C. ABDUL HAKEEM COLLEGE

Melvisharam, Vellore Dist- 632509, TN, India
Telephone : +91 4172 266487, 266987 | **Fax :** +91 4172 266587
Web : www.hakeemcollege.com

SUBJECT LIST

Course B.Sc - Zoology

Batch 2015-2016

Total Credits 140

S.No	E/D	Cate.	Type	S. Code	S. Name	I.Ma	I.Mi	E.Ma	E.Mi	P M	Cr	Pt
Semester - 1					**Subject Count - 5**			**Total Credits - 20**				
1	E	Theory	Language	U15FTA101	Tamil - I	25	0	75	30	40	4	I
2	E	Theory	Language	U15FUR101	Urdu - I	25	0	75	30	40	4	I
3	E	Theory	English	U15FEN101	English - I	25	0	75	30	40	4	II
4	E	Theory	Main	U15MZL101	Invertebrata	25	0	75	30	40	6	III
5	E	Theory	Allied	U15ABY101	Botany - I (Allied)	15	0	60	24	30	4	III
6	E	Theory	Environmental Studies	U15CES101	Environmental Studies	10	0	40	16	20	2	IV
Semester - 2					**Subject Count - 8**			**Total Credits - 25**				
1	E	Theory	Language	U15FTA201	Tamil - II	25	0	75	30	40	4	I
2	E	Theory	Language	U15FUR201	Urdu - II	25	0	75	30	40	4	I
3	E	Theory	English	U15FEN201	English - II	25	0	75	30	40	4	II
4	E	Theory	Main	U15MZL201	Chordata	25	0	75	30	40	5	III
5	E	Practical	Main	U15MZLP21	Practical - I Invertebrata and Chordata	40	0	60	30	40	3	III
6	E	Theory	Allied	U15ABY201	Botany - II (Allied)	15	0	60	24	30	4	III
7	E	Practical	Allied	U15ABYP21	Allied Practical - Botany	10	0	40	16	20	2	III
8	E	Theory	Value Education	U15CVE201	Value Education	10	0	40	16	20	2	IV
9	E	Theory	Soft Skills	U15CSS201	Soft Skills	10	0	40	16	20	1	IV

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S.No	E/D	Cate.	Type	S. Code	S. Name	I.Ma	I.Mi	E.Ma	E.Mi	P M	Cr	Pt
Semester - 3					**Subject Count - 6**			**Total Credits - 20**				
1	E	Theory	Language	U15FUR301	Urdu - III	25	0	75	30	40	4	I
2	E	Theory	Language	U15FTA301	Tamil - III	25	0	75	30	40	4	I
3	E	Theory	English	U15FEN301	English - III	25	0	75	30	40	4	II
4	E	Theory	Main	U15MZL301	Cell and Molecular Biology	25	0	75	30	40	3	III
5	E	Theory	Allied	U15AZL301	Economic Entomology - I (Allied)	15	0	60	24	30	4	III
6	E	Theory	Soft Skills	U15SZL301	Public Health and Hygiene (SBS - I)	15	0	60	24	30	3	IV
7	E	Theory	Non Major	U15NKS301	Services Marketing (NME - I)	10	0	40	16	20	2	IV
8	E	Theory	Non Major	U15NCH301	Medicinal Chemistry (NME - I)	10	0	40	16	20	2	IV
Semester - 4					**Subject Count - 8**			**Total Credits - 25**				
1	E	Theory	Language	U15FUR401	Urdu - IV	25	0	75	30	40	4	I
2	E	Theory	Language	U15FTA401	Tamil - IV	25	0	75	30	40	4	I
3	E	Theory	English	U15FEN401	English - IV	25	0	75	30	40	4	II
4	E	Theory	Main	U15MZL401	Genetics and Biotechnology	25	0	75	30	40	3	III
5	E	Theory	Allied	U15AZL401	Economic Entomology - II (Allied)	15	0	60	24	30	4	III
6	E	Theory	Skill Based	U15SZL401	Poultry Farming (SBS - II)	15	0	60	24	30	3	IV
7	E	Practical	Main	U15MZLP41	Practical - II Cell and Molecular Biology, Genetics and Biotechnology	40	0	60	30	40	3	III
8	E	Practical	Allied	U15AZLP41	Allied Practical - II Economic Entomology	10	0	40	16	20	2	III
9	E	Theory	Non Major	U15NUR401	Functional Urdu - II (NME - II)	10	0	40	16	20	2	IV
10	E	Theory	Non Major	U15NTA401	Basic Tamil - II (NME - II)	10	0	40	16	20	2	IV
11	E	Theory	Non Major	U15NHS401	Civil Services and Other Competitive Examinations (NME - II)	10	0	40	16	20	2	IV
12	E	Theory	Non Major	U15NKS401	Project Management (NME - II)	10	0	40	16	20	2	IV
13	E	Theory	Non Major	U15NMA401	Foundation Mathematics foe Competetive Examinations (NME - II)	10	0	40	16	20	2	IV
14	E	Theory	Non Major	U15NCH401	Chemistry in Every Day Life (NME - II)	10	0	40	16	20	2	IV
15	E	Theory	Non Major	U15NCM401	General Commercial Knowledge (NME - II)	10	0	40	16	20	2	IV

