

Department of Biological Science

Description of Biological Sciences Department Courses

	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 110	General Bio	3	0	3	-

- **Course Description:**

Getting Acquainted with Biology- What is Biology \ Branches of Biology-Historical Development of Biology-Characteristics of Life-How Biological studies Are Conducted-Applications of Biology \ Relations with other Sciences-Careers for Biology Majors-**Chemical Basis of Life**-Inorganic Components of Living

Organisms-Organic Components of Living Organisms-Biological Reactions and Enzymes-**Cells and Tissues: Structure and Functions** -Prokaryotic Cells-Eukaryotic cells-Replication of cells: Mitosis and Meiosis-Plant and Animal Tissues-**Biodiversity**-Principles of Taxonomy and Classification-Viruses, Bacteria, Algae and Fungi-Plants-Animals-**Nutrition- Metabolism and Bioenergetics**-Photosynthesis: Fixation of Sun Energy-Synthesis of Biological Macromolecules, Energy Storage-Breakdown of Biological Macromolecules, Energy Release- **Excretion**-Excretion in Simple Forms of Life-Excretion in Plants-Excretion in Animals-Respiration-**Circulatory System**-Blood: Composition & Functions-Heart & Vessels-Lymph & Lymphatic System-**Reproduction, Fertilization and Development**- Simple Forms of Life-Plants- **The Basic Genetic Mechanisms**-Classic Genetics-Molecular Genetics.

Main text books

Sylvia S. Mader (Latest Edition): Biology. McGraw-Hill, USA.

	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 200	General Laboratory Safety	1	0	1	-

- **Course Objectives:**

- **Course Description:**

Sources of dangers in Laboratories (Physical hazards, Chemical hazards, Radiation, Biological hazards), Safety and Personal protection, First aid, Laboratory arrangement, Laboratory waste disposal, Safety in the field studies.

Main text books

- Barch, M. J., Knutsen, T. and Spurbeck, J. The AGT Cytogenetics Laboratory Manual. 3rd edition, Lippincott-Raven, USA.

1	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 281	General Biology lab	0	1	1	-

▪ Course Description:

Microscopes-Parts, how to use, maintenance, preparing samples for microscopic viewing-Visiting Electron Microscope laboratory, view some prepared samples and their photographs-**Chemistry of organisms**-Study of chemical methods for identifying proteins, carbohydrates, lipids and nucleic acids. Study of some enzymatic reactions-**Cells**-Identifying parts of eukaryotic and prokaryotic cells, and deriving basic differences between them by viewing prepared animal, plant and microbial models as well as viewing by the students samples he prepared himself-**Cell Division**-Study of mitosis and meiosis by means of prepared slides with the light microscope, identifying the serial phases of each, describing them and deriving the differences between them, and pointing out their importance-**Tissue**-Microscopic study of animal and plant tissues, identifying the differences between them and the adaptability of characteristics to functions-**Diversity of organisms**-Identification of categories of classifying organisms, studying the characteristics of the kingdoms and major phyla. Practicing to give scientific names to representatives of known organisms according to the binomial system-**Nutrition** -Study of representatives of autotrophs and heterotrophs.- Conduction of nutrients to cells by osmosis, diffusion and active transport as related to sections in root, stem and leaf in plants and digestive system in rat-**Transport of nutrients and materials in plants and animals**-Study of sections of root, stem and leaf to identify the parts of transport in plants. Study of circulatory system in rat and pointing out role of blood in nutrients and material transport-**Excretion**-Study of organs of excretion in plants and animals. Anatomy of excretory systems in rat. Excretion in simple organisms-**Reproduction** -Study of modes of reproduction in the different representative organisms. Dissection of reproductive organs in higher plants. Dissection of reproductive system in female and male rat-**Development** -Microscopic study of stages of development in flowering plants and vertebrates as-represented by amphioxus.

Simplified demonstration of tissue cultures and stem cells

Main text books

1- Gunstream, S.E (Latest Edition). Explorations in Basic Biology. Prentice Hall, USA.

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2	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 202	General Biology II	3	3	4	Bio 110

Objectives of the course:

Comparative study of biological systems that control and coordinate the activities of organisms such as hormones, circulations, nervous system, sense organs, behavior and ecology.

Course Description

Plant and Animal Hormones - Circulation in Plants and Animals - Immune response in Plants and Animals - Nervous and Sensory systems - Plant and Animal behavior - Ecology - Theories of the Origin of Life and its Evolution.

Main text books:

- Introduction to Biology, Vol. II/ 1997 By Prof. Dr. N.A. Baeshin et al., 3rd edition, published by the Authors, P.O. Box 80203, Jeddah, 21589, Saudi Arabia.

Subsidiary books:

- Audesirk, 1996. Biology, Prentice-Hall International, London, UK.
- Solomon 1993. et al., Biology, John Wiley and Sons Inc., New York, U.S.A.
- Kimbell's Biology, 1993 (Translated in Arabic).

3	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 221	General Genetics	2	3	3	Bio 110

Objectives of the course:

Introducing the student to the major areas of specialization of the science of Genetics. Emphasizing the central role of genetic material in the living organisms. Applications of Genetics.

Course Description

Introduction, definition of the science of Genetics, history of its development, subdivisions and applications - Mendelian genetics, variation of Mendelian ratios, Quantitative genetics - Gene linkage and genetic maps - Non-Mendelian genetics - Chromosome aberrations - Sex - determination - Molecular genetics - Population genetics - Developmental genetics - Immunological genetics.

Main text books:

- Principles of Genetics by Gardner et al., 1987, (translated in Arabic).
- Gardner et al., 1991. Principles of Genetics, John Wiley and Sons Inc., New York, U.S.A.

Subsidiary books:

- klug. Cummings, 1996. Essential of Genetics. Preatice-Hall International , London, UK.

4	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 222	Cell Biology	2	3	3	Bio 110

Objectives of the course:

- Help the student to become acquainted with the unit of the structure and function of organism.
- Emphasis the similarity of essential functions of specialized cells.
- Introduce essential principles which enable the student to make correlation between physiology and cell structure of an organism.
- Emphasis the importance of new applications on living cells and their products.

Course Description:

General introduction. History of cell biology. Cell theory. Cell environment. Relationship between cell and other biological fields. Functional unity of living cells. Types and structures of cells. Differences between virus and cell. Plasma membrane: Structure and Function. Cytoskeleton. Organelles (Structure and Function). Movement and its machineries. Embryonic development. Cell differentiation.

Main text books:

- Ali, Al-Robai and Fareed S. Abu-Zenah, (1995). Cell Biology: Structure and Function (in arabic). Published by the authors, P.O. Box 80057, Jeddah 21589, Saudi Arabia.

Subsidiary books:

- Thrope. N.O. (1994). Cell Biology. John Wiley and Sons. New York.
- Alberts, B. et al., (1994). Molecular Biology of the Cell (3rd Edi). Garland Publishing, Inc. New York.
- Hopkins, C.R. (1987). Structure and Function of Cell. W.B. Saunders com .
- De Robertis, E.D.P. et al., (1980). Cell Biology (7th Edi.). W.B. Saunders. Com . London.

5	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 231	General Microbiology	2	3	3	Bio 202

Objectives of the course:

To provide the student with a clear picture of the principles of microbiology, the different microbial groups and their importance.

Course Description:

Introduction, a brief history of microbiology, the importance micro-organisms, microbial cell structure, microbial growth, microbial reproduction and microbial nutrition.

Main text books:

- Martinko and Parker (1994). Biology of micro-organisms (7th edition) Brock, Madigan, (Prentice Hall).

Subsidiary books:

- H.M.M. Al-Saied Al-Nakhal, (1987) . Microbiology. Dar Al-Marif Cairo .

6	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 241	General Botany	3	3	4	Bio 202

Objectives of the course:

To put together a simplified account of the Angiosperm plant body (structure and development) together with the interrelations between their requirements and the surrounding ecological conditions.

Course Description:

Morphology and anatomy of the plant body:

- Construction of the typical plant body (shoot, leaves, root).
- Modifications of the plant body (Adaptation to manner of growth and Environment), Reproduction (asexual, sexual, alternation of generation).

Main text books:

- El-Hadidi, M.S., Helali, M.N. and Arafa, A.A. (1994). Morphology of Flowering plants, Al-Marreekh, KSA [in arabic] .

