- fungi as biocontrol agents- commercialization of biocontrol agents- factors affecting biological control- safety of biocontrol agents to the environment. Definition, terminology and mechanisms of action of antimicrobial agents- classification of antimicrobial agents: Drugs acting on cell wall, cell membrane, drugs inhibiting protein synthesis, drugs inhibiting nucleic acid synthesis and antimetabolites- Interaction between two antimicrobial agents- characteristics of an ideal antimicrobial agent- antifungal, antibacterial, antiviral, anti-protozoal agents- clinical strategies of prescription in development of antimicrobial and chemotherapeutic agents- antibiotic sensitivity assays- microbial resistance and abuse of antimicrobial agents. <u>Practical part:</u> Microorganisms used in biological control- selection of biocontrol agent- fungi and bacteria as biocontrol agents for pests & insects– biocontrol of nematodes- factors affecting biological control agents- antagonistic effect.	BT207& BT203	2	2/-	3
Ag308	Molecular Genetics	<u>Theoretical part:</u> recognition of DNA as genetic material- methods and tools for studying genes and gene activity- introduction to gene manipulation- directed mutagenesis- Genomic and cDNA library which includes; methods of constructing the library and screening- Methods use in analyzing of genes and their products which includes; Southern blotting, Northern blotting, mapping transcripts and Western blotting- Polymerase Chain reaction PCR- expression of vectors-assaying DNA-	BT206	2	2/-	3

		protein interaction- genetic testing for disease- gene therapy- DNA technology in criminal cases. <u>Practical part:</u> biosafety of genetic materials and genetic modified organisms- gene cloning- Polymerase Chain reaction (PCR) and Biotechnology, Melting point Determination of the Oligonucleotides (primers)- Electrophoresis of amplified PCR- gene expression by isolation of RNA, Northern blotting, preparation of probes and Western blotting- two dimensional gel electrophoresis- Analysis and interpretation of results.				
BT309	General Ecology	<u>Theoretical part:</u> Introduction and terminology- levels of ecological organization and types of ecological studies- the organism and the environment- principles pertaining to environment and organisms- general principles of Ecology- ecological indicators- solar radiation and energy flow in ecosystem- insulation- general principles of ecosystem-different relationships between biotic and abiotic components of ecosystem- energy flow and ecological pyramids- measurement of ecosystem productivity- biogeochemical cycles and roles of microorganisms- microorganisms, soil, plant relationship- temporal variations in ecosystems- biotic factors- edaphic factors- climatic factors. <u>Practical part:</u> Instruments for climate measurements- soil factors- determination of water content, water levels, saturation capacity and field capacity of the soil- determination of wilt point- determination of total salts, chloride, carbonate and bicarbonate- determination of calcium, magnesium, organic carbon, and phosphorus.	B100	2	2/-	3
BT310	Recycling and Waste Management	<u>Theoretical part:</u> Analysis of fundamental physical, chemical, and biological processes- applied to waste management- sources, characteristics, fate, impact, and control of liquid, gaseous, and solid wastes- cross-media issues in waste management- introduction to unit operations and processes for wastewater and waste gas treatment-	BT209	2	2/-	3

		bioremediation of waste streams, including by-product utilization- applications to municipal, industrial, and agricultural wastes. <u>Practical part:</u> Principles of management- Analysis of Ministry of Health regulations, Computer based laboratory information system.				
Ag311	Genetic engineering and Tissue Culture	<u>Theoretical part:</u> Introduction to plant technology- the basic principles and techniques used for in vitro cultivation of tissues- types of tissue culture- establishing and maintaining cell lines- application of plant cell hybridization in biotechnology- plant breeding- marker genes, reporter genes, selectable markers, vectors or direct gene transfer- mutagenesis- regeneration- transformation- micropropagation- production of improved plants to resist pesticides, salinity, drought or plant diseases- roles of transgenic in plant improvement– production of vaccines, oils, proteins in genetically modified plant. <u>Practical part:</u> Culture media- different types of explants-callus regeneration- suspension culture- some application, production of improved plants to resist pests, salinity, drought or plant diseases.	BT208	2	2/-	3
BT312	Introduction to Bionanotechnology	<u>Theoretical part:</u> Principles of nanotechnology- synthesis and biosynthesis of nanoparticles- factors affecting on nanoparticles size- characterization of different types of nanoparticles which synthesize using microbes and plant extracts- application of nanoparticles in different fields. principles and concepts of medicine nanotechnology. <u>Practical part:</u> Synthesis and biosynthesis of nanoparticles - characterization of different types of nanoparticles which synthesize using microbes and plant extracts, application of nanoparticles in different fields such as its anti- microbial effect.	BT203	2	2/-	3
BT313	Stress Physiology	<u>Theoretical part:</u> Physical meaning of stress – types of stress (biotic –abiotic) – salinity stress- water stress (drought-flooding) - temperature stress (heat- frost) other stresses. Drought avoidance and tolerance – adaptation of plant to stresses- alteration in plants in response to these stresses.	BT208	2	2/-	3