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Total Credits 140

S.No	E/D	Cate.	Type	S. Code	S. Name	I.Ma	I.Mi	E.Ma	E.Mi	P M	Cr	Pt
Semester - 5					**Subject Count - 5**			**Total Credits - 21**				
1	E	Theory	Main	U15MZL501	Biostatistics and Bioinformatics	25	0	75	30	40	5	III
2	E	Theory	Main	U15MZL502	Developmental Biology and Immunology	25	0	75	30	40	5	III
3	E	Theory	Main	U15MZL503	Animal Physiology	25	0	75	30	40	5	III
4	E	Theory	Elective	U15EZL501	Bioinstrumentation (Elective - I)	25	0	75	30	40	3	III
5	E	Theory	Skill Based	U15SZL501	Pisciculture (SBS - III)	15	0	60	24	30	3	IV
Semester - 6					**Subject Count - 9**			**Total Credits - 29**				
1	E	Theory	Main	U15MZL601	Environmental Biology	25	0	75	30	40	5	III
2	E	Theory	Main	U15MZL602	Economic Zoology	25	0	75	30	40	4	III
3	E	Theory	Main	U15MZL603	Evolution	25	0	75	30	40	4	III
4	E	Theory	Elective	U15EZL601	Biochemistry (Elective - II)	25	0	75	30	40	3	III
5	E	Theory	Elective	U15EZL602	Nanotechnology In Life Science (Elective - III)	25	0	75	30	40	3	III
6	E	Theory	Skill Based	U15SZL601	Medical Laboratory Techniques (SBS - IV)	15	0	60	24	30	3	IV
7	E	Practical	Main	U15MZLP61	Practical - III Animal Physiology, Developmental Biology and Immunology	40	0	60	24	30	3	III
8	E	Practical	Main	U15MZLP62	Practical - IV Environmental Biology and Economic Zoology	40	0	60	24	30	3	III
9	E	Theory	Extension Activities	U15CEA601	Extension Activities	0	0	50	20	20	1	V

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc. Zoology effective from the year 2015-2016

Year: I Year Subject Code : U15MZL101 Semester : I

Major - 1 Title: **Invertebrata**

Credits: 6 Max. Marks. 75

Objective:
To understand the systematic and functional morphology of various groups of invertebrates.
To study their economic importance, affinities and adaptations.

UNIT – I
Principles of Taxonomy – Binomial nomenclature – classification of the animal kingdom.

PROTOZOA: General characters and classification up to class with examples.

Type study Paramecium. Parasitic protozoans in man. Reproduction in protozoa.

UNIT – II

PORIFERA: General characters and classification up to classes with examples.

Type study - Sycon, canal system in sponges.

COELENTERATA: General characters and classification up to classes with examples.
Type study – Obelia. Polymorphism in Coelenterates

UNIT – III

HELMINTHES: General characters and classification up to classes with examples.
Type study – *Taenia solium.*
Human Nematode parasites and diseases.

ANNELIDA: General characters and classification up to classes with examples.
Type study: *Nereis*. Metamerism in Annelids.

UNIT – IV
ARTHROPODA: General characters and classification up to classes with examples.
Type study – Shrimp. Peripatus and its affinities, Mouth parts of insects (Housefly, Honey Bee and Mosquito.

UNIT – V

MOLLUSCA: General characters and classification up to classes with examples.
Type study – Fresh water Mussel. Foot in Mollusca.

ECHINODERMATA: General characters and classification up to classes with examples.
Type Study- Sea star. Echinoderm larvae and their significance.