Subsidiary books:

- Nadakavukaren (1985). Botany, An Introduction to Plant Biology, West Publishing Company.
- Teuiot Were et al. (1982). Botany, An Introduction to Plant Biology.

7	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 251	General Zoology	3	3	4	Bio 202

Objectives of the course:

To Know the general groups of animal kingdom, biological, morphological, and structural studies and its distribution on earth .

Course Description

General feature, classification feature, nomenclature, support, protection and movement of general groups of animal kingdom and its biological morphology and structural studies and distributions of life on earth.

Main text books:

- M.A. Al-Banhawi et al., (1981). Zoology. 1st. ed., Dar Al-Marif.
- H. Al-Hussaini (1974). Pracitcal Animal Biology. I, II, III vol. 6th ed., (1974) Dar Al-Marif.

Subsidiary books:

- Pleczar, M.J.E.C.S. Chan and N.R. Krieg (1993). Microbiology: Concepts and applications. McGraw Hill Inc.
- El-Obaed (1986). Principles of Virology and Medical Mycology. Maccah El-Mokarama , Library of University Students. (Arabic).
- R. Barnes (1980). Invertebrate Zoology.
- W.N. McFarland et al., (1979). Vertebrate Life.

8	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 271	Fundamentals of Ecology	2	3	3	Bio 202

Objectives of the course:

To introduce the students to the concept of ecology, its divisions, and components and the relationships within the ecosystem, and the negative and positive role of man towards the environment.

Course Description

Introduction to ecology - its concept - field and relations to other sciences. The history and role of Arab and Muslim scientists in the field of ecology. The components of ecosystem, its types and changes. The distribution of organisms and their relationships within ecosystems. Scientific trips to different environmental areas of Saudi Arabia.

Main text books:

- Hassan Abou Al-Fath. (1991). " Ecology". [in Arabic] .
- Eugene P. Odum, (1971). Fundamentals of Ecology. Saunders Company , Philadelphia, USA.

Subsidiary books:

- Charles H. Southwick (1984). Ecology and our environment.
- Samih Graibah and Y. Farhan (1987). Introduction to Ecology.

9	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 325	Molecular Biology	2	3	3	Bio 222

Objectives of the course:

Study the structure of cell macromolecules and their integration and assembly into cellular organelles and structures.

Course Description:

Levels of protein structure, Conjugated proteins, Hemoglobin's, Enzymes, Immunoglobulin - Levels of carbohydrates structure, integration with other

macromolecules to form different structure of plant, animal and microbial cells- Lipids structures and their integration with other macromolecules to form cellular components- Nucleic acids and their integration with other macromolecules to form cellular components.

Main text books:

- Albert et al., (1994). The Molecular Biology of the Cell. Garland Publishing, Inc. New York.
- Karp, (1996). Cell and Molecular Biology, John Wiley and Sons Inc, New York, USA.

Subsidiary books:

- Frefelder, (1994). Molecular Biology. Jone and Bartlett, London, U.K.
- Sheales, Birchi, (1983). Cell & Molecular Biology. John Wiley and Sons, Inc . New York. USA.
- F. W. Price, (1979). Basic Molecular Biology. John Wiley and Sons, Inc., New York. USA.

10	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 330	Virology	2	3	3	Bio 231

Objectives of the course:

To know the nature of viruses and their relationships with the other living organisms, and to study their characteristics and their medical and economical importance .

Course description:

- Nature of viruses, and their relationships with the livings. Their living and non-living characteristics.
- Purification, cultivation, morphology and serological characteristics of the viruses.
- The study of some viral groups (animal, plan and bacterial).

Main text books:

- Levine, A.J. (1992). Viruses. Scientific American Library.
- Belshe, R.B . (1984) .Human Virology. PSG. Publishing Com. INC.
- Matthews, R.E.F. (1981). Plant Virology. 2nd ed. Academic Press.

Subsidiary books:

- Pleczar, M.J., E.C.S. Chan and N.R. Krieg (1993). Microbiology: Concepts and applications, McGraw Hill. INC.

- El-Obaed, O. (1986). Principles of Virology and Medical Mycology, Macca El-Mokarama, Library of University Students. (Arabic).

11	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 331	Bacteriology	2	3	3	Bio 231

Objectives of the course:

To give an idea about the nature, structure and characteristics of bacteria as prokaryotic organisms and to study their different groups.

Course Description:

Morphological characteristics, internal structure, cell wall structure, bacterial movement, speculation, bacterial growth and reproduction, bacterial identifications and classification.

Main text books:

- Abo El-Dahab and El-Gorhany, (1997). The Bacteria (I and II), Dar El-Maref, Egypt. (Arabic).

Subsidiary books:

- Singelton, P. (1995). Bacteria in Biology, Biochemistry and Medicine, edition, John Wiley and Sons.

12	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 332	Mycology	2	3	3	Bio 231

Objectives of the course:

To describe fungi from a morphological and structural point of view. and also provide student with the different divisions of Mycota.

Course Description

General introduction, Morphological and histological structure of fungi, Fungal growth and nutrition; The different groups of fungi: the myxom-ycetes, mastigomycetes, zygomycetes, Ascomycetes, Deuteromycetes and Basidiomycetes. Biological activities of Fungi. Economical importance of Fungi.

Main text books:

- Alexopoulos, C.J. and Mims, C.W. (1979). Introductory Mycology, 2nd ed., John Wiley and Sons.

Subsidiary books:

- C.T. Ingold (1984). The Biology of Fungi, 5th. Ed.
- Harry J. Hadson, (1985). Fungal Biology.

13	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 333	Phycology	2	3	3	Bio 231

Objectives of the course:

To describe the principles of **Phycology**, general classification and economical importance which helps in food problems.

Course Description :

- Morphology of algal cells.
- Classification and reproduction of algae.
- Nutritional relationship between algae and other micro-organisms.
- Economical importance.

Main text books:

- Robert Edward Lee (1980). **Phycology**, Cambridge University Press. UK.

Subsidiary books:

- Bold and Wynne (1978). **Phycology**, Prentice-Hall, Inc. London.

14	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 334	Principles of Microbial Taxonomy	2	-	2	Bio 231

Objectives of the course:

To provide the student with the principles of identification, nomenclature, and classification of different microbial groups.

Course Description:

Introduction to microbial taxonomy, Identification of unknown micro-organisms (phenotypic properties and genetic analysis, commercial

identification systems). Rules of nomenclature. Approaches to microbial classification.

Main text books :

- Goodfellow, M. & O'Donnell, A.G. (eds.) (1993), Handbook of New Bacterial Systematic, Academic Press.
- Microbial Classification (1992). Symp. Soc. Gen. Microbiology.

Subsidiary books:

- Holt et al., (1984). (ed.) Bergey's Manual of Systematic Bacteriology. The Williams & Wilkins Co., Baltimore.

15	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 335	Microbial Ecology	2	3	3	Bio 231

Objectives of the course:

To study Microorganisms in their natural habitats: air, water and soil.

Course Description:

Introduction to microbial ecology defining the scope of Microbial Ecology, historical overview. Measurement of numbers, biomass and activities in microbial ecosystems. Micro-organisms in their natural habitats: air, water and soil microbiology. Interactions among microbial population, interactions between Micro-organisms and plants. Microbial interactions with animals.

Main text books:

- Ronald, M. Ahas/Richard Bartha, (1987). Microbial Ecology, 2nd. ed. The Benjamin /Commings Publishing Company. Inc.

Subsidiary books:

- Alexander, M .(1982) . Introduction to Soil Microbiology, 2nd. ed. John Wiley and Sons Inc., New York, USA.

16	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 336	Microbial Physiology	2	3	3	Bio 331

Objectives of the course:

To give an idea about the principal characteristics of microorganisms, structure and function of their different organelles, their biological activities and metabolism.

Course Description

Effect of different environmental and chemical conditions on microbial growth. Nutritional requirements, energy sources, microbial enzymes, respiration, metabolism of carbohydrates, proteins and lipids, and the relationship between these processes and growth.

Main text books:

- Caldwell, D.R. (1995). Microbial Physiology and Metabolism. W.C.B. U.S.A.

Subsidiary books:

- Some lectures from different scientific references.

17	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 341	Plant Anatomy	2	3	3	Bio 241

Objectives of the course:

To inform students with the ultra structures of the vascular plants and notifying the relationships between this course and other courses of biology.

