

Short Courses Description

I- Compulsory courses from the Specialization

Course number and code: MBIO 140	Course title: General Microbiology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Introduction –Principals of Microbiology - Historical Review of the pioneer Microbiologist – Development of Microbiology – Methods of Studying Microorganisms – Classification of Microorganisms – Chemistry of Microbial Cell - Structure of Microbial Cell – Microbial Genetic – Nutrition and Microbial Metabolism –Survey Of microorganisms and their habitats – Growth and Reproduction – Relationships with other Organisms – Antimicrobial Agents-Immunity – Biotechnology - Microorganisms in medicine – Microorganisms in Industries- Microorganisms and Pollution.	
Course number and code: MBIO 240	Course title: Laboratory Skills
Effective hours: 2 (0+0+4) (Lect. – Exer. – Pract.)	
The basic techniques in Microbiology laboratories (Microbiology Lab. Organization and management The microcopy technique ,Kinds of microscopes , Sterilization techniques – Pure culture techniques – Morphology , growth and staining technique – Effect of physical and chemical factors on microorganisms physiological activities.-Antibiotic production- microbial Enzymatic activities- Medical microbiology.	
Course number and code: MBIO 250	Course title: General Virology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
General characteristics of Viruses- cultivation and purification of viruses – Physical and chemical structure of human and animal viruses –Methods of classification — Families and replication cycle of human and animal viruses – Detection method of vaccine and antiviral drugs.	
Course number and code: MBIO 260	Course title: General Bacteriology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Isolation methods – Pure culture – Identification by using chemical and molecular methods – Bacterial groups, their characteristic taxonomy and biological significance.	
Course number and code: MBIO 270	Course title: General Mycology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
General characteristics of fungi – Growth – Classification – Reproduction – The Economics importance and commercial uses.	
Course number and code: MBIO 280	Course title: Biology of Microalgae
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Divisions of microalgae – the biotechnology of microalgae – the microalgae and human – Cell structure – Nitrogen fixation – growth – Phycotoxins.	
Course number and code: MBIO 320	Course title: Microbial Diagnosis
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Samples collection-Transport – Processing – storage condition for microbial diagnosis of human diseases by molecular technology – Laboratory emphasize basic and clinical techniques for nucleic acid antigenic serology based detection methods.	
Course number and code: MBIO 331	Course title: Microbial Physiology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	

Energy: its importance, its compounds and sources stating the physical and chemical nature of the phenomena. The carbon sources and the spectrum of bacterial utilization of natural carbon sources maintaining the recycling of compounds in and out the biological system. The formation of the primary units for construction of the cell and its relation to nutrition and growth. The primary metabolism and secondary metabolism to explain growth, industrial and the pathogenic nature of microbes.

Course number and code: MBIO 334	Course title: Biochemical Instrumentation Techniques
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Basic understanding of the operational principles and application of various instrumental techniques commonly used. It is designed to cover ultracentrifuge atomic absorption spectrophotometry (AAS), Electrophoresis, all types of chromatography including, gas chromatography (GC), high-performance liquid chromatography (HPLC), Protein isolation and purification. DNA extraction and analysis.	

Course number and code: MBIO 340	Course title: Microbial ecology & Pollution
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Introduction to Microbial Ecology – Methods used to study microbial ecology – survey of microorganisms- Effect of Physical and Chemical factors on the growth and Distribution of microorganisms – Microorganisms in the different environments – effect of environments on microorganism and Microorganisms on the environments – geochemical cycles – Plants Surfaces as an important habitat – Microbial equilibrium in soil - Microbial Pollution.	

Course number and code: MBIO 344	Course title: Water sanitation Microbiology
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Introduction-Water as Biotopes for Microorganisms- Distribution of Microorganisms in the aquatic habitats –s – Microorganisms and Water pollution – Microbial flora of Sewage – Pathogenic Microorganisms in water and sewage- Sewage treatments – Role of Microorganisms in the Purification of Water – Preparation of water for drinking and other purposes – Chemical and Biological tests of water- the economic significance of Aquatic Microorganisms	

Course number and code: MBIO 351	Course title: Microbial Genetic
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Overview of genetic material DNA assembly and structure/function relationships. DNA replication, transcription and translation, regulation of gene expression – Gene cloning and chemical analysis of DNA restriction enzyme and sequencing methods – Recombinant DNA technology and genetic engineering concept and applications in field of microbiology.	

