SYLLABUSES OF COLLEGE OF BIOTECHNOLOGY

YEAR: Second
SUBJECT: Biochemistry-1
THEORITICAL HOURS: 2
PRACTICAL HOURS: 2
UNITS: 3

Biochemistry-1……. Theoretical Syllabus…… First Semester

Course module description:

- Define "biochemistry."
- Identify the five classes of polymeric biomolecules and their monomeric building blocks.
- Explain the specificity of enzymes (biochemical catalysts), and the chemistry involved in enzyme action.
- Explain how the metabolism of glucose leads ultimately to the generation of large quantities of ATP.
- Describe how fats and amino acids are metabolized, and explain how they can be used for fuel.
- describe the structure of DNA, and explain how it carries genetic information in its base sequence

Course/module academic calendar

week	Basic material to be covered	Hours
1	Water, electrolytes, acid base balance and buffers	2
2	Amino acids and peptides	2
3	Enzymes: catalysis, types, function and inhibition	2
4	Lipids: definition, chemical nature, function	2
5	Nucleic acids: nucleotides, DNA, RNA	2
6	Carbohydrates -1: monosaccharides, disaccharides,	2
7	Carbohydrates -2: polysaccharidesand glycoproteins	2
8	Glycolysis -1: reactions and energy produced Storage,	2
9	Glycolysis -2: mechanisms and control	2
10	Glycolysis-3: glycogen, gluconeogenesis, penose pathway	2
11	Citric acid cycle	2
12	Electron transport and oxidative phosphorylation	2
13	Metabolism of amino acids: synthesis and degradation, essential and nonessential amino acids	2
14	Purines and Pyrimidines: synthesis and degradation	2
15	Integration of metabolism	2

Biochemistry - 1 ……..(Practical syllabus)…….. First Semester

Course module description:

Principle and application of Chromatography (Paper, thin-layer, column and GLC), Centrifugation (RPM and G, Ultra centrifugation), Spectroscopic techniques (UV, visible spectroscopy, X-ray crystallography, NMR, IR, fluorescence & atomic absorption), Isotopes and their importance (GM counters & Scintillation counting).

Course/module academic calendar

Week	Basic material to be covered	Hours
1	pH: Operation of pH meter to measure the pH of Haemolymph and body fluids. Preparation of buffers: Phosphate buffer and citrate buffer.	2
2	Chromatographic techniques:a. Paper chromatographic techniques to separate amino acids.	2
3	Chromatographic techniques: b. Thin layer chromatographic technique to separate lipids.	2
4	Chromatographic techniques: c. Column chromatographic techniques to separate urinary pigments.	2 2
5	Chromatographic techniques: d. HPLC – Demonstration.	
6	Colorimetric/Spectrophotometric estimation of the following biomolecules.	2
7	Total free amino acids (Ninhydrin reagent method)	2
8	Colorimetric/Spectrophotometric estimation of the following biomolecules. b. Protein (Biuret and Lowry *et al*., 1951 method)	2 2
9	Colorimetric/Spectrophotometric estimation of the following biomolecules. c. Total soluble carbohydrates (Anthrone reagent method)	2
10	Colorimetric/Spectrophotometric estimation of the following biomolecules. c. Total soluble carbohydrates (Anthrone reagent method)	2
11	Proteins : Properties , Structures , Synthesis types, reactions	2
12	Protein extraction from animal tissues and separation – 1	2
13	Protein extraction from animal tissues and separation – 2	2
14	Protein extraction from animal tissues and separation – 3	2
15	Protein extraction from plant tissues and separation – 4	2

Biochemistry - 2 ……. Theoretical Syllabus…… Second Semester

Course/module academic calendar

week	Basic material to be covered	Hours
1	General principles of catalysis; Enzyme catalysis	
2	Quantization of enzyme activity; Michaels -Men ten kinetics	2
3	Role of enzymes in metabolic regulation, activation, inhibition and covalent modification; Single substrate enzymes	2
4	Buffers, Methods of cell disintegration; Enzyme assays; Dialysis and ultrafiltration; UV, visible and Raman spectroscopy	2 2
5	Theory and application of circular dichroism; Fluorescence; MS; NMR; PMR; ESR and Plasma emission spectroscopy	
6	Principles and applications of different chromatographic and electrophoresis techniques	2
7	Radioactive isotopes; Techniques in measurement of radioactivity	2
8	Application of radioactive isotopes in biological research	2 2
9	Bio-safety measures in handling radioisotopes	2
11	Principles and applications of nonradioactive methods in biological research	2
12	Principles and types of Protein crystallization	2
13	Electro spray and MALDI–TOF	2
14	Enzyme and cell immobilization techniques	2
15	DNA and peptide synthesis	2