		<u>Practical part:</u> Studying the effect of different stresses on plant growth and membrane stability- estimation of some stress- induced compounds.				
BT315	Microbial Toxins	<u>Theoretical part:</u> Introduction and definitions- classification of microbial toxins (bacterial toxins: Lipopolysaccharides toxins (endotoxin) - Protein toxins (exotoxin) – phycotoxins: fresh water algal toxins - marine algal toxins- Mycotoxins-mycotoxicoses)- diversity and occurrence of microbial toxins- factors affecting toxin production by microorganisms - mechanisms of action, bioavailability, toxicity to humans- sources and characteristics of microbial toxins- extraction and purification of toxins- detection methods- spoilage of foods by toxins - strategies for prevention and control of toxins. <u>Practical part:</u> Classification of microbial toxins- cultivation of toxigenic microbes on synthetic medium and natural sources– extraction of microbial toxins– purification of microbial toxin- detection of microbial toxins by physical and chemical methods- bioassay of microbial toxins by using shrimps larvae & mice.	BT203& BT207	2	2/-	3
BT317	Industrial Fermentation	<u>Theoretical part:</u> introduction, selection & preparation of starter- selection& preparation of raw materials- fermentors, fermentation mode- isolation & purification of products- scale up & scale down. <u>Practical part:</u> Industrial microbes: selection, purification, preparation, propagation & sporulation- preparation of raw material (saccharin, starchy& lignocellulosic materials)- fermentation mode (surface, submerged,batch- fedbatch- semicontinuous, continuous& sold state fermentation)- isolation & purification of products.	BT207	2	2/-	3
BT319	Medicinal Plants	<u>Theoretical part:</u> Historical notes- classification of medicinal plants- injurious plants- remedial plants- psychoactive plants- poisons plants- attarin plants- cultivation of medicinal plants.	BT210	2	2/-	3

		<u>Practical part:</u> Types of medicinal plants.				
BT400	Research Project	An essay or research article in one of the different fields of biotechnology	-	-	-/-	2
BT401	Bioinformatics	<u>Theoretical part:</u> Overview of bioinformatics & data acquisition- finding genes & genes structure- identification of STS within a DNA sequence- identifying cloned genes within STS sites- Finding SNPs within STS sites- correlation of a fragment of mRNA to gene locus- retrieving gene sequence- identifying structure of genes- finding all members of a gene family- determination of functional domains of proteins- Phenotype and gene relation- structural bioinformatics. <u>Practical part:</u> The use of computer- based software for analyzing gene sequences and data banks. applications of specific examples of Laboratory Information Management System (LIMS) like Simatic IT Unilab, Biosoft- use of computers in modeling of biological molecules.	BT208	1	2/-	2
BT402	Industrial Biotechnology	<u>Theoretical part:</u> Strains improvement for production of fungal metabolites- media and growth conditions- fermentations- yeast production- ethanol, biogas fermentation- organic acids production- antibiotics production- hypocholesterol- emic agents (lovastatin)- antitumor agents (taxol)- steroids biotransformation- biotechnology of insulin production. <u>Practical part:</u> Fermentation – production of single cell protein - production of bioethanol –production of acids and bases by microorganisms – production of antibiotics by microorganisms.	TB301& TB303	2	2/-	3