Course number and code: MBIO 222	Course title: Microbial Fine Structure
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
The courses outcome of the physiological activities so it does explain the resulting structures; The capsule - The filamentous structures -The cell envelope -The cell wall - The outer membrane - The cytoplasmic membrane - The genetic tools - The chromosomes - The plasmids - The spores - The ribosomes - The biological membranes.	

Course number and code: MBIO 450	Course title: Medical Virology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	

Human and animal viruses- Lab diagnosis and new techniques – Infection methods – General properties of viruses - Overview of steps in viral pathogenesis – Entry and replication – Spread and cell tropism – Cell injury and clinical illness – Host immune response – Recovery from infection- vaccines – Antiviral agents – Viral diseases.

Course number and code: MBI0 451	Course title: Immunology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
How multicellular organisms have evolved defense mechanisms that are foreign to the body – Molecules and cells involved in normal immune defense mechanisms – Organs of immune systems and differences between innate and adaptive immunity, humoral and cellular immunity structure/function relationships in antibodies classes antibody synthesis and genetic mechanisms for antibody diversity, Molecular basis of T-cell activation, role of cytokines in adaptive immunity and inflammation. Structure/function of B-cell and T-cell receptors and MHC-I and II. Immunological methods for production and application of antibody molecules as tools for research diagnosis and treatment. Basis of acquired immune deficiency, hypersensitivity reaction, tolerance and autoimmunity	

Course number and code: MBI0 460	Course title: Medical Bacteriology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Introduction to Pathogenic Bacteria – Bacterial Toxins – External and internal Barriers – Phagocytic Cells – Bacteria Causing Disease to Human or to both Human and Animals – Mechanisms of pathogenesis – Virulence Factors and their role in disease – Identification Methods – Prevention and treatment .	

Course number and code: MBI0 465	Course title: Industrial Microbiology
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
The courses outcome of the physiological activities so it does explain the resulting structures; The capsule - The filamentous structures -The cell envelope --The cell wall - The outer membrane - The cytoplasmic membrane - The genetic tools -The chromosomes - The plasmids - The spores - The ribosomes - The biological membranes.	

Course number and code: MBI0 470	Course title: Medical Mycology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Pathogenic Fungi for Human or Animals – Their Habitats – Mechanisms of Infection – Identification in infected tissues – treatment and Protection.	

Course number and code: MBI0 490	Course title: Scientific Communication
Effective hours: 1 (1+0+0) (Lect. – Exer. – Pract.)	
Graduate level overview of techniques for platform, poster and written scientific presentations. Emphasis will be on oral presentation delivery, proposal development, content organization and audience perspective They will also learn to reflect on critical selection and evaluation, and learn how to use and refer to sources in a scientific context. Basic computer and web skills. Writing scientific texts can be viewed as a process as well as a final product and the participants will be introduced to a theoretical understanding of the academic writing process	

Course number and code: MBI0 492	Course title: Training in the techniques of food microbes, environmental and human health
Effective hours: 6 (0+0+12) (Lect. – Exer. – Pract.)	

During this course the students practice the various microbiological techniques for their applications in laboratories of commercial and research and developmental organizations. Take training in isolation and identification of bacteria ,fungi , protozoa and viruses of significance associated with food, drinking water, soil, air, plants, animals, waste water, sewage and water treatments plants, compost yard, solid wastes employing conventional and latest state of art methodologies At the end of the course they will prepare and present their findings as a report. Their progress will be evaluated by a faculty member.

Course number and code: MBIO 493	Course title: Training in Medical Microbiology Laboratories
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Effective hours: 6 (0+0+12) (Lect. – Exer. – Pract.)

During this course the students practice the various microbiological techniques for their applications in clinical and diagnostic laboratories in hospitals.. Learn the techniques for examination of clinical specimens including skin, dental, respiratory tract, gastrointestinal tract, urine, and blood; to isolate and identify pathogens including bacteria, fungi and viruses employing classical and cutting edge microbiological techniques. They spend some time as trainees in clinical laboratories in hospitals. At the end of the course they will prepare and present their findings as a report. Their progress will be evaluated by a faculty member.

Course number and code: MBIO 499	Course title: Research Project
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Effective hours: 3 (0+0+6) (Lect. – Exer. – Pract.)