Biochemistry -2 ……. (Practical Syllabus)….. Second Semester

Course/module academic calendar

week	Basic material to be covered	Hours
1	Preparation of standard and buffer solutions -1.	2
2	Preparation of standard and buffer solutions -2.	2
3	Extraction and estimation of sugars and amino acids – 1	2
4	Extraction and estimation of sugars and amino acids – 2	2 2
5	Estimation of proteins by Lowry's method	
6	Estimation of proteins by other methods	2
7	Estimation of DNA and RNA by Diphenyamine and orcinol methods	2
8	Estimation of DNA and RNA by other methods	2
9	Separation of Biomolecules by chromatography: Separation of biomolecules by TLC and paper chromatography	2
10	Separation of Biomolecules by chromatography: Separation of biomolecules by TLC and paper chromatography	2
11	Separation of Biomolecules by chromatography: Separation of biomolecules by TLC and paper chromatography	2
12	Separation of biomolecules by gel filtration chromatography	2
13	Separation of biomolecules by ion exchange chromatography	2
14	Separation of biomolecules by affinity chromatography	2
15	Separation of biomolecules by HPLC	2

Text Books

- Textbook of medical **Biochemistry ,8 edition,2012**

References

- Textbook of medical **Biochemistry for medical student,6 edition,2012.**

YEAR: Second
SUBJECT: Animal Physiology
THEORITICAL HOURS: 2
PRACTICAL HOURS: 2
UNITS: 3

Animal Physiology ……..**(Theoretical Syllabus)**

Course module description:

Histology Course is one of the most useful course takes in the biotechnology department. It brings together a lot of the information have already acquired about cells and organs, and it points on in the fascinating direction of development and differentiation. Typically, histology courses, including: general histology (the structure and function of tissues) and special histology (the structure and function of organs).

Course/module academic calendar

Week	Basic material to be covered	Hours
1	Introduction ,	2
2	Membranes, Cell structure, Water and Osmosis	2
3	Ion and water balance, Kidney Function	2
4	Kidney Function, Cell Signaling, Neurons	2
5	Neurons, Sensory Systems, Nervous systems	2
6	Extracellular Recordings of Action Potentials	2
7	Compound Action Potential of a Frog Sciatic	2
8	Frog Neuromuscular Junction: Synaptic Fatigue & Delay, Isometric and Isotonic Muscle Contraction	2
9	Circulation : Blood: A Comparison Between Two Vertebrates, Cardiopulmonary Function in Humans	2
10	Circulation, Respiration,	2
11	Endocrine System : Glands ,hormones, Mechanoreceptors	2
12	Digestion : Properties of Digestive Enzymes	2
13	Metabolism :Absorption ,Secretion	2
14	Thermal Physiology,	2
15	Reproduction, Male & female system	2

Animal Physiology:…….. (Practical Syllabus)

Course module description:

This Practical course helps in understanding how the body functions adapts with respect to its external and internal environment, related to nervous integration, sensation, metabolism and reproduction.

Course/module academic calendar

Week	Basic material to be covered	Hours
1	Introduction to the laboratory, data analysis, and graphical techniques ,Animal use and safety, anesthesia , training on animals management methods	2
2	Scientific Method, Report Writing, Stats	2
3	Cell permeability : Osmotic Fragility of Mammalian Erythrocytes	2
4	Experiment on Erythrocytes	2
5	Experiment on Leukocytes	2
6	Recording BP, HR and Respiration	2
7	Recording BP, HR and Respiration	2
8	Renal Function, Phenol Red Clearance	2
9	Renal Function, Phenol Red Clearance	2
10	Skeletal Muscle: Aspects of skeletal muscle contraction in frogs, Isometric and Isotonic Muscle Contraction,	2
11	Locomotion & Thermoregulation	2
12	Properties of Digestive Enzymes	2
13	Phenol Red Clearance or Intestinal Absorption of Glucose	2
14	Water & Solutes	2
15	Water Diuresis/Osmoregulation	2

Text Books:

- Text book of Animal Physiology,Wesley Mills,New York,1989.
- Human physiology,2008

References: Comparative Animal Physiology,C.Ladd,4th Edition,1991**.**

YEAR: Second
SUBJECT: Animal Histology
THEORITICAL HOURS: 2
PRACTICAL HOURS: 2
UNITS: 3

Animal Histology…… (Theoretical syllabus)

Course module description:

Histology Course is one of the most useful course takes in the biotechnology department. It brings together a lot of the information have already acquired about cells and organs, and it points on in the fascinating direction of development and differentiation. Typically, histology courses, including: general histology (the structure and function of tissues) and special histology (the structure and function of organs).