BT404	Pollution and Bioindicators	<u>Theoretical part:</u> Introduction- classification of pollutants- resources and causes of Pollution- atmospheric pollutants- water and soil pollutants- toxic metals- pesticides and herbicides- factors that influence the plant response to pollutant exposure- metabolism of toxic substances by plants- plants as pollution indicators- interaction of some pollutants with plant function- factors controlling movement of pollutants within the plant organs. <u>Practical part:</u> Biosorption of heavy metals by microbes – biodegradation of organic pollutants (xenobiotics, organophosphates, chlorinated aromatics and other problematic compounds).	BT309	2	2/-	3
BT405	Field Training	Training in one of the different fields of biotechnology.	-	-	-	-
Ag406	Food Microbiology & Biotechnology	<u>Theoretical part:</u> Principles of heat transfer and fluid flow to design food processing operations such as thermal and aseptic processing, freezing, pumping, drying, evaporation, and extrusion- uses of microorganisms in production of foods such as cheese and yoghurt- environmental parameters governing food spoilage by bacteria, fungi and yeasts- isolation, enumeration and identification of food-borne microorganisms- toxins of food borne microorganisms- Advantages and disadvantages of genetically modified food products. Marketing, government regulations and nutrition issues. <u>Practical part:</u> isolation of Microorganisms From Contaminated foods- Enzymes Production from Microorganisms- Assay of Microbial toxins- control of microorganisms in preservation.	BT203& BT207	2	2/-	3
BT407	Molecular Systematics	<u>Theoretical part:</u> Historical review- micro-molecules, macromolecules and semantides- plant genomes- molecular data- gene mapping- gene sequencing genome rearrangements- sequence data- analysis of molecular data- molecular characters- chloroplast DNA structure, rbcl- nuclear genes- ribosomal RNA- low copy number genes and high copy number genes- phylogenetic theory, Characters and character coding- tree building techniques- tree statistics and tree support- Bayesian inference- alignment- molecular Dating- molecular identification using	BT308	2	2/-	3

		RAPD- SSR- ISSR. <u>Practical part:</u> Protein structure- protein & enzymes extraction- SDS PAGE gel electrophoresis- DNA & RNA structure and extraction- DNA & RNA hybridization- DNA sequencing- polymerase chain reaction (PCR)- Plant genome sources.				
BT408	Biochemical Engineering	<u>Theoretical part:</u> introduction– fermentation design, nutritional requirements- fermentation optimization–maximization of products metabolic engineering– harvesting extraction – purification of the products. <u>Practical part:</u> Several experiments on the nutritional requirements- maximization of products- harvesting , extraction and purification of the products.	BT207	2	2/-	3
BT409	Bioenergy	<u>Theoretical part:</u> The concept of biomass as a renewable source of energy- types of bioenergy (bioethanol- biodiesel- biogas- biohydrogen) production of acetone, butanol, ethanol- biomass- (pyrolysis – gasification- incineration). <u>Practical part:</u> Production of ethanol by yeast- production of biodiesel from oleaginous microorganisms- biogas production by methanogenic bacteria – biohydrogen production by dark fermentation & light fermentation – production of acetone, butanol and ethanol by clostridia.	BT204	2	2/-	3
BT411	Bioassay	<u>Theoretical part:</u> bioindicators- bioassays using microorganisms (bacteria, fungi and algae)- aquatic animals- terrestrial animals- cells- tissues and organs culture systems & higher plants- antimicrobial activity tests, immunoassays (ELISA, RIA, & ELFA) – Immunoaffinity- column assays- PCR. <u>Practical part:</u> Several experiments about bioindicators, bioassays- application of ELISA & ELFA.	BT203& BT207	2	2/-	3

C 211	Organic Chemistry for Non – Chemistry Students	<u>Theoretical part:</u> Chemistry of aliphatic compounds – chemistry of selected aromatic compounds. <u>Practical part:</u> Selected practical experiments.	C105	2	3/-	3
C445	Instrumental Methods of Analysis	<u>Theoretical part:</u> Introduction to atomic spectrometry -absorption, florescence and polarography & amperometry, conductometry & and modern voltammetric techniques, analytical Separation. <u>Practical part:</u> selected practical experiments	C105	2	3/-	3
C 453	Industrial Chemistry	<u>Theoretical part:</u> Silicate Technology (Ceramics – Glass – Fertilizers – Cement) Energy and Raw materials – Paper industry – Pigments, Paints , Varnishes and printing Inks . <u>Practical part:</u> No	C 105	3	-/-	3
C460	Analytical Chemistry for Biology Students	<u>Theoretical part:</u> Acid- base titration, precipitation titrations- complexometric titration- redox titration- gravimetric analysis- potentiometric titration- ultraviolet-visible spectrophotometry- atomic spectrometry- conductometry and modern voltammetric techniques- analytical separation- HPLC- Electrophoresis. <u>Practical part:</u> Some experiments in titrations in the field of analytical chemistry.	C105	2	3/-	3
P323	Biophysics	<u>Theoretical part:</u> Studying DNA and biopolymers- cell membrane and membrane potentials- electrical activity of nerve cells- fundamental of measuring circuits and	P105	3	-	3