Reference Books:

1. Ekambaranatha Ayyar.M. and T.N. Ananthakrishnan, 1992. Manual of Zoology Vol.1 [Invertebrata], Viswanathan [Printers and Publishers] Pvt. Ltd.; Madras.
2. Jordan, E.L. and P.S.Verma, 1993. Invertebrate Zoology, 12th Edition. S.Chand and Co.Ltd., New Delhi.
3. Kotpal, R.L. 1988-1992 Protozoa, Porifera, Coelenterata, Helminthes, Annelida, Arthropoda, Mollusca, Echinodermata. Rastogi Publications, Meerut.
4. Parker and Haswell, 1964. Test Book of Zoology. Vol.1 [Invertebrata]. A.Z.T; B.S.Publishers and distributors, New Delhi.
5. L.A Borradile and F.A.Pott. The Invertebrates. Cambridge University Press. UK.
Adam Sedgwick. 1972 A student text book of Zoology. Vol.I and II. Central book Depot. Allahabad.
6. P.S.Dhami and J.K.Dhami. Invertebrate Zoology, S.Chand and Co. New Delhi.
7. Hyman L.H. The Invertebrate Vol.I-IV. 1955, McGraw Hill Co. New York.
8. Barrington, E.J.W. 1969. Invertebrate structure and function. ELBS Publication.
9. Barnes. Invertebrate Zoology. Toppan International Co.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc. Zoology effective from the year 2015-2016

Year: I Year Subject Code : U15ZML201 Semester : II

Major - 2 Title: **Chordata**

Credits: 5 Max. Marks. 75

Objectives:
To understand the systematic and functional morphology of various groups of chordates.
To study their affinities and adaptations to different modes of life.

UNIT – I
Salient Features and General classification of Phylum Chordata upto orders.
Origin of Chordata.
General Characters and affinities of Prochordates.
Type study: Amphioxus

UNIT –II

PISCES
General characters and classification up to orders.
Type study: Shark.
Migration in fishes.

AMPHIBIA
General characters and classification up to orders.
Type study : Frog
Parental care in Amphibia

UNIT – III

REPTILIA
General characters and classification upto orders.
Type study – Calotes.
Identification of poisonous and non – poisonous snakes.

UNIT – IV

AVES
General characters and classification upto orders.
Type study –pigeon
Characters of Archaeopteryx – connecting link.
Flight adaptation.

UNIT – V

MAMMALIA
General characters and classification upto orders.
Type study – Rabbit
Aquatic mammals.
Dentition in mammals.

Reference Books:

Ekambaranatha Ayyar, M and T.N Anantha Krishnan 1992, A manual of zoology Vol. II [Chordata]. S. Viswanathan [Printers and publishers] Pvt. Ltd., Madras.
Jordan E. L. and P.S. Verma 1995. Chordate Zoology and elements of Animal Physiology. S. Chand and co., New Delhi.
Kotpal R.L. 1992. Vertebrata, Rastogi publication, Meerut.
Nigam. H.C 1983 Zoology of chordates, Vishal publications, Jalandhar.
Waterman, Allyn J.et al. 1971, Chordate Structure and functions, Mac. Millan and co., New York.
Jollie. M. 1968. Chordate Morphology. East west press Pvt. Ltd., New Delhi.
Hyman. L.H. Comparative vertebrate zoology. McGraw Hill co. New York.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc. Zoology effective from the year 2016-2017

Year: II Year Subject Code : U15MZL301 Semester : III

Major - 3 Title: **Cell and Molecular Biology**

Credits: 3 Max. Marks. 75

Objectives:
To learn the cytological techniques, the structure and functions of various cellular components.
To understand the integrated activity of the whole cell as in mitosis, meiosis and protein synthesis.
To understand the molecular basis of cell structure DNA structure and functions.

UNIT – I
History of Cell and Molecular Biology – Principles of microscopes light and electron, Cytological techniques - Cell fractionation, Homogenization Centrifugation, Isolation of Sub-cellular components. Biochemical technique – Electrophoresis and their applications.

UNIT – II
Cell – Cell theory, Ultra structure and function of animal cell – Plasma Membrane – Endoplasmic reticulum, Ribosomes, Golgi Complex, Lysomes, Centrioles and Mitochondria.

UNIT – III
Nucleus – Ultrastructure, Composition and Function – Nuclear Membrane Nucleoplasm-Chromosomes DNA, RNA, Protein Synthesis – Nucleolus.