Course/module academic calendar

week	Basic material to be covered	Hours
1	Histological Methods, Tissues and Cells	2
2	Epithelium: Surface and Glandular	2
3	Connective Tissue, Adipose Tissue (Cartilage and Bone)	2
4	Blood	2
5	Muscle	2
6	Nervous tissues, Spinal Cord & PNS	2
7	Integumentary System (Skin)	2
8	Circulatory System: Immune System and Lymphoid Organs	2
9	Hematopoiesis	2
10	Skeletal System, Chondrogenesis and Osteogenesis	2
11	Respiratory System : Oral Cavity and Salivary Glands	2
12	Digestive System :Esophagus, Stomach, Intestine & Colon, Pancreas, Liver & Gallbladder	2
13	Female Reproductive System	2
14	Male Reproductive System	2
15	Central Nervous System	2

Animal Histology: …….. (Practical Syllabus)

Course/module academic calendar

week	Basic material to be covered	Hours
1	Microscopy, Cells, Organelles, Mitosis	2
2	Epithelium	2
3	Cells : Nerve , Muscle	2
4	Connective Tissue	2
5	Cartilage, Bone, Bone Development	2
6	Blood, Hematopoiesis and Bone Marrow	**2**
7	Lymphoid Tissues	2
8	Respiratory System	2
9	Cardiovascular System	2
10	Skin	2
11	Urinary System	2
12	Gastrointestinal System I , Gastrointestinal System II ,	2
13	Endocrine Glands	2
14	Male Reproductive System , Female Reproductive System	**2**
15	The Eye , Ear	2

Text Books

- Text book of veterinary histology by Samuelson 2007

References:

- Text book of veterinary histology by Dellmann&Brown 2007

YEAR: Second
SUBJECT: Microbiology (1)
THEORITICAL HOURS: 2
PRACTICAL HOURS: 2
UNITS: 3

Microbiology (1) ……**(Theoretical Syllabus) …..… First semester**

Course module description:

Microbiology course introduction to the microbial world diversity of prokaryotes, their development, structure and function of Prokaryotic metabolism, nutrition and growth. Microbial genetics and control. Fundamental principles of the interrelationship of microorganisms and their role in the environment.

Course/module academic calendar

week	Basic material to be covered	Hours
1	The scope & Early History of Microbiology	2
2	Principle of Classification & Survey of the Microbial World	2
3	Techniques used in the observation of Microorganisms	2
4	Introduction of Biochemistry of Microorganism	2
5	Prokaryotes (structure, Organization)	2
6	A survey of Prokaryotes	2
7	Fungi	2
8	Protozoa	2
9	Algae	2
10	Viruses(Structure, Organization, Cultivation, and Viral Pathogenesis	2
11	Bacterial Growth & Cultivation techniques	2
12	Microbial Metabolism & Cellular Regulation	2
13	Microbial Genetics,	2
14	Control of Microorganisms	2
15	Antimicrobial Chemotherapy	2

Microbiology -1 ….. (Practical Syllabus) ……. First Semester

Course/module academic calendar

Week	Basic material to be covered	Hours
1	Introduction & General Instructions	2
2	Microscope & Microscopy	2
3	Microscopic Slide Techniques	2
4	Sterilization Methods	2
5	Culture Media	2
6	Differentiation of Gr^{-ev} Bacteria Groups by Staining Reactions	2
7	Differentiation of Gr^{+ev} Bacteria Groups by Staining Reactions	2
8	Counting of Bacteria	2
9	Isolation of Pure Bacteria colonies	2
10	Technique for Isolation of Anaerobic Bacteria	2
11	Bacterial Anatomy	2
12	Biochemical Activities of Microorganisms	2
13	Antibiotics Sensitivity	2
14	Isolation of Microbes from Clinical samples (urine,sputum etc..)	2
15	Final Exam	2

YEAR: Second
SUBJECT: Microbiology (2)
THEORITICAL HOURS: 2
PRACTICAL HOURS: 2
UNITS: 3