		systems- temperature and pressure measurements- measuring cell potential. <u>Practical part:</u> Some experiments in the field of biophysics.				
MC 354	Computer Networks	<u>Theoretical part:</u> Network architectures and protocols, placing emphasis on protocols used in the internet. Specific topics include application layer protocols, network programming, transport protocols, routing, multicast; data link layer issues, multimedia, networking, network security, and network management. Simulation of the network/ transport layer functions, routing, congestion control, an Ethernet controller, and applications using TCP/ IP or remote procedure calls. Intended audience: computer science and computer engineering majors. <u>Practical part:</u> network programmin.g	MC105	2	2/-	3
Z 292	Biology of Water Pollution	<u>Theoretical part:</u> Aquatic systems; mechanisms of interaction; physical alteration ; nutrients and eutrophication, acidification; pesticides ; heavy metals; petrochemical; industrial wastes ; thermal pollution , radioactivity , oils, field analysis ; land use and planning concepts ; biological organization of lakes , rivers estuaries, and the deep sea; human impact on aquatic environments; laboratory and field approaches to the study of natural processes . Biological assessment of water quality. Management of water resources on the light of water pollution. <u>Practical part:</u> selected practical experiments.	Z 100	2	2/-	3

M100	General Mathematics(1)	-	Calculus: Functions of one variable - Limits and Continuity - Derivatives -	2	-	2	3
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			Applications of Differentiation - Taylor and McLaurin series, Indefinite and definite integrals. Algebra: Mathematical induction - series - Partial fractions - Matrices and systems of linear equations - Approximate solutions of non-linear equations.			
M105	General Mathematics(2)	M100	Calculus: Techniques of integration - Definite integrals and their properties–improper integral – numerical integration - Applications of definite integrals. Geometry: Coordinate systems in the plane - Straight lines and circles in general forms - Conic sections - Geometric transformations in the plane - Coordinate systems in the space - The plane and the straight lines in the space and surfaces of revolution of second order and ruled surfaces.	2	- 2	3
MC100	Computer	-	Fundamentals of programming and computer languages - Algorithm and Flowcharts - Elements of Language under case - Basic Instructions in Language under case - Control Instructions - Arrays and dimension statement – Subprograms - Some applications.	1	2 -	2
MS241	Biostatics	M105	Some basic probability concepts – Some important sampling distributions – Estimation Hypothesis testing – Analysis of variance - Regression and correlation – Multiple regression and correlation – Goodness of fit test.	3	- -	3

C100	General Chemistry (1)	(A):Atomic Spectra – Electron Orbital and Quantum Numbers – Quantum Energy Levels in Atoms – Basic Concepts of Bonding Electronegativities – Lewis Structure – The Octet Rule – Dipole moment – Resonance Hybridization in Molecules – Geometries of Molecules – Orbital Configuration for Diatomic Molecules. (B):State of Matter – Introduction in Surface and Colloids Chemistry – Electrolytic Cell – Electrochemical Cells – Potential of Electrode (Practical: Selected practical experiments)	-	2	3	3
C105	General Chemistry (2)	(A): Chemical Equilibrium – Ionic Equilibrium – Basic of Qualitative Analysis – Solution Chemistry. (B):Introduction on Organic Chemistry-Bonding in Organic compounds – Hybridization in Carbon Compounds – Physical Properties of Org. Compounds – Nomenclature, Synthesis and Chemical Reactions of alkanes, alkenes and alkynes (Practical: Selected practical experiments)	C100	2	3	3
P100	General Physics(1)	Physical quantities - Units and dimensional analysis - Vectors - The laws of motion in one- and two- dimensions and its applications - Newtown's second Law of motion and its applications. Work and energy - Heat and heat conduction - The kinetic theory of gases - Specific heat of gases - First law of thermodynamics. 12 Experiments related to the above topics.	-	2	-/3	3
P105	General Physics(2)	The nature and propagation of light - Reflection and refraction at plane surface - Lenses & Mirrors, Eye's structure and camera - Microscopes and Telescopes - Coulomb law and electrostatic fields - Electrostatic potential- Capacitance and dielectrics- Electric current, DC circuits and Krichhoff's Rules-Magnetic field and magnetic force - Electromagnetic induction. 12 Experiments related to the above topics.	P100	2	-/3	3
G100	Fundamentals of Geology	Origin of Planet Earth: Constituents of the Earth's crust (crystals, minerals, rocks) – Classification of rocks Internal Processes: Dynamics, structures and plate tectonics –Development of structural traps and ore deposits External Processes: Weathering – Erosion – Wind action – Geological work of	-	2	3	3