Course Description:

To studying the general and ultra structures of the cell wall, Pits, types and divisions of meristems, types of the permanent primary cells and tissues, pro-vascular system, plant primary structure, types of the secondary growth of roots and stems, abnormal secondary growth, the attendant changes of the secondary growth.

Main text books and Subsidiary books:

العودات، محمد عبدو والدعيجي، عبدالله بن رشيد (1412). مورفولوجيا النبات وتشريحيه. مطبوعات جامعة الملك سعود

-Esau, K. (1960). Anatomy of Seed Plant. John Wiley & Sons Inc.

- Esau, K. (1967). Plant Anatomy. 2nd. Edit. John & Sons Inc.
- Fahn, A. (1990). Plant Anatomy. 4th. Edit. Pergamon press, Oxford.
- Mauscth, J. D. (1988). Plant Anatomy. Cummings & Hathaway. USA

18	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 342	Plant Physiology (1)	2	3	3	Bio 241

Objectives of the course:

Study of anabolism and catabolism in plants.

Course Description:

Introduction of enzymes, photosynthesis, respiration, chemical reaction of light and dark, carbohydrate, nitrogen and fats metabolism.

Main text books:

- Dr. M.H. Wahaiby, (1989). Plant Physiology. King Saud University, Rhyadh .
- Dr. M. Hassonah, (1983). Principle of Plant Physiology, New Press, Egypt.
- Dr. A.S. Ahmed, (1983). Photosynthesis, Al-Mussel University, Iraq.

Subsidiary books:

- M. Ropert, F.H. Wisdom. (1985). Plant Physiology. Translated by M.M. Sheraky et al., Arab publishing group, Cairo, Egypt.
- W.H. Street and H. Opik. (1984). Physiology of Flowering Plants .

19	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 343	Taxonomy of Flowering Plants I	2	3	3	Bio 241

Objectives of the course:

To put together a simplified account of basic principles as is needed by students in a beginning course in taxonomy, together with illustrated descriptions of the most important families of flowering plants, representative of the flora of Saudi Arabia.

Course Description:

Part 1 : dealing with the morphology of the flower, inflorescences, development of floral parts, pollination, fertilization, seed and fruit dispersal.

Part 2: dealing with the description of some selected families of flowering plants. with scientific trips to natural areas and its environment.

Main text books:

- Lawrence, G.H.M. (in Arabic 1969), Taxonomy of Vascular Plants, Anglo-Egyptian Lib. Cairo.
- Saad, S.I. 1979. Taxonomy of Flowering Plants, Almaaref Est. Alexandria.

Subsidiary books:

- Stace, C.A. 1989. Plant Taxonomy and Biosystematic. Rout ledge, Chauspan & Hall Inc. (USA).
- Hickey, M. & King, C. (1981). 100 Families of Flowering Plants, Cambridge.

20	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 344	Taxonomy of Flowering Plants II	2	3	3	Bio 343

Objectives of the course:

To discuss topics in relation to and understanding of modern plant taxonomy, such as structural botany and biosystematics, together with further illustrated description of selected families of flowering plants.

Course Description:

Part 1 : Sources of taxonomic information; structural, palynological, chromosomal anatomical and chemical information.

Part 2 : description of selected families of flowering plants. with scientific trips to natural areas and its environment.

Main text books:

- Stace, C.A. (1989). Plant Taxonomy and Biosystematic. Rout ledge, Champan & Hall Inc. (USA).
- Cronquist, A. (1981). An Integrated System of Classification of Flowering Plants, New York.

Subsidiary books:

- Lawrance, H.M. 1951. Taxonomy of Vascular Plants, Macrmillan Publishing Co., Inc . (New York).

21	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 345	Soil, Water-Plant Relationships	2	3	3	Bio 241

Objectives of the course:

The course aims to study the plant soil and water relationships, soil components of mineral nutrition, soil texture, soil water and soil profile.

Course Description:

Formation and development of natural soil and role of physical and chemical factors, soil properties (structure, texture, water, temperature, air, microorganisms and formation of organic matter), Soil Minerals, physical properties of water, polar and non polar liquids, structure of water molecule, water balance at cellulose level and causes of its changes, forces leading to water preservation in the cells, mechanism of water translocation in plant, absorption, transpiration.

Main text books:

- Dr. Ahmed Taher, (1984). Fundamental of Soil Sciences, Al-Mussel University, Iraq.
- Dr. M.A. Al-Wahaiby, (1984). Plant Water Relationship, King Saud University , Riyadh.

Subsidiary books :

- P.J. & Boyer, J.S. (1995). Water Relations of Plants and Soils.
- C.A. Black. (1987). Soil-Plant Relationships. Timber press, USA.
- Kramer. (1969). Plant and Soil Water Relationships, Academic press, London.

22	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 348	Medical Plants of Saudi Arabia	2	3	3	Bio 241

Objectives of the course:

The course aims to study the medical plants of Saudi Arabia which affecting man's health. Information well be provided on plants that heal and feed or harm .

Course Description:

Provide a brief history of the medical plants, with special notes on the studies of Arab's and Moslem's searchers on this field, the importance of the medical plants in the human life, the uses of the medical plants and their values, studying the medical plants of Saudi Arabia (including their description, identification and classification).

Main text books:

- Chevallier, A. (1996) The encyclopedia of medical plants . New York : Kindersley .

23	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 351	Invertebrates I	2	3	3	Bio 251

Objectives of the course:

To know about the biology of lower invertebrate (Protozoa, Porifera, Coelesterata, Platyhelminthes and Nematoda , (classification, general features and example for every phylum, begging of the life and its evaluation, biology and morphology.

Course Description:

Classification of lower invertebrates and examples for every phylum, begging of the life and its evaluation, metabolism, symmetry, cleavage and gastrulation, respiration, excretion, reproduction and biological colony. Fied trip to local habitats for collecting samples and studding invertebrate animals.

Main text books:

- Marshall and Williams (1974). Textbook of Zoology: Invertebrates, 7th ed. Parker and Haswel.
- E. Bartintan, (1970). Invertebrate structure and function, 1st . ed./ Nelson.

Subsidiary books:

- R. McNeill, (1979). The Invertebrates. 1st ed. Cambridge.
- M.S. Lauerack (1979). Lecture Nat's an Invertebrate Zoology, 2nd Edition Blackwell Scientific Pub.

24	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 352	Invertebrates II	1	3	2	Bio 351

Objectives of the course:

To know about the biology of higher invertebrates (Annelida, Arthropoda, Mollusca and Echinodermata), coelomic cavity, movement, excretion, nervous system, endocrine glands, biological associations and biological ecology.

Course Description:

Classification of higher invertebrates, general features, coelomic cavity, segmentation, movement, excretion organs, receptors and sensor organs, endocrine glands in Annelida and Insect and types of biological associations.

Main text books:

- Marshall and Williams (1974). Textbook of Zoology: Invertebrates, 7th Edition. Parker and Haswell Vol. I.
- E. Barrington, E.J. (1970). Invertebrate structure and function, (First Edition /Nelson) and Sons, London.

Subsidiary books:

- R. McNeill Alexander, (1979). The Invertebrates. First Edition. Cambridge Univ. Press, Cambridge.
- M.S. Laverack, & Dando, J. (1979). Lecture Notes on Invertebrate Zoology, 2nd Edition Blackwell Scientific Pub.

25	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 353	Animal Histology	2	3	3	Bio 251

Objectives of the course:

Introduction to the basic constituents of different systems and the definition of histology to enable the student to identify its kinds, shapes and origin. Moreover, special attention may be devoted to the scientific terminology related to this field of study.

Course Description

Brief and simple introduction to the cell, its constituents, its formation and its indirect division. Study of the different kinds of animal cells. Study of the different kinds of systems. Study of ductless gland and the sensory system.

Main text books :

- Nasar, Ahmed N., (1995). Histology, 2nd ed., Printed by Dar-Al-Maarif, 1119 Cornish Al-Nile, Cairo.

Subsidiary books:

- El-Gohary, Mahmoud, (1994). Histology and its Technology.
- B. Fawcett. (1994). A Text Book of Histology.
- Stevens & Lowe (1992). Histology.
- R. Romren .(1989). Histology: A Text & Atlas.

26	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 354	Animal Physiology I	2	3	3	Bio 251

Objectives of the course:

A comparative study of physiological processes in different species of animals and their integration in different organs of animals.