UNIT – IV
Cell cycle and cell division – Amitosis, Mitosis and meiosis and their significance.

UNIT – V
Semi conservative replication, mechanism and enzymology of DNA replication, structure and functions of DNA & RNA [mRNA, tRNA, rRNA].

Reference Books:

Cohn, N.S., 1979, Elements of Cytology, Freeman Book co., New Delhi.

De Robertis, E.D.P. and E.M.F. De Robertis, 1988. Cell and molecular Biology, 8th Edition, International edition Informes Hongkong. 734p.

Gies, A.C., 1979. Cell Physiology, Saunders co., Philiadelphia, London, Toronto, 609p.

Powar, C.B.,1989.Essentials of Cytology, Himalaya Publishing House, Bombay, 368p.

Verma, P.S., and V.K. Agarwal, 1995. Cell and Molecular Biology, 8th Edition, S. Chand & Co., New Delhi, 567p.

Rastogi. S.C. Cell and Molecular Biology, 2008 2nd Edition, New Age International (p) Ltd., New Delhi.

G.P. Jayanthi 2009 Molecular Biology, M.J P Publ. Chennai.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc. Zoology effective from the year 2016-2017

Year: II Year Subject Code : U15AZL301 Semester : III

Allied - 3 Title: **Economic Entomology - I (Allied)**

Credits: 4 Max. Marks. 60

Objectives:
To study the insect pests and their control measures.
To study the economic importance of insects as vectors, pollinators, predators & parasites.

UNIT – I
Classification of insects up to order level.
Biology of Butterfly

UNIT – II
Beneficial insects. Mode of life, economic importance and development.
Honey bee
Silk worm (*Bombyx mori*)
Silk worm rearing

UNIT – III
Harmful insects
An account of any one pest of : 1.Rice (*Scirpophaga*)2. Cotton (Boll worm) 3. Coconut (Rhinocerus beetle)

UNIT – IV
Principles and method of pest control – Components of Integrated Pest Management (IPM)

UNIT – V
Insect Vectors- Malaria, Dengue, Chikungunya and human lymphatic Filariasis.

Reference Books:

B. Vasantharaj David and T. Kumaraswami 1982. Elements of Economic Entomology, Popular book Depot, Chennai.

Nayar, K.K., Ananthakrishnan, T.N. and B.V. David, V 1992 General and Applied Entomology Tata McGraw, New Delhi.

P.G. Fenemore Manual. Silkworm Rearing. FAO Agricultural Service Bulletin, Rome.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc. Zoology effective from the year 2016-2017

Year:	II Year	Subject Code :	U15SZL301	Semester :	III
Skill Based -1	Title:	**Public Health and Hygiene (SBS - I)**			
Credits:	3			Max. Marks. 60	

Objectives:
To impart awareness on public health and Hygiene
To create knowledge on Health Education.

UNIT – I
Scope of Public Health and Hygiene – nutrition and health – classification of foods – Nutritional deficiencies – Vitamin deficiencies.

UNIT – II
Environment and Health Hazards – Environmental degradation – pollution and associated health Hazards.

UNIT – III
Communicable diseases and their control measures such as Measles, Polio, Rabies, Leprosy and HIV infection.

UNIT – IV
Non – communicable diseases and their preventive measures such as Hypertension, Coronary Heart Diseases, Diabetes, Obesity and Mental ill – Health.

UNIT – V
Health Education in India – WHO programmes – government and voluntary Organizations and their health service – Precautions first Aid and awareness on sporadic diseases.

Reference Books:
Park and Park, 1995: Text book of preventive and social medicine – Banarsidas Bhanot Publ. jodhpur- India.

Verma, S. 1998: Medical zoology, Rastogi Publ.- Meerut- India

Singh, H.s. and Rastogi, P. 2009: Parasitology, Rastogi Publ. India.

Dubey, R.C and Maheswari, D.K. 2007: Text Book of Microbiology – S. Chand & co. Publ. New Delhi – India.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc. Zoology effective from the year 2016-2017

Year:	II Year	Subject Code :	U15NZL301	Semester :	III
Non Major - 1	Title:	**Poultry Farming (NME - I)**			
Credits:	2			Max. Marks. 40	

Objective:
To impart training on Modern Poultry Farming Technology
To create knowledge on self employment opportunity.