		waters (surface, groundwater, seas and oceans) – Formation of hydrocarbons and sedimentary ores – Development of stratigraphic traps Time scale: Geologic timescale and fossil records				
Z 100	General Zoology	Protoplasm. Organization and function of animal cell. Study of the animal tissues. Life functions. Introduction to early development of animals. Characters and classification of the major animal phyla.	-	2	3	3
F300	Scientifics Ethics and Safety	The course will cover ethical, social, environmental, and safety issues surrounding important scientific advances including genetically modified organisms, animal cloning, nanotechnology, weapons of mass destruction, and stem cells. It will focus on intensive discussions to develop the powers of reasoning and judgment. The second part of the course will cover biosafety and how scientists should handle biological and chemical waste, in relation to national and international biosafety regulations.	-	2	-	2
UR 050	Human rights	Basic concepts about human rights, what is the human rights, importance of human rights study, human rights and peoples rights, human rights initiation and resources, evolution and initiation resources, national resources, international resources, types of human rights and their constrains rights, civilian and politician rights, economical and social rights, human rights in Islamic laws and other laws constrains, constrains under ordinary circumstances, constrains and expectation circumstances, mechanisms of human rights protection, organizational mechanisms, legislative mechanisms at national and international levels, applied aspects of human rights in science and research fields, local and global human rights case studies.	-	2	-	-

برنامج بيوتكنولوجيا النبات والميكروبيولوجى المقررات الدراسية لمستوى الثانى (٩-٩-٢٠٢٣)

الفصل الدراسي	كود المادة	اسم المادة	المتطلب السابق	نوع المقرر (متطلب)	حاله المقرر		عدد الساعات				الدرجة						
					أجبارى	أختياري	نظري	عملي	تدريب	معمله	عملي	شفوي	منتصف الفصل	اعمال السنه	نظري	المجموع	
الاول	٢٠١ ن ت	مقدمه عن التقنيه الحبويه	١٠٠ ن	تخصص	١		٢	-			٢	-	١	٢	١	٥٠	١٠٠
	٢٠٣ ن ت	علم البكتريا	١٠٠ ن	تخصص	١		٢	٢			٢	٢	١	١	١	٥5	١٠٠
	٢٠٧ ن ت	علم الفطريات	١٠٠ ن	تخصص	1		2	2			3	20	10	10	10	50	100
	ن ت209	علم للخليه	ن 100	تخصص	1		1	2			2	20	10	10	10	50	100
	211 ن ت	مورفولوجى وتشريح النبات	١٠٠ ن	تخصص اختياري		1	2	2			3	20	10	10	10	50	١٠٠
	٢٤١ ر	احصاء حيوى	١٠٥ ر	تخدم التخصص اجبارى	١		٣	-			٣		10	30	10	50	١٠٠
	٢١١ ك	كيمياء عضويه لغير طلبه كيمياء	١٠٥ ك	تخدم التخصص اختياري		1	٢	٣			٣	20	10	10	10	50	١٠٠

<u>٧٠٠</u>						<u>19</u>				<u>٢</u>	<u>٥</u>				<u>المجموع</u>	
100	50	10	10	10	20	3		2	2		١	تخصص	١٠٠ ن	علم الطحالب	٢٠٤ ن ت	الثاني
100	50	10	10	10	20	3		2	2		1	تخصص	100 ن	بيولوجيا جزئيه	٢٠٦ ن ت	
100	50	10	10	10	20	3		2	2		1	تخصص	100 ن	فسيولوجيا النبات	٢٠٨ ن ت	
100	٥٠	١٠	١٠	١٠	٢٠	2		2	1		1	تخصص	١٠٠ ن	تصنيف النباتات الزهرية	٢١٠ ن ت	
100	50	10	10	10	20	3		2	2	١		تخصص اختياري	١٠٠ ن	علم الفيروسات	202 ن ت	
١٠٠	50	10	10	10	20	٣		٢	2		١	تخدم اجباري	100 ن	بيولوجيا تلوث المياه	٢٩٢ ن ت	
<u>٦٠٠</u>						<u>١٧</u>				<u>١</u>	<u>٥</u>				<u>المجموع</u>	