Course Description:

Nutrition: Nutrients, Feeding methods in animals, Digestion and absorption, Metabolism and energy. Temperature regulation, Body temperature of animals, Temperature tolerance, Mechanisms of temperature regulation, Temperature adaptation.

Excretion: Organs of excretion in animals and their functions, Excretory products and nitrogen excretion.

Reproduction: Reproduction strategies in animals, Sexual organs, Sexual cycles , Pregnancy and Parturition.

Main text books:

- Schmidt-Nielsen, K. (1994). Animal Physiology: Adaptation and Environment . Cambridge University Press, Cambridge, U.K.
- Withers, P.C. (1992). Comparative Animal Physiology, Saunders College Publishing, USA.
- Prosser, C.L. (1991). Comparative Animal Physiology. Wiley-Liss, Inc. New York.

Subsidiary books:

- Guyton, A.C. (1994). Medical Physiology. W.B. Saurders Company, Philadelphia , U.S.A.
- Eckert, R. (1988). Animal Physiology-Mechanisms and Adaptation.

27	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 355	Embryology	2	3	3	Bio 251

Objectives of the course:

The study of the Embryology and its applied subjects such as artificial insemination and teratology.

Course Description:

Introduction, gametogenesis, fertilization, cleavage and fate maps, early development in amphioxus, frog, chicken and human, twins, artificial insemination, parthenogenesis, teratology.

Main text books:

- Karim, S. (1991), Introductory of Descriptive and Experimental Embryology, Dar El-Mogtama, Jeddah.

Subsidiary books:

- Balnisky, B., (1981), An Introduction to Embryology, 5th ed., Sounder College Publishing.
- Walbot, V. and Holder, N., (1987), Development Biology, Random House, New York.

28	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 356	Animal Specimen Techniques	1	3	2	Bio 251

Objectives of the course:

This course aims to learn students the basic theoretical and practical techniques of histological and whole mount preparations, specimen preservation and related informations.

Course Description

Methods of specimen collection, types of light microscopy, fixation and fixatives, tissue processing, microtomy and paraffin sections, frozen sections, theory of staining and staining techniques, types of microscopically preparations, introductory histochemistry, and museum and demonstration techniques.

Main text books:

- Humason, G.L. (1974). Animal Tissue Techniques ,W.H. Freeman and Company, San Francisco.
- التحضيرات المجهرية - تأليف د. عدنان عبدالأمير العطار ، د. سيهلة العلان ، د. كواكب المختار - العراق .
- المبادئ الأساسية للتحضير المجهرى الضوئي - د. أحمد الحاج ، 1982م - جون وايلي - لندن .

Subsidiary books:

- Bancroft & Stvrens, (1996). Theory & Practical of Histological Techniques , 4th . ed., Churchill Livingstone, New York.

71	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 357	Animal Cells & Tissues Culturing	1	3	2	Bio 353, 355

Objectives of the course:

This course aims to teach and train the student on the methods of cell and tissue culture using the latest available methods in order to be able to apply it in the different practical aspects of life.

Course Description:

An introduction on the development of cell and tissue culture – behavior of the cultured cells (growth, development, metabolism...) – the effect of the intrinsic and extrinsic factors on the cell and tissue cultures – the natural factors such as hormones, different growth factors – extrinsic factors such as the medium (saline solutions, different types of artificial media) – methods of avoiding infections of cell and tissue culture – source of cultures (different sources, of cells and tissues and the conditions under which each cell or tissue type is used – methods of cell and tissue culture and their practical applications (the student should be familiar with the different types of cell and tissue culture and should be able to identify the apparatus and material used) – embryo culture – brief description of organ culture.

Main text books :

- Paul, J. (1980) Cell and Tissue Culture, Churchill Livingstone.
- Freshney, R. (1986) Animal Cell Culture, IRL Press. Oxford.
- Abe, S. (1988) Cell Culture of Spermatogenic Cell Form Amphibians Development, Growth & Differ. 30 (3), 209-218 .

- R. Ian Freshney (2000) Culture of Animal Cells: A Manual of Basic Technique. 4th Edition Wiley.

29	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 358	Herpetology	2	3	3	Bio 251

Objectives of the course:

To provide information about historical life of amphibians and reptiles, to be aware about different characters of all herpetology orders by examining their biology, morphology and anatomy.

Course Description:

Introduction, historical original of amphibians and reptiles, some biological aspects, ecological adaptation, behavior, physiology, anatomy, reproduction, characteristics and classification of amphibians and reptiles, geographical distribution, economic importance and conservation of amphibians and reptiles, with given more information about species living in Saudi Arabia. Field trips to study local reptiles and amphibians and to collect samples.

Main text books:

- Hichman, S.P. (1990). Integrated principles of Zoology. Times mirror/mosby College Publishing st. Louis Toronto Santa Claro (pp 342).
- Arnold, E.N. and Barton, J.A. (1980). Afield guide to the Reptiles and Amphibians . Collins St James's Place, London (pp 272.)
- Goin, C.J. and Goin, O. (1978). Introduction to Herpetology. Freeman London. (3rd. ed.).

Subsidiary books:

- Stebbins, R.C. and Cohen, N.W. (1995). A Natural History of Amphiians , Princeton, New Jersey: Princeton University Press (pp. 316).
- Guide to Living repiles by Webb et al., (1986) Webb Wall work Elgood (pp 172).
- Porter, K.R. (1976). Herpetology. Saunders, London.

30	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	

Bio 359	General Entomology	2	3	3	Bio 351
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Objectives of the course:

To provide a basic and applied information of entomology for undergraduate students with emphasis on: The essential characteristics of insects-insect importance to human - present the different approach of this science.

Course Description:

The insect importance and classification - insect morphology - [insect head and antennae - mouthparts - eyes - major wing and leg types - study of abdomen appendages] - Anatomy and internal structure - The body wall - (integument) - Metamorphosis - Taxonomy - Insect ecological factors. Field trips to study local insect habitats and to collect samples.

Main text books:

- R.F. Chapman, (1987) Insect structure and function (I and II). Al-Dar Al-Arabia , Egypt. (Arabic Edition).
- A. Ghadwri, H. Abas, and M. Camal, (1980) The General Enotomology. Ministry of Higher Education, Iraq. 395 pp. (Arabic Edition).

Subsidiary books:

- Larry, P. Pedigo, (1995). Entomology and Pest Management. Prentice Hall. 2nd ed.
- Pedigo, L.P. (1989), Entomology and Pest Management. Macmillan pub. 646 pp.
- A. Rawash, M. Al-Helaly, M. Eedrees, M. Suliman, and A. Al-Aziree (1987) Principles of Entomology. Alexandria University.

31	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 390	Training	-	6	2	Approval of Dep.

Objectives of the course:

To apply scientific skills that a student has gained through out his studying of different courses by trained him in applied fields of Biology at a governmental or commercial sector.

Course Description:

- Improved lectures and trainings in the field of Biology are assigned to the student.
- The student can accomplish his laboratory or field study at a governmental or commercial sector, by then he must subject his results which are related to the training's subject.

The student must write a complete scientific report about his study, training, and results. He must present his report in a seminar, or address a speech in front of a committee to evaluate his training program.

32	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 391	Biological terminology & literature	2	-	2	-

Objectives of the course:

To introduce students (through different special topics in Biology) to the most important scientific and Latin language terms in the field of Biology.

Course Description:

- Lectures and readings in special topics in Biology are assigned to students out of scientific and principle references that improved by the Department.
- Students study list of scientific terms in Arabic, English and Latin in the field of Biology. They ought to know how to acquire scientific terms from different resources (References, Dictionaries, Abstracts, and different electronic media).

- Main text books:

To be assigned at the beginning of each term.

Subsidiary books :

To be assigned at the beginning of each term.

33	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 392	Computer applications in Biology	2	3	3	-

Objectives of the course:

The goal of this course is to train and prepare the student to use the computer in biological sciences and that through writing the program to solve different problems and using some computer packages

34	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 430	Immunology and Serology	2	3	3	Bio 330, 331

Objectives of the course:

- Know and understand the different mechanisms of innate immunity. Describe how the acquired-immunity work.
- Understand some of non-desirable immunity e.g. hypersensitivity, immunodeficiency, autoimmunity diseases, Tumor and Transplantation.
- Understand immunity to Bacteria, Virus, Fungi and Protozoa.
- Understand Vaccination procedures.
- Understand the application antibody-antigen interaction in Laboratory investigation.