Microbiology -2 ……. (Theoretical Syllabus) ……. Second Semester

Course/module academic calendar

week	Basic material to be covered	Hours
1	Resistance in the Host-Parasite Interactions	2
2	Microbial virulence	2
3	Antigens, Immunoglobulin, and state of Immunity	2
4	Principles of diseases transmission	2
5	Identification of Disease Agents	2
6	Microbial Skin Disease, mouth, Respiratory Tract, etc..	2
7	Industrial Microbiology	2
8	Food & Diary Microbiology	2
9	Soil Microbiology	2
10	Water Microbiology	2
11	Microbial of Ecology & Environmental	2
12	Microbial Disease of Urinary Tract	2
13	Microbial Disease of Central Nerve System	2
14	Microbial Disease of Circulatory system	2
15	Normal flora	2

Microbiology-2 ……. (Practical) …… Second Semester

Course/module academic calendar

week	Basic material to be covered	Hours
1	Clinical microbiology: staphylococci, coagulase, mannitol salt, hemolysis,	2 2
2	Environmental factors affecting growth of bacteria**:** Temperature, pH, Osmotic pressure	2
3	Biochemical Activities of Bacteria -**1 :** Carbohydrates(fermentation) , starch hydrolysis Proteins, amino acids, lipids & enzymes-**A :** lipid hydrolysis, Casein hydrolysis, gelatin hydrolysis	2
4	B: Proteins, amino acids & enzymes **:** Hydrogen sulfide production-SIM, Urease activity, Nitrate reduction,	2
5	Food Microbiology **:** Bacterial count of a food product (serial dilutions/pour plates), Bacterial genetics : Transformation,	2
6	Motility : soft agar deeps , Culturing anaerobes , bacterial growth in agar deeps, oxygen requirement , gas pak system,	2
7	Acid-fast bacteria Staining, Capsule stain , Antibiotic testing	2
8	Direct Bacterial Agglutination, Tube Agglutination test	2
9	Characteristic of Bacteriophages	2
10	Microbiological Examination of Diary products & Selected foods	2
11	Introduction of Protozoa	2
12	Introduction of Helminthology	2
13	Introduction of Mycology	2
14	Medical Mycology	2
15	Isolation of Algae	2

Text books:

- Microbiology, Ananthanarayan & paniker's, 8th edition, universities press (India). 2009

References:

- Foundationsin Microbiology, Fourth Edition,The McGraw−Hill , (2002).
- Jawetz, Melnick, &Adelberg's Medical Microbiology, Twenty-Fifth Edition,,USA, McGraw-Hill Companies (2010).
- Harvey, Richard A.; Champe, Pamela C.; Fisher, Bruce D. Lippincott's Illustrated Reviews: Microbiology, 2nd Edition, Lippincott Williams & Wilkins.(2007).

YEAR: Second
SUBJECT: Molecular Biology
THEORITICAL HOURS: 2
PRACTICAL HOURS: 2
UNITS: 3

Molecular Biology …….. (Theoretical Syllabus)

Course module description:

The student will learn the structure and function of biological macromolecules, in Particular nucleic acids (DNA and RNA) and proteins and how these molecules act to copy, express and accurately transmit genetic information. The course focuses on mechanisms of: DNA replication, transcription, translation (protein synthesis) in prokaryotes and eukaryotes .DNA damage and repairing.

Course/module academic calendar

week	Basic material to be covered	Hours
1	Nucleic Acids: Nucleic acid as the genetic material. The nature of genetic material. The chemical nature of polynucleotides	2
2	The DNA structure (double helix and A,B, Z-forms). DNAs of various sizes and shapes. RNA secondary and tertiary structures	2
3	Physical chemistry of nucleic acids. Organell DNA (assignment). Storage of nucleic acid	2
4	Denaturation and renaturation of DNA. C-value paradox, Cot value and curve, chemical complexity	2
5	**Enzymology of DNA replication:** DNA polymerases, Helicase, DNA ligase, Primase, Telomerases and Topoisomerase	2
6	**DNA replication machinery:** General features of DNA replication. Replication in prokaryotes. Replication in eukaryotes	2
7	DNA damage and DNA repair. Nucleotide excision repair. Base excision repair. Mismatch repair. Double strand breakage repair	2
8	**Transcription:** RNA polymerase structure in prokaryotes and eukaryotes.	2
9	**Transcription:** Transcription initiation by RNA polymerase I, II, III and organell-specific RNA polymerases. Regulatory sequences in prokaryotes and eukaryotes	2
10	Activators, repressors and general transcription factors. Molecular mechanisms of transcription activation andrepression	2
11	Stages of transcription in prokaryotes and eukaryotes: Initiation, Elongation and Termination	2
12	**Nuclear mechanisms of post-transcriptional control:** Pre-mRNA processing: Splicing, Capping and Cleavage/Polyadenylation. Pre-rRNA processing: Splicing, Cleavage, Exonucleolytic digestion and Base modification. Pre-tRNA processing: Splicing	2
13	**Cytoplasmic mechanisms of post-transcriptional** **Control**: Mechanisms of mRNA degradation in the Cytoplasm, Surveillance mechanisms prevent translation of improperly processed mRNAs. Localization of mRNAs. permits production of proteins at specific regions within the cytoplasm Micro RNAs (miRNAs), RNA interference (RNAi	2
14	**Translation**: The genetic code **(**revision). The structure of: t-RNA (revision). Prokaryotic and eukaryotic ribosomes. Aminoacylation of tRNA (revision). Stages of translation in prokaryote2s and eukaryotes (initiation, elongation and termination). Post-translational modifications.	2
15	Final exam.	2