المستوى الثالث برنامج بيوتكنولوجيا النبات والميكروبيولوجى – المقررات الدراسية

الفصل الدراسي	كود المادة	اسم المادة	المتطلب السابق	نوع المقرر (متطلب)	حاله المقرر		عدد الساعات			الدرجة							
					أجباري	اختياري	نظري	عملي	تدريب	مقدمة	عملي	شفوي	الفصل	منتصف	السنه	اعمال	نظري
الأول	٣٠١ ن ت	التقنيه الحيويه للبكتريا	٢٠٣ ن ت	تخصص	1		2	٢		3	20	10	10	10	10	50	100
	303 ن ت	التقنيه الحيويه للفطريات	207 ن ت	تخصص	1		2	2		3	20	10	10	10	10	50	100
	٣١١ ن ت	زراعه الانسجه والهندسة الوراثيه	٢٠٨ ن ت	تخصص	1		2	2		3	20	10	10	10	10	50	100
	307 ن ت	المكافحه البيولوجيه والعوامل المضاده للميكروبات	٢٠٣ ن ت ٢٠٧ ن ت	تخصص	١		2	2		3	20	10	10	10	10	50	100
	٣١٩ ن ت	النباتات الطبيه	٢١٠ ن ت	١٠٠ ن	١		٢	٢		٣	20	10	10	10	10	50	100
	٣١٣ ن ت	فسيولوجيا الاجهاد	٢٠٨ ن ت	اتخصص		1	2	2			20	10	10	10	10	50	100
	٣١٥ ن ت	السموم الميكروبيه	٢٠٣ ن ت ٢٠٧ ن ت	اختياري						3	20	10	10	10	10	50	
	المجموع				٥	1				١ ٨							١٠٠
	٣٠٢ ن ت	علم الانزيمات	٢٠٨ ن	تخصص	1		2			3	-	10	30	10	10	50	100

100	50	10	10	10	20	3		٢	٢		١	تخصص	٢٠٤ ن ت	التقنية الحيوية للطحالب	٣٠٤ ن ت
100	0٥	10	0٣	10	-	2		-	2		1	تخصص	100 ن	المعالجة البيولوجية للبيئة	٣٠٦ ن ت
١٠٠	50	10	10	10	20	3		2	2		١	تخصص	٢٠٦ ن ت	وراثة جزييه	٣٠٨ ز
100	50	10	10	10	20	3		2	2			تخصص	٢٠٩ ن ت	اعاده التدوير وادارة النفايات	٣١٠ ن ت
	50	10	10	10	20			2	2	١		اختيارى	٢٠٣ ن ت	مقدمه عن تقنيه النانو الحيوية	٣١٢ ن ت
١٠٠	٥٠	١٠	١٠	١٠	٢٠	3		2	2		1	تخدم اختيارى	٢٠٣ ن ت	مناعة	٣١٨ ط
	٥٠	10	٣٠	10			٢		٢				١٠٥ ر	شبكة حاسب	٣٥٤ رك
<u>٦٠٠</u>						<u>17</u>					<u>2</u>	<u>٤</u>			<u>المجموع</u>

برنامج بيوتكنولوجيا النبات والميكروبيولوجي – المقررات الدراسية (المستوى الرابع)

الفصل لدراسي	كود المادة	اسم المادة	المتطلب السابق	نوع المقرر (متطلب)	حاله المقرر		عدد الساعات				الدرجه					
					أجباري	أختياري	نظري	عملي	تدريب	معمده	عملي	شفوي	منتصف الفصل	اعمال السنه	نظري	المجموع
الاول	٣٠٩ ن ت	بينه عامه	١٠٠ ن	تخصص	١		٢	٢		٢	٢	١	١	١	٥٠	١٠٠
	٤٠١ ن ت	المعلوماتيه الحيويه	٣٠٨ ز	تخصص	١		1		2	٢		10	30	10	50	100
	٤٠٥ ن ت	تدريب ميداني	٢٠١ ن ت ٢٠٧ ن ت	تخصص	1				-	-	-	-	-	-	-	-
	٣١٧ ن ت	التخمير الصناعي	٢٠٧ ن ت	تخصص	٢		٢	٢		٦	20	10	10	10	50	٢٠٠
	409 ن ت	الطاقة الحيويه	٢٠٤ ن ت	اختياري			٢	٢			-	10	0٣	10	0٥	
	٤١١ ن ت	اختبارات بيولوجيه	٢٠٣ ن ت ٢٠٧ ن ت				٢	٢			20	10	10	10	50	
	٣٢٣ ف	فيزياء حيويه	١٠٥ ف	تخدم اجباري	١		٣	-		٣		10	30	10	٠5	١٠٠
		المجموع			5	2				1						٥٠٠

