

بيان التوصيف العلمى للمقررات الدراسية فى قسم البيولوجيا

SLBI102 **Cytology & Histology** (5 Cr.)

Cytology: Chemical components of cells, Eukaryotes, prokaryotes and viruses, Plasma membrane, Cytosol and ribosomes, Endomembrane system, Mitochondria and plastids, Peroxisomes (microbodies), Cytoskeleton, Organization of the nucleus, The cell cycle.

Animal Histology: Epithelial tissue: Covering epithelium, Connective tissue, proper and specialized (cartilage, bone, blood), Muscle tissue, Nervous tissue.

Plant Histology: Structure of the cell wall, Meristems, Parenchyma, Protective, Tissues, Conducting tissues, Supporting tissues, Secretory tissues.

SLCH101 **Basic Chemistry** (5 Cr.)

Structures and properties of matter; Bonding, Molecular Geometry, VSEPR; Chemical Equations and Quantitative Relations, Stoichiometry; State of matter (Gas laws, liquids and solids) and Solutions.

SLMT101 **Introductory Calculus** (5 Cr.)

Sequences, limit of a sequence, convergent and divergent sequences, adjacent sequences, functions in one variable, limit of a function, continuity of functions, derivative of a function, differentiable functions, Hospital's rule, Roll's theorem, Mean value theorem, logarithmic, exponential, trigonometric and hyperbolic functions, inverse functions, inverses of trigonometric and hyperbolic functions, equivalent functions, finite expansion, finite expansions and limits, Taylor's formula, Mac-Laurin's formula.

SLCS101 **Introduction to Computers** (4 Cr.)

The course aims at making students competent in computer-related skills and provides them with a broad, general introduction to hardware and software fundamentals, productivity software, digital media, database applications, networking, the Internet, and security and privacy issues, as well as hands-on practice on common software applications such as Word, Excel, Power Point, Internet and Email.

SLPH101 **Mechanics** (4 Cr.)

Measurements, motion in one dimension, vectors, motion in two dimensions, Newton's law with applications, work, energy and power, linear momentum and collisions, rotation and angular momentum, and oscillations.

Lab. Mechanics (1 Cr.)

Error analysis, measuring of velocity and acceleration, measurement of gravitational acceleration forces, friction, conservation of energy and momentum, ballistic pendulum, rotation, harmonic motion.

ILIS101 Islamic Culture**(2 Cr.)**

مدخل عام: معنى الثقافة ومفهومها، العلاقة بين الثقافة والحضارة. الأسس الدينية للثقافة الإسلامية: الوحي، النبوة، القرآن والسنة، العقيدة والشريعة. المفاهيم التربوية للثقافة الإسلامية: الإيمان، الإنسان، الأخلاق، العلم. خصائص الثقافة الإسلامية: عالمية الإسلام، ثقافة الحوار في الإسلام، الإسلام والتنوع الثقافي، الإسلام والتفاعل الحضاري.

CLEN101 Remedial English**(2 Cr.)**

To get introduced to the language, To speak about oneself and one's surrounding, To communicate about simple daily tasks, To interact on different topics in a direct and simple way.

CLFR101 Remedial French**(2 Cr.)**

Briser la glace avec la langue, Parler de soi et de son entourage quotidien, Communiquer sur des tâches simples et habituelles, Echanger des informations directes et simples sur des sujets variés.

CLAR101 Remedial Arabic**(2 Cr.)**

يتوزع مقرر التأهيل في اللغة العربية على الشكل التالي: النص وتكوينه (الجملة، المقطع، النص) والكتابة والتعبير في مجالات التقنيات الأكثر رواجاً (الرسالة، المقالة التقرير والقصة). دراسة آثار كتابية كاملة (ادبية وتواصلية)، التمرس على التعبير الشفوي (عرض، نقاش، تعليق) والتعبير الكتابي (تحليل، محاكاة، تعبير حر، التذوق الأدبي).

SLBI201 Biological Evolution @ Biodiversity**(5 Cr.)**

Behavior of chromosomes during mitosis and meiosis ,Mutations, Mendelian or classical genetics, Sex-linkage, Human genetics, Gene interaction, polygenic inheritance and multiple-alleles genes, Asexual reproduction, Sexual reproduction, Spermatogenesis, Male reproductive system, Oogenesis. Female reproductive system, Fertilization, Biodiversity and systematic, Protista, Prokaryotes and viruses, Yeasts and molds.