UNIT – I
External morphology of variety of fowls such as Plymouth rock, light Sussex, Minorca, Rhode Island, Red and White Leghorn.

UNIT – II
Classification of fowls based on their use: meat type such as Broilers, Egg type such as white leghorn and commercial layers, Dual purpose varieties, game and ornamental purpose varieties.

UNIT – III
Feeding poultry –Feed Preparation- Management of Egg Layers – Management of Broilers in large scale farms.

UNIT – IV
Poultry diseases. Prevention and precautions during vaccination.

UNIT – V
Management of a modern poultry farms – Progressive plans to promote poultry as a self employment venture.

Reference Books:
Jull Morley, A. 1971: Poultry Husbanry, Tata –McGraw Hill Publ. Co New Delhi – India.

Sastry, Thomas and Singh, 1982: Farm Animals Management and Poultry production – Vikas Publ. co. New Delhi – India.

Harbans Singh and Earl.N. Moore, 1982: Live stock and poultry production – prentice hall India Publ. Co., New Delhi – India.

Banarjee, G.C. 1986: poultry, Oxford – IBH publ. co., New Delhi – India.

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Syllabus for B.Sc. Zoology effective from the year 2016-2017

Year: II Year Subject Code : U15MZL401 Semester : IV

Major - 4 Title: **Genetics and Biotechnology**

Credits: 3 Max. Marks. 75

Objectives:

Genetics
To know the principles of genetics, pedigree analysis and population genetics.
To learn some genetic studies in man and applied Genetics.

Biotechnology
To integrate biology with technology. To study the application of scientific and engineering processes in the processing of materials by biological agents.

GENETICS

UNIT – I
Introduction to genetics – Basis of Mendelian Inheritance and Mendelian Laws – Interaction of Genes – Complementary Factors, Inhibitory and lethal Factors – Atavism. Multiple Alleles – Blood Groups and their Inheritance in Human.

UNIT – II
Linkage and crossing over – Drosophila – Morgan's Experiments - Cytological Evidence for Crossing Over. Sex determination and sex linkage in Drosophila and Man.

UNIT – III
Mutation – chromosomal Aberrations – examples from Human – applied Genetics – Animal Breeding – Heterosis, Inbreeding, Out breeding, Out Crossing, Hybrid Vigour.

BIOTECHNOLOGY

UNIT –IV
Cistron – Recon, Muton – Gene Regulation – Operon concept – Lac Operon.
Definition – Fine structure of Gene - Tools of Genetic Engineering – Enzymes, Linkers and Adaptors, Cloning vectors [plasmids, pBr322, Phage λ, Cosmids and phagemids].
Techniques of Genetic Engineering - recombinant DNA Technology and gene Cloning in prokaryotes [cDNA and Genomic Library].

UNIT – V

PCR- blotting techniques.
Application of Recombinant DNA technology in Medicine & Agriculture.
Genetically Modified Organisms (GOMs)

Reference Books:

Verma, P.S. and V.K. Agarwal, 1995 Genectis, 8th edition, S. Chand & Co, New Delhi – 110 055. 580pp.

Gunther S. Stent, 1986. Molecular Genetics. Macmillan Publishing Co Inc. 773pp.

Higgins H, Best GJ and Jones J [1996] Biotechnology – Principles and application Black well scientific Publication Oxford London.

Gupta P.K. Elements of Biotechnology [2001] Rastogi publication, Meerut.

Dubey 2006 Text Book of Biotechnology S. Chand & co. New Delhi.

Gardener. 1991. Principles of Genetics. 8th edition. John wiley & sons Inc. New York. Chichester, Brisbane, Toronto, Singapore.

Monroe. W. Strick Berger 2004 Genetics. Printice Hall of India New Delhi.

Kumar H. D.1998 A text book of Biotechnology, affiliated East West pvt. Ltd., New Delhi.

Nicholls. 2002 Genetic Engineering, Cambridge University Press. UK.

S. Gladis Helen Hepsyba and CR. Hemalatha 2009 Basic Bioinformatics MJP Publ. Chennai.

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Syllabus for B.Sc. Zoology effective from the year 2016-2017

Year: II Year Subject Code : U15AZL401 Semester : IV

Allied - 4 Title: **Economic Entomology - II (Allied)**

Credits: 4 Max. Marks. 60

Objectives:

To study the basic concepts of insecticides and integrated insect pest control

UNIT – I
Insects and their interrelations with environments, insects as Pollinators, parasitoids, Scavengers and weed killers.