Molecular biology …….. (Practical Syllabus)

Course/module academic calendar

week	Basic material to be covered	Hours
1	Isolation of genomic DNA from prokaryotic cells	2
2	Isolation of genomic DNA from eukaryotic cells	2
3	Isolation of RNA from animal tissues and reverse transcription – 1	2
4	Isolation of RNA from plant tissues and reverse transcription – 2	2
5	Amplification of specific gene sequences by polymerase chain reaction (PCR) – 1	2
6	Estimation of DNA -1: Spectrophotometry & Fluorimetry	2
7	Estimation of DNA -2: , Restriction Enzyme Digestion Agarose Gel Electrophoresis	2
8	Restriction enzyme digestion of DNA and agarose gel electrophoresis – 1	2
9	Restriction enzyme digestion of DNA and agarose gel electrophoresis – 2	2
10	Isolation of plasmid DNA and cutting with restriction enzymes	2
11	Isolation of plasmid DNA and cutting with restriction enzymes	2
12	. Setting up a ligation reaction	2
13	Transformation; preparation of competent cells and transforming them with suitable plasmid	2
14	Transformation; preparation of competent cells and transforming them with suitable plasmid	2
15	RNA Extraction & Quant (RT-PCR)	2

Text Books

- Molecular Biology of gene, James D.et,al…,Fifth edition, Dorling Kindersley9india),2009

References:

- Human Molecular Genetics, Tom Strachan and Andrew P Read, New York: Wiley-Liss; 1999.

YEAR: Second
SUBJECT: Plant Physiology
THEORITICAL HOURS: 2
PRACTICAL HOURS: 2
UNITS: 3

Plant Physiology ……. (Theoretical Syllabus)

Course module description:

This course deals with the most important facts about plants in which several factors are presented to show the real phenomena of plants considering it as photosynthetic and autotrophic (with very few exceptions) organisms, have chlorophyll a and b except for some algae, have a cellulose cell wall and a cell vacuole, and have an alternation of diploid and haploid generations.

Course/module academic calendar

week	Basic material to be covered	Hours
1	Plant Water Relations (introduction) , Important of water in plant	2
2	Water Relations :diffusion, Osmosis, Absorbent	2
3	Water Relations : Water absorption and transmission in plant	2
4	Nutrients absorption in plant	2
5	Respiratory : Anaerobic respiration, Aerobic respiration	2
6	Hydrolysis of sugar, Krebs cycle	2
7	Oxidation & Energy production	2
8	Photosynthesis	2
9	Photosynthesis sources	2
10	Substrates of Photosynthesis (Water, light, pigments)	2
11	Light & dark Reactions	2
12	C3 Cycle (for Nitrogen fixation)	2
13	C4 cycle (for Co2 fixation)	2
14	KAM Cycle (foo2 fixation)r c	2
15	Plant Hormones	2

Plant physiology: ……. (Practical Syllabus)

Course/module academic calendar

week	Basic material to be covered	Hours
1	Introduction to the plant lab equipments	2
2	Types of Physiological Solutions & Preparation them	2
3	Buffers Types, Measurement of PH & PH important of Plant	2
4	Experiments in (Osmosis, Diffusion, Absorbent)	2
5	Test of live membranes to Osmosis	2
6	Separation of pigments by Chromatography technique	2
7	Measurement of absorbent spectrum of chlorophyll	2
8	Quantification of chlorophyll	2
9	Photosynthesis (Hill reaction)	2
10	Transpiration	2
11	Measurement of leaf area	2
12	Quantification of Plant proteins	2
13	, Experiments in plant hormones	2
14	Enzymatic activities of plant	2
15	Plant Mineral Nutrition	2