SLCH201 Introduction to Physical Chemistry**(4 Cr.)**

Thermodynamics, Kinetics, Quantitative aspects of reaction of equilibrium, Ionic equilibrium; Acids and bases in solutions – PH, Electrochemical processes – Redox reactions.

Lab. Introduction to Physical Chemistry**(1 Cr.)**

Formula of an hydrate, Molar mass determination of a volatil liquid, Acid-base titration, Redox titration, Preparation and standardization of solutions, Solubility product constant.

SLCH202 Introduction to Organic Chemistry**(4 Cr.)**

Electronic structure of organic molecules (Isomers, structure formula), Electronic effects (inductive and resonance), Nomenclature, Stereochemistry, Nucleophilic substitution, Elimination, Electrophilic aromatic substitution.

SLMT201 **Introduction to Integration & Series** (5 Cr.)
Antiderivative, antiderivatives of basic functions, indefinite integrals, integration of rational functions, definite integral, Mean value theorem, improper integrals, first and second kinds of improper integrals, functions of two variables, double integral, partial derivative, double integral with polar coordinates, series, convergent and divergent series, tests of convergence, differential equations of first order : separable, homogeneous and linear equations.

SLMT202 **Statistics and Probability** (5 Cr.)
Population, Sample, Characteristics, Frequency distribution of one variable: Graphical representation, Measures of central tendency, Measures of dispersion, Frequency distribution of two variables (Bivariable Data): contingency table, Least square method, Correlation, Linear Regression, Probability: Counting, Conditional Probability, Bayes theorem.

SLPH201 **Electricity & Magnetism** (3 Cr.)
This course deals with electricity and magnetism, Coulomb's law, Gauss theorem, electricity field and potentials, Ampere's law and magnetic field, electrical current and ohm's law, electromagnetic induction, alternating current and electromagnetic field, as well as optics including refraction, interference and diffraction.

Lab. Electricity & Magnetism (1 Cr.)

Electricity and Magnetism: Electric fields, capacitance and constant measurements, construction of ammeters and voltmeters, Wheatstone Bridge, potentiometer, oscilloscope operations, RL, RC and RLC circuits.

Geometrical optics: Law of refraction and prism, mirrors and lenses, interference and diffraction, polarization

CLEN201 **Remedial English** (2 Cr.)
To get familiar with the target language, To express and react easily in different situations, To communicate spontaneously, easily, and efficiently, To be fluent in the language in all domains: personal, public, and professional.

CLFR201 **Remedial French** (2 Cr.)
Se lancer dans la langue du travail, Exprimer et réagir aisément dans des situations inhabituelles, Communiquer avec assez de spontanéité, d'aisance et d'efficacité, Perfectionner la langue dans le domaine personnel, public et professionnel.

SLBI301 **Anatomy and Histology of Organs** (4 Cr.)
Organization of living systems, Tissues (epithelium, connective, muscular and nervous tissues), Organs wall: Skin, Brain, Spinal cord, Heart, Stomach, Lung, Bladder, Muscles, bones, Ovaries and testis and Endocrine glands, Systems (Circulatory, respiratory, urinary, nervous, muscular, skeletal, reproductive and digestive systems).

Lab. Anatomy and Histology of Organs (1 Cr.)

Observation of slides and microscopic identification: Tissues (epithelium, connective, muscular and nervous tissues) and Organs: Skin, Heart, Stomach, Lung, Bladder, Bones, Ovaries and testis, Preparation of slides and staining.

SLBI302 **Kingdom of Plants (Vegetative Organs)** (4 Cr.)

A study of the evolution of the vegetative apparatus in plants ranging from non vascular to lower vascular and higher vascular. Course Structure contain: Evolution from non vascular plants to vascular plants, Non vascular and lower vascular plants, Root of Spermatophytes, Sequence of differentiation and growth in all root types, Stem of Spermatophytes, Leaves of Spermatophytes, Classification of plants according to Rankier based on the location of buds (underground, under water or aerial).

Lab. Kingdom of Plants (Vegetative Organs) (1 Cr.)

This lab work enables the student to identify all vegetative organs of the plant body. Bryophyta, Pteridophyta, Pteridophyta, Root: primary and secondary tissues, Stem: Primary tissues, Stem: Secondary tissues, Double coloration of different stem types, Leaves.