During this course the student conduct an original research project by selecting a research problem; plan and design research experiments and conduct the same independently and as a part of a research group. Learn to do scientific literature search by referring research periodicals. Preparation and presentation of research project report

Course number and code: MBIO 463	Course title: Antibiotics
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Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)

Introduction to antibiotics and their discovery – Antibiotic producing microbes and their isolation – Antibiotics groups – Synthesis pathways – Purification, action and release – Their peaceful use and their side effects – Antibiotic sensitivity tests – Antagonism and Synergy.

II- Compulsory courses from OUTSIDE the Specialization

Course number and code: CHEM 101	Course title: General chemistry (1)
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Effective hours: 4 (3+0+2) (Lect. – Exer. – Pract.)

Stoichiometry: SI units, chemical formulas, the mole, methods of expressing concentration, calculations based on chemical equations.

Gases: Laws, kinetic theory, deviation and van der Waals equation.

Thermo chemistry: Types of enthalpy changes, Hess Law and its applications,, first law of thermodynamics.

Solutions: Type of solutions and laws related, colligative properties.

Chemical Kinetics: Law of reaction rate, reaction order, factors affecting the reaction. *Chemical Equilibrium:* Reaction between K_c & K_p , Le Chatelier's principle and factor affecting equilibrium. Ionic equilibrium: Acid and base concepts, pH calculations of acid, base and buffer solutions.

Eleven experiments including: Physical properties of mater, Hess's law, chemical kinetics, volumetric analysis.

Course number and code: STAT 106	Course title: Biostatistics
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Effective hours: 2 (1+1+0) (Lect. – Exer. – Pract.)	
Introduction to Bio-Statistics, types of data and graphical representation. Descriptive statistics: Measures of Central tendency- Mean, median, mode, Measures of dispersion-Range, Standard deviation, coefficient of variation. Calculating Measures from an Ungrouped Frequency Table Approximating Measures from Grouped Data. Basic probability, conditional probability, concept of independence, Sensitivity, Specificity etc, and Bayes Theorem for predictive probabilities. Some discrete probability distributions: cumulative probability distribution, Binomial, and Poisson –their mean and variance. Continuous probability distributions: Normal distribution, Standard normal and t distributions. Statistical inference: Point and interval estimation, Type of errors, Concept of P-value, testing hypothesis about one and two samples means and proportions including paired data – different cases under normality.	
Course number and code: FSN 321	Course title: Food Microbiology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
<i>The student must review the department concerned for decisions that taught outside the college.</i>	

III- **Elective courses from the Specialization**

Course number and code: MBIO 251	Course title: Molecular Biology
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Overview of genetic material DNA assembly and structure/function relationships. DNA replication , transcription and translation , regulation of gene expression – Gene cloning and chemical analysis of DNA restriction enzyme and sequencing methods – Recombinant DNA technology and genetic engineering concept and applications in field of microbiology.	
Course number and code: MBIO 335	Course title: Biodegradation
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Introduction – Growth –Linked Biodegradation - Acclimation – Detoxification Sorption Bioavailability – Effect chemical Structure on Biodegradation – Predicting Products Of Biodegradation – Cometabolism – Environmental effect – Bioremediation Technology – Bioremediation Metals and other inorganic pollutants – Biodegradation of Air Pollutants.	
Course number and code: MBIO 345	Course title: Interaction between Microorganisms
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Introduction - molecular and cellular aspects of host-pathogen interaction - Interaction among microorganisms and other Organisms - The major Symbiotic interactions – (Nitrogen fixation, Microorganisms, Mycorrhizae and Lichens , Characteristics , Structure , Distribution and commercial uses.	
Course number and code: MBIO 346	Course title: Mining Microbiology
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Role of microorganisms in the degradation of natural products, petroleum products and on the obtaining of minerals form the natural resource.	
Course number and code: MBIO 348	Course title: Lichenology
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	

Introduction & lichen structures, Lichen Forms & Reproduction, Physiology & Nutrition, Symbiosis & Syntrophism, Growth & lichenometry, Lichens & Air Pollution, Lichens as Pollution Monitors, Taxonomy & Identification, Economic uses & Applications.

Course number and code: MBIO 349	Course title: Yeast
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Yeast Ultra structure -Nutritional requirement for Growth -Growth -Factors affecting growth – Cultural and physiological characters-Yeast classification and reproduction- Methods of bakery yeast production and preservation – Yeast uses in food industries – yeast as food-Single cell protein - Economical importance of Yeast.	