Course Description :

Introduction course to immunology give the student the basic knowlage of the different scope of immunology.

Main text books:

- Norman Staines et al., (1993). Introducing Immunology. 2nd. ed. Mosby - Yearbook Europe, Lynton House, 7-12 Tavistock Square, London.
- Weir, D.M. (1988). Immunology, (6th. ed.). Churchill Livingstone, Robert Steveson-House, 1-3 Baxter's Place, Leith Walk, Edinburgh.

Subsidiary books :

- Roitt, Ivan et al., (1989). Immunology (2nd. ed.). Churchill Livingstone , Gowermedical Publishing, Middlesex-House, 34 Cleveland Street, London.

35	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 431	Soil and Water Microbiology	2	3	3	Bio 331, 332

Objectives of the course:

To provide the principles of soil and water Microbiology, and to give laboratory experience in microbiological examination of soil and water samples.

Course Description:

- Soil and aquatic microorganisms.

- Microbial activities in soil and water.
- Economic significance of soil and aquatic microorganisms.
- Water purification and Sewage treatment.
- Microbiological examination of soil and water samples.

Main text books:

- Ford, T., (1993). Aquatic Microbiology. Blackwell, USA.
- Mahmoud et al., (1988). Soil Microbiology. Anglo, Cairo (in Arabic).

Subsidiary books:

- J.M. Lynch, (1983). Soil Biotechnology, Blackwell Scientific Publication, London.
- B. Austin, (1988). Marine Microbiology. Cambridge University Press, Cambridge, New York.
- M. Alexander, (1982). Introduction to Soil Microbiology. John Wiley & Sons, New York.
- G. Rheinheimer, (1980). Aquatic Microbiology, John Wiley & Sons, London. 2nd ed.

36	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 432	Plant Pathology	2	3	3	Bio 332

Objectives of the course:

To introduce the student to plant pathology which is the study of disease in plants and this implies the growth, appearance and behavior.

Course Description:

Pam ping off and seedling blights, root and foot rots, wilts, powdery mildews, powdery mildews, rusts, smut, blights, anthracnose, leaf spots, leaf curl witches' broom, club root, galls, canker and scab, mosaics and yellows, post-harvest diseases, diseases control.

Main text books :

- Campbell, C.L. & Madden, L.V. (1990). An introduction to plant diseases, John Willey & Sons. London .

Subsidiary books :

- Principles of plant pathology, S.A.J. Tarr .

37	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 433	Microbial Genetics	2	3	3	Bio 221, 231

Objectives of the course:

Demonstrating the important role played by microorganisms in genetical studies. Genetic mechanisms in microorganisms on the molecular and organismal levels. Role of microorganisms in genetic engineering and biotechnology.

Course Description:

Introduction to the Science of Microbial Genetics. Molecular genetics of microorganisms. Recombination in bacteria and fungi. Plasmids. Transposons. Genetic Engineering and Biotechnology.

Main text books :

- D. Freifeldes, (1987). Microbial Genetics. Jonse and Partlett, London. U.K.
- B. Banbridge, (1987). Genetics of Microbes. Blackie and Son Limited, Glasgow , U.K.

Subsidiary books:

- Klug & Cummings, (1996). Essential of Genetics. Patrice-Hall International , London. U.K.
- Gardner et al., (1991). Principles of Genetics. John Wiley and Sons Inc., New York . USA.

38	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 434	Medical Microbiology	2	3	3	Bio 336

Objectives of the course:

- Understand the principle of controlling of microorganisms by physical and chemical agent.
- Understand the types of host-parasite relationship.
- Know the most medically important bacteria, which disease, they cause and how we treat their infection.
- Know the most medically important Fungi.

Course Description:

- Control of Microorganisms (Sterilization, disinfection and Antibiotics).
- Host - parasite relationship.
- The medically important bacteria.
- The medically important fungi.

Main text books :

- W. A. Volk (1994). Essentials of Medical Microbiology. Lippincott Company, East Washington Square, Philadelphia, PA 1910.

Subsidiary books:

- Mims et al. (1993). Medical Microbiology. Mosby-Year Book Europe LTD. Lynton House, 7-12 Tavistock Square, London WC1H 9LB.
- Greenwood et al. (1992). Medical Microbiology 14 Edition. Churchill. Livingstone, Robert Stevenson House, 1-3 Baxter's Place, Leith Walk, Edinburgh EH1 3AF.

39	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 435	Industrial Microbiology	2	3	3	Bio 335, 336

Objectives of the course:

Describe the role of microbes in nature and how to use this role in industrial applications.

Course Description:

- Growth Dynamics.
- Productions of vitamins, enzymes, antibiotics, organic acids.
- Environmental pollutants treatments.

Main text books:

Subsidiary books:

- Stanbury, P.F., Hall, S.J. & Whitaker, (1999). Principle of Fermentation Technology, 2nd ed. Butterworth Heinmann. Pergamon Press Oxford, New York.
- Du Block Kristiansen (1987). Basic Biotechnology, Academic Press, London.
- Best and Johes, (1985). Otechnology Principle and Application, Higgins. Blackwell Scientific Publications, London .

40	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 436	Food Microbiology	2	3	3	Bio 335

Objectives of the course:

To give the student informations about the role of different microorganisms in the various types of food and dairy products, and the importance of these to human.

Course Description:

The characteristics of food microorganisms, the different methods of food preservation, spoilage of different foods, spoilage of canned foods, food poisoning, and microorganisms of dairy and their role.

Main text books:

- Food Microbiology and Dairy, El-Shekhly and Hamad (1397 H), King Saud Univ. Press.

Subsidiary books:

- Jay, J.M. (1991). Modern Food Microbiology. 4th ed. Chapman & Hall, USA.
- Food Microbiology, Frazier (translated by Nageeb and Yaseen, 1982).

41	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	

Bio 437	Pollution Microbiology	2	3	3	Bio 335
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Objectives of the course :

To give an understanding of the roles of microorganisms in environmental pollution.

Course Description:

- Microbial pollution of different ecosystems (air, water, soil).
- Microbial indicators of pollution.
- Microbial control of pollution.

Main text books :

Subsidiary books :

- Fry et al., (1992). Microbial Control of Pollution. Cambridge, UK.
- C.S. Cox, (1987). The Aerobiological Pathway of Microorganisms. John Wiley & Sons, New York.
- Higgins, I.J. (1975). The Chemistry and Microbiology of Pollution. Academic Press , New York.

42	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 438	Ecology of Algae	2	3	3	Bio 333

Objectives of the course :

This course aimed to know the different environments where the algae can live and to any extent they affect on the environments.

Course Description:

- Distribution of algae in different environments (snow, lakes, rivers, fresh bonds, hot springs, swamps, seas and oceans)and characteristics features of each environment.
- Bottom algae, phytoplankton and their collection.
- Physical, chemical, and biological factors that affect their distribution.

Main text books :

Subsidiary books :

43	Course	Course Title	No. of Units		Pre-requisites
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	No.		Th.	Pr.	Credit	
	Bio 440	Economic Plant	2	3	3	Bio 241

Objectives of the course:

Study of economic value of plants and its role in human being life.

Course Description:

Economic value of plants producing cereals, vegetables, fruits, fibers, timber, cork, rubber, resins, gums, tannis, fats, oils, sugars, spiles and drugs.

Main text books:

- Hill, A.F. (1951). Economic Botany.

Subsidiary books:

- A.H. Al-Dien, (1991). Medical Hrbicides and Plants (Ancient and recent), Lebanon.

44	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 441	Plant Nutrition	2	3	3	Bio 345

Objectives of the course:

To study the plant mineral composition, their functions and deficiency symptoms.

Course Description:

Introduction, plant mineral composition, source of mineral salts, mechanisms of mineral salts uptake, factors affecting uptake, functions of essential mineral elements and its deficiency symptoms, foliar nutrition.

Main text books:

- Larcher, W. (1995). Physiological Plant Ecology. 3rd ed, Springer.
- Introduction to Plant Nutrition, (1984) by S. Najm and A. Al-Naymy, Al-Mussel University, Iraq.

Subsidiary books:

- A.A. Younis et al., (1986). General Botany. Book Shop, Cairo, Egypt.