SLBI303 **Biophysics** (5 Cr.)

Measurement and the scientific method, Elastic properties of biologic materials, Static biomechanics, Molecular phenomena related to biologic processes, The effect of heat, Circulation of blood, Light and modern physics, Nuclear radiation, Echography.

SLCH301 **Organic Chemistry** (4 Cr.)

Synthesis and reactivity of organic compounds. Alkanes and cycloalkanes, Alkenes and Alkynes, Arenes, Alcohols, Ethers and Phenols, Aldehydes and Ketones, Carboxylic acid and their derivatives, Amines.

Lab. Organic Chemistry (1 Cr.)

Melting point, Distillation, Recrystallisation, Extraction, Chromatography, Desydration of Alcohols, Preparation of Aspirin, Oxidation of Alcohols, Esterification.

SLBI304 **Cellular Physiology** (5 Cr.)

Intra and extra-cellular compartment, Functional structure of bio-membranes and permeability, Signal transduction via membranes, Transport of physical elements through the membrane, Cell motility, Cellular bioenergetics.

SLBI305 **General Geology** (4 Cr.)

History of Earth, Solid and liquid matter of Earth, Composition, structure, physical properties and dynamics, Mineral and hydrocarbon extraction, Mitigation of natural hazards, some engineering fields, Environments and past climates and present-day climate changes.

Lab. General Geology (1 Cr.)

Studying and examination of the composition, structure and physical properties of solid and liquid matter of Earth, Crystallography, Rocks.

SLBC301 **Structural Biochemistry**

(4 Cr.)

Carbohydrates: Classification. Structures. Chemical properties. Nucleic acids: Structures. Physico-chemical properties. Determination of nucleotide sequences. The different classes of RNA in the eukaryotic cells. Proteins: Classification. Structures. Chemical and physical properties. Study of the primary structure of peptides and proteins. Lipids: Classification. Structures. Enzymes: Nomenclature and classification of enzymes. Kinetics of enzymatic reactions. Influence of physical and chemical agents on the enzymatic activity. Active site of enzymes. Enzymatic activity and specificity of the enzymatic catalysis. Coenzymes and vitamins: Classification. General properties.

Lab. Structural Biochemistry

(1 Cr.)

Laboratory security. Preparation of solutions, Absorption spectrophotometry: Determination of λ_{max} . Determination of the concentration of a solution, Acid-base titration, Qualitative tests for carbohydrates, Qualitative tests for lipids. Determination of the iodine number of lipids, Determination of the saponification number of lipids. Determination of the acid number of lipids, Qualitative tests for proteins, Polarimetry: determination of the specific rotation of a carbohydrate, Determination of the concentration of a reducing sugar by a spectrophotometric method.

SLBI401 **General Immunology**

(4 Cr.)

The cells and organs of immunity, Antigenicity et immunogenicity, Acquired and natural immunity, The complement, HLA system, Auto-immunity, Hypersensitivity (I, II, III, IV), Immunoglobulins, Immune deficiency.

Lab. General Immunology

(1 Cr.)

Familiarization with the laboratory of Immunology, Agglutination, Hemagglutination, Passive Agglutination, Blood antigens (ABO, Rhesus), Techniques in tubes and in glass plate, Coombs Test, Electrophoresis, Electrotransfert and Western blotting, Dot Blotting, Radial immunodiffusion (Ouchterlony) or in tube ELISA, Isolation and enumeration of mononucleocytes on Ficoll and/or magnetic beads.

SLBI402 **Physiology of functions**

(4 Cr.)

Homeostasis and control, Skeletal System: Functions of bone, bone formation and growth, Muscular Tissue Contraction and relaxation of muscle fibers and control of tension, Nervous Tissue and Autonomic Nervous System: Electrical signals and synapses, Sensory, Motor and Integrative Systems: sensation and integrative functions, Cardiovascular System: Functions and properties of blood, hemostasis, heart valves and conduction system, cardiac cycle and blood Vessels and hemodynamics, Respiratory, System: ventilation, lung volumes and capacities and gases exchanges, Digestive System: Phases of digestion, chemical and mechanical, Urinary System: Glomerular filtration, tubular reabsorption and secretion, urine elimination.

Lab. Physiology of functions

(1 Cr.)

Laboratory activities encourage critical thinking, understanding of tissue and organs structures by dissection, and the application of scientific methods. A series of laboratory exercises in which the students measure cardiovascular, neuromuscular and respiratory parameters on themselves using a computer based acquisition system.