Text Books

- Plant Physiology mineral nutrition ,Manisha Majumdar,Book Rix-Editon, 2011

References

- Plant physiology,C.J. Glegg, Association for science of education,London,1973
- Plant physiology,Lincoln Taiz & Eduardo,fith edition,2010

YEAR: Second
SUBJECT: Plant Anatomy
THEORITICAL HOURS: 2
PRACTICAL HOURS: 2
UNITS: 3

Plant Anatomy …….. (Theoretical Syllabus)

Course module description:

This course is gives an introduction to the basic internal structure of plants, including their cells, tissues, and organs. It will consider the appearance and description of plant parts, but also emphasize developmental and functional aspects. In other words, it will relate structures with how they arose and their possible functions. The lab will consist of experience with the use of microscopes, the sectioning and staining of plant materials, and the observation of plant structures.

Course/module academic calendar

week	Basic material to be covered	Hours
1	Introduction to Plant Anatomy, Introduction to the Plant Kingdom	2
2	Basic plant morphology and review of the cell components.	2
3	Plant Structure: The protoplast &Cell walls	2
4	Tissues types : parenchyma, collenchymas & sclerenchyma	2
5	Tissues – epidermis ,xylem and phloem	2
6	Apical meristems: Primary root , shoot growth and division theories	2
7	Roots anatomy in monocot & dicot	2
8	Stems anatomy in monocot & dicot	2
9	Secondary growth – vascular cambium components	2
10	Secondary growth – xylem and phloem	2
11	Secondary growth – periderm	2
12	Leaves anatomy	2
13	Reproduction, Flowers	2
14	Fruits, seeds anatomy	2
15	Functional anatomy case study	2

Plant Anatomy: …….(Practical Syllabus)

Course/module academic calendar

week	Basic material to be covered	Hours
1	Cell Wall stages formation, Primary cell wall, Secondary cell wall, intercellular space	2
2	Plant Cell, living components (plastids) , Non living Components	2
3	Cell wall structure, Types of Pits	2
4	Meristematic Tissues, Root growing Points, Growth and Division Theories in Root & Steem	2
5	Lateral Meristems, Vascular Cambium, and its Components, Cork cambium, Periderm	2
6	permanent tissues , Parenchyma Tissues ,Types of Parenchyma Tissues, Cell shape in Parenchyma Tissues	2
7	Collenchyma tissues, Types of Collenchyma tissues	2
8	Sclerenchyma Tissues, Cell Types in Sclerenchyma Tissues	2
9	Sclereids and types of Sclereids , Fibers and types of fibers.	2
10	Xylem Tissue in Gymnosperms And Angiospermae ,xylem in vertical & horizontal sections	2
11	(*A*nnual rings, Types of Xylem (Diffuse – and ring porous Ring porous wood,)	2
12	Phylum in Gymnosperms And Angiospermae,Primary and Secondary Phylum	2
13	Internal structure of Stems and root in Monocot and Dicot	2
14	Types Central cylinder	2
15	Anatomy of seeds & fruits	2

Text Books

- Esau plant anatomy Meristems cell and tissue of the plant body ,Ray F .Evert ,2006P
- Plant Anatomy: An Applied Approach, David F. Cutler, Ted Botha, Dennis Wm. Stevenson, Willy, 2008.

References:

- Plant anatomy, Manisha Majumdar,book Rix: Edition,2004

YEAR: Second
SUBJECT: Genetics (general)
THEORITICAL HOURS: 2
PRACTICAL HOURS: 2
UNITS:

Genetics (General) ……. (Theoretical Syllabus)

Course module description:

This module is a major requisite for the students of genetic engineering and it is presented in 15 weeks completing 30 lecturing hours as well as considered as an entry of molecular genetics. Its contents focus on an overview of basic genetics (an introduction to Mendelian and non-Mendelian inheritance. DNA Structure, at the end of the course some quantitative genetics issues are discussed).