45	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 442	Plant Physiology (2)	2	3	3	Bio 342

Objectives of the course:

To study the plant growth and plant hormones.

Course Description:

Dormancy and germinations of seeds, measurement of growth rates of various plant organs, role of auxins, gibberellins and cytokinins in plant, uses of growth regulatory in plant, studies of flowering and verbalization on plants.

Main text books :

- Dr. M.J. Abdulhafiz, (1982). Plant Physiology, part 1. King Saud University , Riyadh.
- F.C. Steward and A.D. Krikorian. (1971). Plants, Chemicals and Growth. Academic Press Inc. London.

Subsidiary books :

- M. Ropert, F.H. Wisdom, (1985). Plant Physiology. Translated by M.M. Sheraky et al., Arab publishing group, Cairo, Egypt.
- Plant Physiology, Dr. M. Abdulgader, Dr. F. Abdullatif , Dr. A. Shogy, Dr. A. Abo-Rabaih, 1982, Al-Mussel University, Iraq.

46	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 443	Plant Ecology	2	3	3	Bio 271, 345

Objectives of the course:

To broaden the student knowledge about the effect of the ecological factors on the plant life.

Course Description

This course study in detail the effect of the following ecological factors on the plant life: These are, light, temperature, air, topography, water, soil and the biological factor, the latter consist of animal, human and plant. Some of the local habitats in Saudi Arabia are also studied. Botanical excursion to the different physiogeographical regions.

Main text books:

- Migahid et al., (1987) Plant Ecology Science, King Saud University, Readh, Saudi Arabia, 386 p (in Arabic).

Subsidiary books:

- Badre, A. and Kassim, A. (1993), Fundamentals of Plant Ecology. King Abdulaziz University, Jeddah, Saudi Arabia, 190 p (in Arabic).

- Abulfatih, H.A. (1991), Ecology Science, King Saud University, Riyadh, Saudi Arabia, 195p (in Arabic).

47	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 444	Plant Microbiology	2	3	3	Bio 332

Objectives of the course:

To give the students an understanding of the beneficial and detrimental effects of microorganisms on higher plants.

Course Description:

- Symbiotic associations between microorganisms and higher plants.
- Major microbiological processes in soil which influence plant growth.
- Microbiology of rhizosphere and philosopher.
- Principles of plant pathology.

Main text books:

- Campbell R. (1985). Edward Arnold. Plant Microbiology .
- Campbell, C.L. and Madden, V.V. (1990). An Introduction to Plant Diseases epidemiology, John Wiley & Sons. London .

Subsidiary books:

- Smith, S.E., Read, D.J., and Harley, J. (1996). Mycorrhizal Symbiosis. Academic Press, London. 2nd ed.

48	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 445	Plant Ecophysiology	2	3	3	Bio 442, 443

Objectives of the course:

This course is concerned fundamentally with the responses of plants to some external environmental stresses.

Course Description:

Introduction, what is stress, stress factors, radiation stress, stress due to extreme temperature, water stress and salt stress. Plant resistance to environmental stresses. a scientific trip to study these, phenomenon in nature.

Main text books :

- Larcher, (1995). Physiological Plant Ecology Third Edition, Springer.
- R. Ahmed (1984). Water and Plant Life. Al-Mussel University, Iraq.

Subsidiary books:

- Migahid et al., (1987) Plant Ecology Science, King Saud University, Riyadh.
- Al-Odatt et al., (1985). Plant Geography. King Saud University, Riyadh.

49	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 446	Archegoniates	2	3	3	Bio 344

Objectives of the course:

To put together a simplified account of the higher division of the plant Kingdom (Kingdom plantae, not including division entophyte) together with illustrated description of the most important families and genera.

Course Description:

Nomenclature, identification of the following divisions: Hepatophyta, Bryophyta, Psilophyta, Microphylophyta, Articulata, Pterophyta, Cycadophyta; Ginkgophyta, Coniferophyta, Gnetophyta. a scientific trip to some areas as an example.

Main text books:

- Bold, H.C. and La Claire, J.W. (1987). The Plant Kingdom, Englewood, Prenntice Hall College. USA.
- Raven ,H.R., Evert, R. and Eichhorn, S.E. (1986). Biology of plants, Worth Publishers, Inc.,

Subsidiary books:

- Migahid, A.M., Shlaby, A.F., Bashy, A.Y., The Bryophytes.
- Migahid, A.M., Shlaby, A.F., Bashy, A.Y., Seedless Vascular Plants.
- Migahid, A.M., Shlaby, A.F., Bashy, A.Y., The Gymnosperms.

50	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 447	Plant Tissues Analysis	2	3	3	Bio 241

Objectives of the course:

This course teach the student different ways of plant analysis in the laboratory to know its histology and constituents.

Course Description:

- Determination of plant content of carbohydrates, proteins, amino acids and other plant productions.
- Determination of plant mineral salts using the atomic absorption spectrophotometer.

- The studying methods of plant tissues using the scanning and transmission electron microscope.
- Plant techniques.

Main text books:

- Hand book of reference methods for plant analysis. (1997) author: Yash, P. K. Florida plants online .
- Cell biology (practical) . Prof. A. Al-robai, Mr. F. Abu zenah . King Abdul Aziz Uni.

51	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 448	Flora of Saudi Arabia	2	3	3	Bio 443

Objectives of the course:

To study the natural vegetation of different habitats of Saudi Arabia.

Course Description:

Introduction, history of botanical investigations of Saudi Arabia, botanical nomenclature, growth forms, discription of different geographical regions in Saudi Arabia. Botanical excursion to the different phytogeographical regions to collect the characteristic plants of each region.

Main text books:

- A.M. Megahid, (1989). Flora of Saudi Arabia, King Saud University, Riyadh.

Subsidiary books:

- J.P. Mandaville, (1990). Flora of Eastern of S.A., John Wiley & Sons Ltd. England.
- Hermistra et al., (1990). Plants of Northern region of Saudi Arabia. Range and Animal development Research Center, Al-Jouf, Saudi Arabia.
- S. Collentte (1985). Flowers of Saudi Arabia, Meteorology and Environmental Protection Administration, Scorpion Publishing, London.
- S. Collentte (1999). Wildflowers of Saudi Arabia

52	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 450	Endocrinology	1	3	3	Bio 354

Objectives of the course:

A study of endocrine glands structurally and functionally and their role in regulation of metabolism, growth and reproduction in different animals and some abnormalities of hormonal secretion.

Course Description:

Chemistry of hormones, Regulation of hormone secretion, Hormone receptors, Mechanisms of hormonal action, Measurement of hormone concentrations.

Invertebrate hormones regulate regeneration, molting, metamorphosis, reproduction, metabolism and color change.

Endocrine glands in vertebrates: the pituitary gland, thyroid gland and parathyroid glands, pancreatic hormones, adrenal gland, sex hormones, gastrointestinal hormones, kidney and heart hormones, pineal gland and thymus gland.

Main text books:

- Schmidt-Nielsen, K. (1994). Animal Physiology: Adaptation and Environment . Cambridge University Press, Cambridge, U.K.
- Prosser, C.L. (1991). Comparative Animal Physiology. Wiley-Liss, Inc. New York.
- Turner, D. and Begnara, J.T. (1986). General Endocrinology. W.B. Saunders Company, Philadelphia, USA.

Subsidiary books:

- Guyton, A.C. (1994). Medical Physiology. W.B. Saunders Company , Philadelphia, U.S.A.
- Roder, K.D. (1990). Insect Physiology.

53	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 451	Parasitology	2	3	3	Bio 251

Objectives of the course:

Is to give a comprehensive review of the facts and trends in Veterinary and Human parasitology, the rough contributions from distinguished specialists in different fields.

Course Description:

Introduction to Parasitology, types of parasitism and biological associations, host parasite relationship, (habitats, host-parasite reactions, effect of parasite on host), epidemiology of parasitic diseases, examples of parasites of man and animals, their biology and life cycle, parasitic helminthes, Cestoda and Nematoda, ectoparasites, examples of intermediate hosts and vectors of disease agent among Arthropods.

Main text books:

- Heins Mehlhorn (1988). Parasitology in Focus, (ed.). Springer-Verlag.
- Cheng, T.C. (1984). General Parasitology. Academic Press. 2nd ed.