SLBI403 **Zoology** (4 Cr.)

Introduction to the organization of animal world, Phylum of Protozoa, Phylum of spongia, Phylum of cnidaria, Phylum of ctenaria, Phylum of plathelminthe, Phylum of rotifera, Phylum of nemathelminthe, Phylum of annelida, Phylum of lophophoriens, Phylum of mollusks, Phylum of pararthropoda, Phylum of arthropoda, Phylum of echinoderma, Phylum of cephalocorda, Phylum of urochorda, Phylum of vertebrate.

Lab. Zoology (1 Cr.)

Study of external morphology and the intern organization for at least one, example of each phylum (Observation of slide; dissection).

SLBI404 **Pedology** (5 Cr.)

Generals, Constituents of the sol, Physical properties of sol, Chemical Properties of sol, Biological properties of sol, Genesis and Classification of sol, Study of principal Known sols.

SLBI405 **Introduction to Molecular Biology** (4 Cr.)

The structure of genetic material, The organization of the DNA in chromosomes, DNA Replication, Transcription, RNA molecules, and RNA processing, The genetic code and the translation of the genetic message.

Lab. Introduction to Molecular Biology (1 Cr.)

Use of microscope, Prokaryotic cell, Eukaryotic cells: unicellular and multicellular, Organelles (nucleus, cells wall, storage material,...), Plant and animal cells: plasmolysis, turgescence, Plant tissues: epidermis, parenchyma, collenchymas, sclerenchymas, xylem and phloem, Plant mitosis, Epithelium of the mouth, Epithelial tissues, Conjunctive tissues, Cartilaginous tissues, Bone tissues, Muscle tissue, Animal mitosis.

SLBC401 **Metabolic Biochemistry** (5 Cr.)

Anabolism. Catabolism. Carbon, oxygen and nitrogen cycles. Heterotrophic, autotrophic cells, photosynthetic and chemotrophic cells. Bioenergetics. Carbohydrate catabolism. Glycogen catabolism. Glycolysis cycle. Oxidative degradation of glucose. Oxidation chain. Lipid catabolism. Biosynthesis of carbohydrates, fatty acids, triacylglycerols, phosphoglycerides and cholesterol. Oxidative degradation of amino acids. The genetic information and biosynthesis of proteins. Biosynthesis of amino acids. Biosynthesis of puric and pyrimidic rings.

SLBC402 **Clinical Biochemistry** (5 Cr.)

Hydro-electric equilibrium. Acid-base equilibrium. Phosphocalcic metabolism. Iron metabolism. Magnesium, copper and lithium metabolism. Carbohydrate metabolism. Lipid and lipoprotein metabolism. Generalities on nitrogen metabolism. Plasmatic proteins. Plasmatic enzymes. Non-protein nitrogenous constituents. Functional exploration of the liver and the kidney. Laboratory organization.

SLBI501 **Biology of Animal Development** (4 Cr.)

The developmental biology occupies the central position in modern biology; it unifies the molecular biology, the genetic and the morphogenesis disciplines. The course of development biology proposed the following objectives:

- Deliver theoretical and practical knowledge's on developmental biology mechanisms that permit the students to obtain the complementary information for L1 and L2 courses.
- Learn the relative notions of maternal genome expression and its importance in the beginning of development, in the embryonic genome activation and its impact on embryo organization form, especially the polarity axes, the symmetrical plane, the embryonic inductions and the role of principal genes.

Lab. Biology of Animal Development (1 Cr.)

Fertilization and sea urchin embryology; Embryology of Amphibians: revision of embryonic stages accomplished in Biol 200 and completed with stages: young gastrula, neural plate, neural groove, organogenesis of larva; Embryology of birds: revision of embryonic stages accomplished in Biol 200 and completed with stages (complete embryos or serial slides): Dissection of chicken egg (in vivo): young and late stages, Organogenesis of the eye; Embryology of Mammals: transverse section of the uterus: stages pre-ovulatory and post-ovulatory, umbilical cord and human placenta.

SLBI502 **Plant Physiology** (4 Cr.)

Introduction to plant physiology: general organization of vegetative organs, Plant and water, importance and absorption of water, transpiration, Photosynthesis, Respiration, Mineral nutrition: circulation and role of nutrients.