Course/module academic calendar

week	Basic material to be covered	Hours
1	Introduction to the course and the study of genetics	2
2	Cellular reproduction & Model Genetic Organisms; Cells & chromosomes, -Mitosis &Meiosis, an introduction to some model research organisms	2
3	Mendelian Genetics: Monohybrid crosses	2
4	Mendelian Genetics: Dihybrid and Trihybrid crosses	2
5	Sex Determination and Sex Linkage	2
6	Mendel Modified: Incomplete dominance, lethal alleles, and multiple alleles	2
7	Modified Ratios: Gene Interactions	2
8	Quantitative Traits, Genetic Testing, Quantitative Genetics	2
9	Linkage, crossing over and chromosome mapping; Linkage, recombination & crossing over	2
10	DNA Structure , Mitochondrial DNA , DNA replication , Gene Expression: RNA Processing	2
11	Gene Expression: Translation, Control of Gene Expression in Prokaryotes, Control of Gene Expression in Eukaryotes	2
12	Molecular Genetics: Molecular Genetics: PCR and DNA cloning ,Blotting and Probing	2
13	Mutations, Chromosomal Mutations: Altered Chromosome Number	2
14	The Human Genome Project and Functional Genomics	2
15	Population and Evolutionary Genetics	2

Genetics (General) :…… (Practical Syllabus)

Course/module academic calendar

week	Basic material to be covered	Hours
1	Introduction to Lab genetics & Lab Safety	2
2	The Drosophila, Structure of the Fly	2
3	Drosophila Life cycle: Egg, Larva, Pupa & Adult	2
4	Culturing Drosophila -1: Food problem (Too much yeast, Mites, Wet food, Dry food)	2
5	Culturing Drosophila -2 : Incubation, Disposing of old Cultures	2
6	Working with Flies: Anesthetizing Flies, Looking at Flies, Stock keeping, Transferring Flies to Fresh Vials.	2
7	Crosses: Virgin females, Telling Males from Females, Setting up a Cross, Labeling & Book keeping.	2
8	Crosses : Nomenclature (Wild Type)	2
9	Bacterial Conjugated -1 : count the number of bacteria in a culture of E. coli by serial dilution plating.	2
10	Bacterial Conjugated -2: Actual conjugation experiment to be done	2
11	Bacterial Conjugated -3: counting the plates resulting from the conjugation experiment	2
12	Data Analysis (Conjugated)	2
13	Plasmid Mapping -1: Required Materials Preparation (Electrophoresis system , Ethidium bromide & Ultraviolet light ,DNA)	2
14	Plasmid Mapping -2: Pouring and running electrophoresis gels	2
15	Plasmid Mapping -3: data Analysis and bands counting.	2

Text Books

- **Principle Of Genetic ,**

References

YEAR: Second
SUBJECT: Principle of Biotechnology
THEORITICAL HOURS: 2
PRACTICAL HOURS: 2
UNITS:

Principle of Biotechnology ……. (Theoretical Syllabus)

Course module description:

This course will give the students a knowledge and skills in working with biological materials, technology usable biochemical processes, mechanisms regulating metabolism and the use of living organisms or their components, particularly in food, pharmaceutical, chemical technology and environmental protection.

Course/module academic calendar

week	Basic material to be covered	Hours
1	Overview of biotechnology	2
2	Types of Biotechnology	2
3	Fermentation technologies : Solid substrate fermentation, Liquid fermentation	2
4	Fermentation technologies : Batch fermentation, Feed-batch process, Continuous fermentation, Downstream processing	2
5	Monoclonal antibodies, Development of antibody-based therapeutics, Applications of monoclonal antibodies, Vaccine preparations	2
6	Microorganisms in bio processes	2
7	Microorganisms in bio processes	2
8	Raw materials in biotechnology	2
9	Processes and equipment of industrial biotechnology	2
10	Isolation and analysis of product	2
11	Food biotechnology	2
12	Chemical biotechnology	2
13	Pharmaceutical biotechnology	2
14	Environmental biotechnology	2
15	Biodegradation and bioremediation	2

Principle of Biotechnology ……. (Practical Syllabus)

Course/module academic calendar

week	Basic material to be covered	Hours
1		2
2		2
3		2
4		2
5		2
6		2
7		2
8		2
9		2
10		2
11		2
12		2
13		2
14		2
15		2

Text Books

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References

YEAR: Second
SUBJECT: Cell Biology (**Prokaryotic**)
THEORITICAL HOURS: 2
PRACTICAL HOURS: 2
UNITS: 3

Cell Biology ……. Theoretical Syllabus…… First Semester

Course module description:

After complete of this course, students will be able to explain the cell biology of human & animal cell. Describe fertilization, implantation and gastrulating and understand the basis for the manipulations performed during in vitro fertilization treatment, Students will be able to portray the composition and structure of the plasma membrane, the properties of ion channels, and the events which occur during the generation of an action potential.