Subsidiary books:

- J.D. Smyth (1994). Introduction to Animal Parasitology, 3rd ed. Cambridge Univ. Press, Cambridge.
- Chandlers and Read (1961). Introduction to Parasitology. John Wiley & Inc, New York. 822 p.

54	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 452	Ornithology	2	3	3	Bio 251

Objectives of the course:

To introduce students to birdlife and to a creature able to fly and migrate. To look at different characters of all avian orders by examining their biology, morphology and anatomy.

Course Description:

- Studying birds taxonomy and their scientific classification according to major habitats .

- Studying the biological aspects of birds such as : sense organs, calls and songs , breeding, molting, navigation, migration and anatomy of internal organs.
- Studying birds distribution in the world and in Saudi Arabia.
- Studying economical importance of birds and methods for protecting birds. field trips to study local marine and land birds and to collect samples.

Main text books:

- Welty, J.C. (1997). The Life of Birds. 4th ed. Philadelphia.
- Gill, Frank, B. (1994). Ornithology. 2nd ed. New York. USA.

Subsidiary books:

- Jennings, M.C. (1981) The Birds of Saudi Arabia: A check list. Cambridge, UK.
- Welty, J.G. (1975) The Life of Birds. Philadelphia, USA.

55	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 453	Animal Physiology II	2	3	3	Bio 354

Objectives of the course:

The aim of this course to complete the study of physiological processes in different animals.

Course Description:

Respiration methods in animals and respiratory organs, Mechanism of respiration and gas exchange, Respiratory pigments, Regulation of respiratory movements.

Circulation: Circulatory systems and heart types, Blood components and its functions, Blood flow and blood pressure, Hormonal and neural control of circulatory system.

Locomotion : Structure of muscle and muscle types, Mechanism of muscle contraction and neural control.

Nerves and nervous systems: Neuron, Transmission of nerve impulses, Receptor types and their mechanisms of action, Sense organs and how they work.

Main text books:

- Withers, P.C. (1992). Comparative Animal Physiology. Saunders College Publishing, USA.
- Prosser, C.L. (1991). Comparative Animal Physiology. Wiley-Liss, Inc. New York.
- Roder, K.D. (1990). Insect Physiology.

Subsidiary books:

- Schmidt-Nielsen, K. (1994). Animal Physiology: Adaptation and Environment . Cambridge University, Cambridge, U.K.
- Eckert, R. (1988). Animal Physiology, Mechanisms and Adaptation, W.H. Freeman and Company, New York, USA.
- Guyton, A.C. (1982). Human Physiology and Mechanisms of disease, W.H . Freeman and Company, New York, USA .

56	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 454	Ichthyology	2	3	3	Bio 251

Objectives of the course:

To introduce the student to Ichthyology, its sections and fields of specialization and higher studies in order to make use of the different fisheries and increase them with scientific methods. In addition to that, it introduces the student to periods of reproduction.

Course Description:

Introduction to Ichthyology and its sections, classification of fish into main groups, study of external characteristics, study of different systems, food and nutrition, fish environments, lines and population, fish reproduction, fish fecundity, dangerous and poisonous fish, introduction to the different kinds of fish in Saudi Arabia (The Red sea and Arabian Gulf). Field trips to study local fishes and to collect samples.

Main text books:

- Kholi, Abdulrahman, (1972). Ichthyoidal Wealth.
- Ahmed, Hashim A., (1987). Biology of fish.

Subsidiary books:

- Red Sea Reef Fishes (1986), Randall. Printed in Great Britain by Thomson Litho Ltd . East Kenbridge, Scotland.
- Translated, Basics of Zoology, 1992.

- Biology of Fishes (1982). Q. Bone, N.B. Marshall Printed in the United States of America.
- Marine Ecology (1982) Jeffry, S. Levinton, Printed in USA.

57	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 455	Mammology	2	3	3	Bio 251

Objectives of the course:

To introduce student to Biology of mammals, their life and to be a ware about different characters of all Mammology orders by examining their biology, morphology and anatomy.

Course Description:

- Evolution, classification, anatomy, and biology of mammals.
- Zoogeography of mammals and fauna of Saudi Arabia (mammals).
- Field trips to study local mammals and to collect samples.

Main text books:

- Kamal, K.B. (1990). Wildlife of Saudi Arabia (mammals) Madina press P. 184.
- Azin Al-dein, F.H. (1970) Atlas of mammals, Dar Al-Sharg pp. 493.
- Heikman et al., (1990) Fundamentals of Zoology.
- Kingdon, J. (1997). The Kingdom Field Guide to African mammals. Natural World AP, London.

Subsidiary books:

- Harrison and Bates (1991), The Mammals of Arabia, Harrison Zoological Museum Publication. London.
- Kingdon, I. (1990) Arabia mammals, Al-Areen Wildlife Park, pp. 279.
- Fauna of Saudi Arabia (Wildlife commission (all volumes.
- Vaughen, T.A. (1978). Mammology (2ed.) Saunders College Philadelphia.

58	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 456	Animal Behavior	2	3	3	Bio 251, 354

Objectives of the course:

To introduce the student to animal behavior under either natural or

laboratory conditions in three different lines of scientific thought: the psychological, the physiological and the zoological.

Course Description:

Introduction, coordination and animals phenomenon, nervous system and behaviour, hormones and behaviour, sexual behaviour, reproductive – parental care (epigenetic), aggression, social behaviour, animal language, orientation and migration, ritualization communication.

Main text books:

- Ridley, M. (1995). Animal Behavior: An Introduction of Behavioral Mechanisms , Development and Ecology. Boston, Massachusetts: Black Well Scientific Publications . 2nd ed. (pp. 288).
- S.P. Hicemane et al., (1990). Integrated Principles of Zoology.
- J.P. Scott. (1970). Animal behaviour. University of Chicago Press, Chicago , Illinois (pp. 374).
- D. McFarland (1985). Animal Behavior. Pitman Publishing Limited- London (pp. 576).

Subsidiary books :

- Nelson, R.J. (1995). An Introduction to Behavioral Endocrinology. Sunderland , Massachusetts: Sinauer Associates (pp. 611).
- N.R. Carlson. Allyn and Bacon, INC. (1986). Physiology of Behavior. Allyn and Bacon, Inc., London (pp. 788).

59	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 457	Animal Ecology	2	3	3	Bio 271

Objectives of the course:

To introduce the student to the universal and local habitats and the adaptability of animals to that habitats. To be aware of the importance and need for conservation and protection of wild life.

Course Description:

The geographical distribution of animals according to its habitats and trophic levels, the effect of biotic and a biotic components of ecosystems on other animals, the structure and type of populations and communities and its seasonal and Random changes (Growth, migration, aestivation, hibernation, distribution, diversity, dominance ... etc). An introduction to the fauna of Saudi Arabia and its needs for conservation, protection and development. Field trips to study local animal habitats and to collect samples.

Main text books:

- Boran, A.H. and M. H. Abu-diah (1994) [in Arabic], Ecology, Dar-alshorook Publ., Amman, Jordan.
- Smith, Robert Leo, (1996) [in English] Ecology and Field Biology (5th, ed).

Subsidiary books:

- Kroom, M. and Y. Qassab (1985) [In Arabic] Animal Ecology, Halab univ. Syria.
- Fauna of Saudi Arabia (vol. 1-14) [in English].
- Hikman, S.B. et al., (1988). [In Arabic] Fundamentals of Zoology (part 4). Trans . by Khalifa, M.H. et al., Al-Dar Al-arabiah publ., Egypt.
- Smith, Robert Leo (1996). Ecology and Field Biology (5th . Ed).

60	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 458	Economic and Medical Entomology	1	3	2	Bio 359

Objectives of the course:

To introduce students to : Common insects of economic and medical importance in local environment. Diseases and Damages they cause to humans, animals and plants. Type of infection. Life cycles and methods of these pest control. Beneficial insects and making use of them.

Course Description:

Identification of economic and medical insects, Benefits and damages of insects. Factors affecting distribution of insects. Classification of economic and medical insects. Study of life cycles. Injurious stages. Nature of infection and damages caused to humans, live stalk, plants, stored materials and belongings. Important methods of pest control and making use of beneficial insects.