Lab. Plant Physiology (1 Cr.)

Extraction of photosynthetic pigments, Determination of the intensity of transpiration using balance, Aerobic respiration: measure of O₂ and CO₂, Mineral deficiency within plants, Sub-cellular distribution of water and ions: theoretical bases and applications.

SLBI503 **General Microbiology** (4 Cr.)

The role of the microbiology, The composition of the microbial world, Bacteria, Microbial genetics, Microbial nutrition, Microbial metabolism, Microbial growth, The control of microbial growth, Host-Microbe interactions, Viruses.

Lab. General Microbiology (1 Cr.)

Laboratory rules, Aseptic Technique and Transfer of Microorganisms, The Gram Stain, Identification of Bacteria through Biochemical Testing, Identification of The Enterobacteriaceae, Identification Using API, KIRBY-BAUER Test for Antibiotic Susceptibility, MIC & MBC Determination, Enumeration of Bacteria, Enumeration PF Bacteriophage.

SLBI504 **Applied Immunology** (5 Cr.)

The Blood Groups Antigens, Anti Tumor Immunity, Deficits Immune, Transplantation and Registry, What the Stem Cell Transplant, Monoclonal antibodies, Production of monoclonal antibodies on an industrial scale, Immunotherapy and Immunoprophylaxis.

SLBI505 **Molecular Biology** (4 Cr.)

Introduction and brief presentation of enzymatic tools in molecular biology, Principles of nucleic acids extraction, Preparation of cDNA and genomic libraries – screening and selection, Labeling of nucleic acids, PCR and RT-PCR, Nucleic acid sequencing, Detection of nucleic acids by hybridization, Investigation of protein-DNA interaction (aim, principles and applications), Introduction to transcriptome and proteome investigation, Organization of eukaryote genome, Regulation of gene expression at the chromatin level, Regulation at the transcription level, Post-Transcription regulation, Translation and post-translation regulation.

Lab. Molecular Biology (1 Cr.)

Genomic DNA extraction (yeast, buccal epithelium, leucocytes, onion, ...), Transformation of bacteria (GFP or another, possible purification of the protein in question), Extraction of plasmid DNA – digestion, Optical density analysis, Hyperchromicity, Electrophoresis.

SLBI506 **Molecular Genetics** (5 Cr.)

Chemical and structural aspect of the nucleic acids, Anatomy of the genome of Prokaryotes and Eukaryotes, DNA replication, Mutation, reparation and recombination, Transcription, Translation, Genetics of Microorganisms, Genetics of Organelles.

SLBI507 **Paleontology** (5 Cr.)

The following specific objectives are developed in the course: To understand the different types of fossilization, To reconstitute the past physical environment or the paleoecology, To be aware of the evolution of both plants and animals (flora and fauna) in order to better understand and protect human environment. Objectives, fossils and fossilization; Methods applied for fossil studies – species and classification; Paleoecology: principles and concepts, biotopes and biocenosis, biosphere geosphere interactions, results and paleogeography; The first form of life on Earth and primary fossils; The first plant fossils, importance and time succession; The principal groups of animal fossils: coelentera, mollusks, trilobites, brachiopods, bryozoans, graptolites and echinoderms; The first vertebrates in aquatic, terrestrial and atmospheric environments through space and time; Hominization; Biological crisis and principal extinction through geologic time; Evolution mechanisms and theories.

SLBI601 **Nutrition** (4 Cr.)

Nutritional biochemistry, Major and minor constituents of foods, Animal and Plant Food Products, Role of nutrients in disease, Analysis of foods by chemical and physical methods, Food processing and quality management, Food product development, analysis and packaging.

Lab. Nutrition**(1 Cr.)**

Quantitative analysis of foods by chemical and physical methods, Determination of major and minor constituents of foods.

SLBI602 Bioinformatics**(5 Cr.)**

This course introduces the scientist to Bioinformatics, which uses computer databases to store, retrieve and assist in understanding biological information. Genome-scale sequencing projects have led to an explosion of genetic sequences available for automated analysis. These gene sequences are the codes, which direct the production of proteins that in turn regulate all life processes. The student will be shown how these sequences can lead to a much fuller understanding of many biological processes allowing pharmaceutical and biotechnology companies to determine for example new drug targets or to predict if particular drugs are applicable to all patients. Students will be introduced to the basic concepts behind Bioinformatics and Computational Biology tools. Hands-on sessions will familiarize students with the details and use of the most commonly used online tools and resources. The course will cover the use of NCBI's Entrez, BLAST, PSI-BLAST, ClustalW, Pfam, PRINTS, BLOCKS, Prosite and the PDB. An introduction to database design and the principles of programming languages will be provided.