Course/module academic calendar

Week	Basic material to be covered	Hours
1	Introduction to prokaryotic Organism	2
2	Ultra structure of prokaryotic cells	2
3	Structure of generalized of Prokaryotic Cell	2
4	External structure : Cell Extension , preplasmic flagella	2
5	CELL ENVELOPE: (The boundary layer of bacteria, differences in the cell wall, structure of cell wall, Gr^{+ve} cell wall	2
6	CELL ENVELOPE: Gr^{-ve} cell wall, mycoplasma and other cell wall deficient bacteria, cell membrane structure	2
7	BACTERIAL INTERNAL STRUCTURS: Contents of the cell cytoplasm, Bacterial Chromosome..etc)	2
8	BACTERIAL Morphology: Shape , Size , & arrangement	2
9	SURVEY : Prokaryotic groups with unusual Characteristics	2
10	Molecular Structure -1 : structure of Prokaryotic Gene	2
11	Molecular Biology -1 : DNA replication	2
12	Molecular Biology-2 : Transcription ,Translation In Prokaryotes	2
13	REGULATION OF GENE EXPRESSION IN PROKARYTES: (Positive control – Catabolic repression.	2
14	REGULATION OF GENE EXPRESSION IN PROKARYTES: Negative control – Operon model (Lac, Trp)	2
15	DNA recombination – Molecular mechanism in Prokaryotes	2

Cell Biology (Prokaryotic) ……. Practical Syllabus…… First Semester

Course/module academic calendar

Week	Basic material to be covered	Hours
1	The Microscope	2
2	Cell Structure (Prokaryotic) -Gr^{+ev}	2
3	Cell Structure (Prokaryotic) -Gr^{-ev}	2
4	Cell Morphology (Prokaryotic)	2
5	Plastids	2
6	Mitochondria	2
7	Crystals	2
8	Killed & Fixation	2
9	Mitosis	2
10	Cell preparation to show the Mitosis -1	2
11	Cell preparation to show the Mitosis-2	2
12	Cell preparation to show the Mitosis-3	2
13	Meiosis	2
14	Chromosomes	2
15	Chromatin	2

YEAR: Second
SUBJECT: Cell Biology (**Eukaryotes**)
THEORITICAL HOURS: 2
PRACTICAL HOURS: 2
UNITS: 3

Cell Biology ……. Theoretical Syllabus… Second Semester

Course/module academic calendar

Week	**Basic material to be covered**	**Hours**
1	Introduction of Eukaryotic Organism	2
2	**Eukaryotic Cell** : Chemical Structure, and Macromolecules	2
3	**Eukaryotic Cell** : Micro molecules ,Lipids , Nucleic Acid	2
4	**Plasma Membrane** : (Structure , Function)	2
5	**Plasma Membrane** : Movement of Substances	2
6	**Cytoplasm** : Microtubules (Structure & Function)	2
7	Endoplasmic Reticulum ,Golgi apparatus , and Lysozymes	2
8	**Mitochondria** : Source ,Structure , Function)	2
9	**Plastids** : (Source ,Structure , Function)	2
10	Proteins Synthesis ,Protein Nature , Correlation between Genes & Proteins	2
11	Gene Expression Control	2
12	Opron System Bacteria	2
13	Nucleus	2
14	Nucleuses	2
15	Chromosome structure	2

Cell Biology (Eukaryotes) ……. Practical Syllabus…… Second Semester

Course/module academic calendar

Week	Basic material to be covered	Hours
1	Introduction to the Cell biology lab	2
2	Eukaryotic Cell Types (Morphology, size, shape)	2
3	Eukaryotic Cell Types (Morphology, size, shape)	2
4	Cell Structure (Eukaryotic Cell)	2
5	Cell membrane	2
6	Mid Exam	2
7	Membrane transport	2
8	Electrical Signaling	2
9	Cell motility	2
10	Chromosome & Nucleus	2
11	Cell Cycle (Mitosis) in Eukaryotic cell -1	2
12	Cell Cycle (Mitosis) in Eukaryotic cell-2	2
13	Electrophoresis : preparation of gel electrophoresis.	2
14	Photosynthesis/Respiration: Isolation of chloroplast, chlorophyll content.	2
15	Final Exam	2

Text books:

- The World of the Cell, Becker, Kleinsmith, and Hardin. (Fifth Edition).Benjamin Cummings: San Francisco. (2003)

References:

- Introduction of cytology, Veer Bala Rastogi,kedar Nath,132.R.G.coollege rouad,2010.
- Cell biology.Thomas D.Pollard and William C. Earnshaw (second edition) sounders, USA,(2007)