Course number and code: MBIO 466	Course title: Introduction to Petroleum Microbiology
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Microbiology of Oil Field-(Indigenous Microbial Communities, sulfate-Reducing Bacteria and Archae, Hypothermophilic and Methanogenic Archae in oil field ,fermentative iron – Reducing and Nitrate – Reducing Microorganisms). Biotechnology and Oil Production (Biodegradation of Hydrocarbon under Anoxic conditions, the microbiology of marine oil spill.	

Course number and code: MBIO 487	Course title: Plankton
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Aquatic systems – phytoplankton-Zooplankton – Bacterioplankton - Mechanism of sinking and floating factors effecting plankton growth. -Interactions with other organisms- Seasonal succession -Diurnal changes and vertical migrations –Planktons primary and secondary production.-Mechanisms of survival.	

IV- **Elective courses from OUTSIDE the Specialization**

Course number and code: BOT 102	Course title: Botany
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Plant and their importance. Chemical and fine structures of the plant cell. Metabolism. Anatomy. Plant tissues, Plant water relations. Heredity and its applications. Levels of structural organization and evolution in plants (structure, taxonomy, economical and biological importance). Plant morphological and anatomical adaptation to environment Environmental pollution.	

Course number and code: ZOOL 103	Course title: Principles of General Zoology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Study of structure of animal cell. Tissues, General characters of animal Kingdom. Classification of animal Kingdom. Study of Protozoa with selected examples. General characters and classification of different phyla of animal Kingdom with selected examples. Introduction of physiology: Nutrition, digestion and metabolism, blood (structure and function).	

Course number and code: BOT 346	Course title: Pollution and Environmental Protection
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Introduction to the Ecosystem plant cover, deterioration, forests. Natural range and means of protection. Biotic factors and their effects on vegetation conserves and national parks, control of pollution. Concept,	

nature and sources pollution, air, water and soil. Effect of pollution on ecosystem. Biological method of controlling pollution.

Course number and code: ZOO 212	Course title: Parasitology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Understanding and practice the different methods and techniques applied for identification of parasitic infection. Identification of the main characteristics of the different stages of the parasite. How to determine: the site of infection, diagnosis and diagnostic stages, pathogenicity & treatment. How to elucidate the life cycle of a parasite (host (s) and mode of transmission). Mastering photography, measurements and report writing.	
Course number and code: PHYS 209	Course title: Biophysics
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Animal mechanics, properties of fluids, heat and heat flow in biological systems, nature of sound and sound intensity, applications on sound hearing, echolocation, use of ultrasound in medicine, nature of light, applications on image formation, resolution of eye, mechanism of vision, color vision, biological effects of UV and visible radiation, radiation biophysics, radiation dose and its measurement, RBE multi target theory, laser in medicine.	

Course number and code: CHEM 253	Course title: Fundamental of Analytical Chemistry
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Theoretical Part: Introduction to quantitative analysis, concentration units, chemical equilibria and its application on acid base reaction. Solubility, factors affecting solubility, solubility products. Acid-base, precipitation, complexation and redox titrations.	
Practical Part: Qualitative analysis, including identification of anions and cations. Volumetric analysis, e.g. Acid base titration, precipitation titration, complexation titration and redox titration.	

Course number and code: ZOOL 262	Course title: Microtechniques
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
The different types of chemical fixatives: their advantages and disadvantages. Steps used in animal microtechniques and how to stain specimen with chosen dyes. Steps used in preparing and staining of animal tissues for electron microscopy.	

V- Service Courses to Other Specialization and Colleges [credit hours (Lect. – Exer. – Pract.)]

Course number and code: MBIO 140	Course title: Microbiology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Benefiting College: Science. Introduction to microbiology, sterilization, groups of microorganisms, their habitats, structure, nutrition, growth and reproduction, relationship with other organisms, their economic importance.	
Course number and code: MBIO 240	Laboratory Skills
Effective hours: 2 (0+0+4) (Lect. – Exer. – Pract.)	
The basic techniques in Microbiology laboratories (Microbiology Lab. Organization and management The microcopy technique ,Kinds of microscopes , Sterilization techniques – Pure culture techniques – Morphology , growth and staining technique – Effect of physical and chemical factors on microorganisms physiological activities.-Antibiotic production- microbial Enzymatic activities- Medical microbiology	