SLBI603 Biotechnology**(4 Cr.)**

Historical view of biotechnology, Fundamentals of molecular biotechnology, Gene expression in prokaryotes and eukaryotes, Use of microbial systems in molecular biotechnology, Plant biotechnology, Recombinant DNA in industrial and agricultural fields, Transgenic animals, Stem cell research, Regulations of molecular biotechnology, Applications of recombinant DNA technology in medical and pharmaceutical field.

Lab. Biotechnology**(1 Cr.)**

Methodology and applications of recombinant DNA, Protein engineering in a microbial system, Study of the fermentation process, Manipulation of plants.

SLBI604 Neurophysiology**(5 Cr.)**

This course covers the fundamental aspects of the functioning of the nervous and endocrine systems and represents a part of the teaching of Integration of animal physiology of functions at the end of the course, students will have acquired:

- the property possessed by the cells of these two systems in the origin and the integration of a signal: nerve impulses and hormone signal
- the functional organization of these two systems
- the basic mechanisms of the transduction of the nervous and hormonal signals
- physiologic processes that ensure basic cellular interactions and coordination of body functions.
- an introduction, with the aid of examples, the role of these 2 systems in the regulation of other functions as well as in maintaining homeostasis

Introduction (generality and terminology), Distribution, abundance of life and population dynamics, Study of different natural ecosystem, Interactions between organisms and their natural environment, Functioning of the ecosystems

Environments and anthropic activities (simplification and modification of ecosystem by human activities), Ecological factors (abiotics and biotics), Economic interest of the environmental protection.

Lab. General Ecology**(1 Cr.)**

Visiting and studying ecological systems, population dynamics, population harvesting, biological communities in space and time, and the relationship between ecological goods and services.

Ce cours a pour objectif principal de développer les connaissances des étudiants sur le milieu pharmaceutique et de les préparer des éventuelles possibilités de travail dans ce secteur. En plus, cet enseignement prépare les étudiants désirant suivre des études supérieures (master et doctorat) au raisonnement scientifique et à la conduite appliqués dans la recherche pharmaceutique. Ce cours est divisé en plusieurs modules: **Module 1:** Les phases de développement d'un médicament. Ce module décrit les différentes phases par lesquelles doit passer une molécule avant d'obtenir l'autorisation de mise sur le marché (AMM) et les études qui suivent cette AMM. **Module 2.** Pharmacologie générale. Ce module comporte la pharmacocinétique et la pharmacodynamique des médicaments. **Module 3.** Pharmacothérapie. Ce module permet d'étudier deux familles pharmacologiques : les médicaments de l'inflammation et les antinéoplasiques. **Module 4.** Pharmacie industrielle. Ce module regroupe les technologies liées à la formulation des médicaments et leur production industrielle dans des conditions d'efficacité optimale qui suivent les bonnes pratiques de fabrication (GMP). **Module 5.** Pharmacie galénique. Ce module décrit les formes pharmaceutiques et galéniques les plus utilisées.

Five kingdom concept-a brief idea of different kingdoms. A course in the anatomy, physiology, reproduction and taxonomy of lower to higher plants. Topics include organization of plant cells and tissue systems, morphology, respiration and photosynthesis, genetics, growth and development, environmental factors, nutrition, ecology, and mechanisms of evolution.

Plantae: Green algae (chlamydomonous, Red algae and brown algae (general account) Bryophytes: (Moss-polytrichum); Pteridophytes: (Fern-poly podium); Gymnosperm (pine) and Angiosperm: (General account of their basic features, types and habitats). Reproduction and development in angiosperm: **Asexual reproduction**, sexual reproduction structure and function of flower, inflorescence, sporogenesis, game to genesis, pollination, fertilization, development of embryo, endosperm, seed and fruit, forms of fruit, mechanism of seed dispersal, defensive mechanism. Tissue in flowering plants-meristematic and permanent tissue, tissue system, secondary growth, typical organization of tissue in stem (example sunflower, maize, curcubita), root (example monocot and dicot root), leaf (example-isobilateral and dorsiventral).