Main text books:

- D.S.K. Kettle. (1995). Medical and Veterinary Entomology. Croom Helm Ltd . Provident House, Burrell Row Buckingham, Kent BR3 IAT. 2nd ed.
- Faragallah, A.A. and Taher, M.O. (1990) Termites (white Ants).
- M. W. Sersce. (1986). Lecture Notes on Medical Entomology, Reader in Medical Entomology, Liverpool School of Tropical Medicine

Liverpool, England. Black Well Scientific. Osney Mead, Oxford OX2 OEL.

- Hammad, M. Sh. and Dabbour, A. (1982). Insect and Animal Pests and Methods of their Control.
- M.W. Serirce, Lecture Notes on Medical Entomology.

- المرشد الى علم الحشرات الطبية . تأليف : م. سيرفس . ترجمة : د. علي محمد سليط ، السيد زهير يونس الصفار ، والسيد رياض أحمد العراقي . رقم الايداع في المكتبة الوطنية ببغداد 815 لسنة 1984 م ، جامعة الموصل - مديرية مطبعة الجامعة .

Subsidiary books:

- Service, M.W. (1996). Medical Entomology for Students. Chapman & Hall . London.
- Abo-Zaid, M., Alsibaey, A. and Tantour, J. (1974) Principal of Plant Protection and Agricultural Pest Control.

61	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 459	Comparative Vertebrates Anatomy	2	3	3	Bio 251

Objectives of the course:

This course aims to comparative study for the internal anatomy of vertebrates.

Course Description:

Include anatomical structure of vertebrates and comparative studies to all systems (Integumentary system, skeletal, circulatory, respiratory, digestive, nervous, genato-urinary and endocrine system) in all vertebrates subphylums starting from Amphioxus, Lampry, Fish, Amphibians, reptiles, Birds and Mammals.

Main text books:

- Kardong, K. V. (1995) Vertebrates Comparative Function Evolution. Wm. C. Brown Publishers.

62	Course	Course Title	No. of Units	Pre-requisites
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	No.		Th.	Pr.	Credit	
	Bio 471	Environmental Pollution	2	3	3	Bio 271

Objectives of the course:

The environmental pollution plant relationships are the main objectives of this course.

Course Description:

The course study some of the environmental pollution factors and their effects on the plant. These are (a) the solid waste, (b) solution waste, (c) air pollution, (d) radioactivity pollution and (e) thermal pollution. The local environment is also will be discussed against these factors. Scientific visits to the main pollution sources in Saudi Arabia (Factories, sewage works ... ect) to collect data and samples from deferent sites. A scientific trip to study the effect of pollutants on natural environment.

Main text books:

- Tershow, M. (1984) Air Pollution and Plant Life, John Wiley and Sons, New York , USA, 486 p.
- N. W. Lepp (1981). Effect of Heavy Metal Pollution in Plants. Applied Science Publishers. London and New Jersey. 2 Volumes 352-257 p.

Subsidiary books:

- Martin, M.H. and Cougetery, P.J. (1985) pollution monitoring series, Biological monitoring of heavy metal pollution, applied science publishers, London and New York, 475 p.
- Al-Aodat et al., (1985) pollution and environment protection, King Saud University , Riyadh, Saudi Arabia, 343 p.

64	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 460	Biology and Classification of Vertebrates	2	3	3	Bio 251

Objectives of the course:

To provide information about some of Biological aspects for different Vertebrata.

Course Description:

Biological aspects of fishers (Swimming and movement, food and feeding habits, defensive organs and color adaptation biology of reproduction and migration) – classification of fishers – Biology of Amphibians (Reproduction, Adaptation, Behavior, Regeneration and color change) – Classification of Amphibia – Biology and classification of reptiles – Biology of birds (Flight, beaks and feeding mechanism, social behavior in birds reproduction and migration) – Classification of birds – A brief account of the biology and classification of mammals.

Main text books:

- Hichman, S. P. (1990) . Integrated principles of Zoology . Times mirror / mosby college publishing st. louist Toronto Santa Claro (pp 342).
- Villee, C. A. ; Solomon, E. P. ; Martin, C. E. ; Martin, D. W. Berg, L. R. and Davis, P.W. (1990) Biology (2nd edition) . Saunders. College publishing. Philadelphia FT. (p.p. 1412).
- Store, T. ; Usinger, R. ; Nipakin, J. ;Stiepnis, R. (1989) . Elements of Zoology. Published by Grow-Hill Book company, Inc. New York, New York.

65	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 461	Principle of Animals Classification	2	-	2	Bio 251

Objectives of the course:

To provide information about the methods and principles of animals classification.

Course Description:

Study the history of systematic Zoology – Theoretical of methods and principles of systematic Zoology – animal field guide collection – kinds of Taxonomic characters – Taxonomic characters – The principles of statistical in systematic Zoology. International ruler Zoological nomenclature.

Main text books:

- Ernst, M. Gorton Linsley E. ; Usinger, R. (1985) . Methods and Principles of Systematic Zoology. Publishing MC Grow-Hill Book Company, Inc. New York, New York.
- Karoom, M. A. (1990) The Synopsis of Animal Taxonomy. Alepp University Publications Faculty of science.

66	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 462	Fauna of Saudi Arabia	2	3	3	Bio 251

Objectives of the course:

To introduction students with local animals groups of Saudi Arabia and their geographical distribution, which inhabiting all sea and land habitats, and their present status. To introduce with animal species importance, their numbers, and protection of endangered species in Saudi Arabia.

Course Description:

The approach is to study animal species and its importance in Saudi Arabia, including the Read Sea and the Arabian Gulf regions. Studying the principles and scientific methods of collecting faunal information. To determine animal species status such as endemic, relict, and affinities. To study the geographical distribution and habitat types of marine and terrestrial species within the kingdom. To study the conservation methods of wildlife species and to focus on the system of protecting natural habitats in Saudi Arabia. Field trips to collect local animal specimens.

Main text books:

- Krupp, F. and Mahnert, V. (eds.)1987 -2004 , Fauna of Saudi Arabia , Vols. (9-22), NCWCD, Riyadh , Saudi Arabia.
- Buttiker, W. and Krupp, F. (eds.)1979 -1987 , Fauna of Saudi Arabia , Vols. (1-8), NCWCD, Jeddah , Saudi Arabia.

67	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	

Bio 463	Insect Physiology	2	3	3	Bio 359
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Objectives of the course:

This course aims to teaching the student principle of the physiology in Insects.

Course Description:

The physiology of the integument and muscles – respiratory and circulatory systems and the associated tissues – nutrition – metabolism and excretion – growth and development – the bioenergetics of flight muscles and metabolic control – the nervous system and sense organs – behavior – the endocrine system of insects.

Main text books:

- Physiological systems in insects , Marc J. Klowden . Academic press ; London 2002 .
- The Insects ; Structure and Function . R.F. Chapman . Hodda & Stoughton , London.

68	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 464	Insect Taxonomy	2	3	3	Bio 359

Course Description:

Economic important of insect taxonomy – the task of the taxonomist – study of species formation and factors of evolution – levels of taxonomy – old and new systematic taxonomic categories – segregation of species – identification – taxonomic characters – description – preparation of material – entomological drafting – verbal description – taxonomic keys – the international roles of entomological nomenclature – general basic of insect taxonomy .

Main text books:

- Imms, A.D. 1985 . A General Textbook of Entomology , Methuen and Co. Ltd. London . 600 p .

- Mayer, E. 1982 . Systematics and the Origin of Species . Colombia University Press . New York .450 ps.

69	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 465	Insect fauna of Saudi Arabia	2	3	3	Bio 359

Course Description:

Basic components of entomology – significance of insects – textbook publications – development of economic entomology – insecticide formulation – insecticides application equipment – major insect pest groups in Saudi Arabia – pests field crops in Saudi Arabia – greenhouse pests in Saudi Arabia – pests of stored grains and other commodities – pests of floriculture and ornamental plants – medical and veterinary pests – insect laboratory rearing.

Main text books:

- Pedigo, L. 1996 . Entomology and Pest Management . Mc milin Co. 600 p.

70	Course No.	Course Title	No. of Units			Pre-requisites
			Th.	Pr.	Credit	
	Bio 466	Insect Pest Control	2	3	3	Bio 359

Course Description:

Introduction – insect pests and economic importance – survival factors of insects – factors that affect on insect lifecycle – general methods of insect pests control – natural control – applied control – microbial control – chemical control – resistance of insect to insecticides – some recent advances in pest control – integrated control.