Course number and code: MBIO 250	Course title: General Virology
Effective hours: 3(2+0+2) (Lect. – Exer. – Pract.)	
General characteristics of Viruses- cultivation and purification of viruses – Physical and chemical structure of human and animal viruses –Methods of classification — Families and replication cycle of human and animal viruses – Detection method of vaccine and antiviral drugs.	
Course number and code: MBIO 260	Course title: General Bacteriology
Effective hours: 3(2+0+2) (Lect. – Exer. – Pract.)	
Isolation methods – Pure culture – Identification by using chemical and molecular methods – Bacterial groups , their characteristic taxonomy and biological significance	
Course number and code: MBIO 270	Course title: General Mycology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
General characteristics of fungi – Growth – Classification – Reproduction – The Economics importance and commercial uses.	
Course number and code: MBIO 320	Course title: Microbial Diagnosis
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Samples collection-Transport – Processing – storage condition for microbial diagnosis of human diseases by molecular technology – Laboratory emphasize basic and clinical techniques for nucleic acid antigenic serology based detection methods.	
Course number and code: MBIO 340	Course title: Microbial ecology & Pollution
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Introduction to Microbial Ecology –Methods used to study microbial ecology – survey of microorganisms- Effect of Physical and Chemical factors on the growth and Distribution of microorganisms–Microorganisms in the different environments –effect of environments on microorganism and Microorganisms on the environments –geochemical cycles – Plants Surfaces as an important habitat – Microbial equilibrium in soil - Microbial Pollution.	
Course number and code: MBIO 344	Course title: Water sanitation Microbiology
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Introduction-Water as Biotopes for Microorganisms- Distribution of Microorganisms in the aquatic habitats –s – Microorganisms and Water pollution – Microbial flora of Sewage – Pathogenic Microorganisms in water and sewage- Sewage treatments –Role of Microorganisms in the Purification of Water –Preparation of water for drinking and other purposes –Chemical and Biological tests of water- the economic significance of Aquatic Microorganisms	
Course number and code: MBIO 346	Course title: Mining Microbiology
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Role of microorganisms in the degradation of natural products, petroleum products and on the obtaining of minerals form the natural resource.	
Course number and code: MBIO 348	Course title: Lichenology
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Introduction & lichen structures, Lichen Forms & Reproduction, Physiology & Nutrition, Symbiosis & Syntesis, Growth & lichenometry, Lichens & Air Pollution, Lichens as Pollution Monitors, Taxonomy & Identification, Economic uses & Applications.	
Course number and code: MBIO 450	Course title: Medical Virology

Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Human and animal viruses- Lab diagnosis and new techniques – Infection methods – General properties of viruses - Overview of steps in viral pathogenesis – Entry and replication – Spread and cell tropism – Cell injury and clinical illness – Host immune response – Recovery from infection- vaccines – Antiviral agents – Viral diseases.	
Course number and code: MBIO 460	Course title: Medical Bacteriology
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Introduction to Pathogenic Bacteria – Bacterial Toxins – External and internal Barriers – Phagocytic Cells – Bacteria Causing Disease to Human or to both Human and Animals – Mechanisms of pathogenesis – Virulence Factors and their role in disease – Identification Methods – Prevention and treatment .	
Course number and code: MBIO 463	Course title: Antibiotics
Effective hours: 3 (2+0+2) (Lect. – Exer. – Pract.)	
Introduction to antibiotics and their discovery – Antibiotic producing microbes and their isolation – Antibiotics groups – Synthesis pathways – Purification, action and release – Their peaceful use and their side effects – Antibiotic sensitivity tests – Antagonism and Synergy.	
Course number and code: MBIO 465	Course title: Industrial Microbiology
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
The courses outcome of the physiological activities so it does explain the resulting structures; The capsule - The filamentous structures -The cell envelope --The cell wall - The outer membrane - The cytoplasmic membrane - The genetic tools -The chromosomes - The plasmids - The spores - The ribosomes - The biological membranes.	
Course number and code: MBIO 487	Course title: Plankton
Effective hours: 2 (1+0+2) (Lect. – Exer. – Pract.)	
Aquatic systems – phytoplankton-Zooplankton – Bacterioplankton - Mechanism of sinking and floating factors effecting plankton growth. -Interactions with other organisms- Seasonal succession -Diurnal changes and vertical migrations –Planktons primary and secondary production.-Mechanisms of survival.	

Important Note: The student must review the department concerned for decisions that taught outside the college (Compulsory and Elective).