UNIT – II
General classification of insecticides – based on mode of action, contact, systemic, fumigants, nerve and stomach poison. Biological control.

UNIT – III
Basic principles of insecticide formulation and their application in pest control – plant protection appliances used – working and application.

UNIT – IV
Precautions in handling of insecticides. Pesticides and environmental pollution.

UNIT – V
Assessment of insect pest population, Estimation of insect pest damage – Insect pest outbreak and surveillance.

Reference Books:

B. Vasantharaj David and T. Kumaraswami 1988. Elements of Economic Entomology. Popular book Depot, Chennai.

Nayar, K.K., AnanthaKrishnan, T.N. and B.V. David 1992 General and applied Entomology Tata McGraw, New Delhi.

P.G. Fenemore, Alka Prakash 1997 Allied Entomology, Wiley Eastern Ltd. New York. Wigglesworth J.B., 1994. Insect physiology, Chapman and Hall, London.

Temphare D.B., 1984. A Text Book of Insect Morphology, physiology and Endocrinology. S. chand and co., New Delhi.

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Syllabus for B.Sc. Zoology effective from the year 2016-2017

Year:	II Year	Subject Code :	U15SZL401	Semester :	IV
Skill Based -2	Title:	**Poultry Farming (SBS - II)**			
Credits:	3			Max. Marks. 60	

Objective:
To impart training on Modern Poultry Farming Technology
To create knowledge on self employment opportunity.

UNIT – I
External morphology of variety of fowls such as Plymouth rock, light Sussex, Minorca, Rhode Island, Red and White Leghorn.

UNIT – II
Classification of fowls based on their use: meat type such as Broilers, Egg type such as white leghorn and commercial layers, Dual purpose varieties, game and ornamental purpose varieties.

UNIT – III
Feeding poultry –Feed Preparation- Management of Egg Layers – Management of Broilers in large scale farms.

UNIT – IV
Poultry diseases Viral, Bacterial, Fungal, Protozoan and Ectoparasite-Lice. Prevention and precautions during vaccination.

UNIT – V
Management of a modern poultry farms – Progressive plans to promote poultry as a self employment venture.

Reference Books:
Jull Morley, A. 1971: Poultry Husbanry, Tata –McGraw Hill Publ. Co New Delhi – India.

Sastry, Thomas and Singh, 1982: Farm Animals Management and Poultry production – Vikas Publ. co. New Delhi – India.

Harbans Singh and Earl.N. Moore, 1982: Live stock and poultry production – prentice hall India Publ. Co., New Delhi – India.

Banarjee, G.C. 1986: poultry, Oxford – IBH publ. co., New Delhi – India.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc. Zoology effective from the year 2016-2017

Year:	II Year	Subject Code :	U15NZL401	Semester :	IV
Non Major - 2	Title:	**Sericulture (NME - II)**			
Credits:	2			Max. Marks. 40	

Objective:
To impart training on silk worm culture technology
To create knowledge on self employment opportunity

UNIT – I
Classification of commercial varieties of mulberry. Mulberry plantation establishment and cultivation practices.

UNIT – II
Diseases of mulberry – fungal, bacterial, viral and nematode diseases, deficiency diseases and their remedial measures.

UNIT – III
Biology of silk worm (*Bombyx mori*).
Silkworm rearing operations – Chawki rearing and late age rearing techniques.

UNIT – IV
Diseases of silk worm.Physical and commercial characters of cocoons. Reeling operations, importance of by – products of Sericulture.

UNIT – V
Economics of Sericulture – Sericulture prospects in India- Sericulture as Self Employment venture.

Reference Books:
Ganga, G. 2003: comprehensive sericulture Vol-l, Moriculture – Oxford –IBH Puubl. Co. India.

Ganga, G. 2003: comprehensive sericulture Vol –II Silkworm rearing – Oxford – IBH Publ. Co. India.

Ganga, G. and Sculochana Chetty, J. 1997: An Introduction to sericulture Oxford – IBH Publ. Co.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year: III Year Subject Code : U15MZL501 Semester : V

Major - 5 Title: **Biostatistics and Bioinformatics**

Credits: 5 Max. Marks. 75

Objective:

To get a basic knowledge of statistical methods and computations in biology.

To study the application of information sciences [mathematics, statistics and computer sciences]in biology.

To study the application of information technology to the management and analysis of biologicaldata.

UNIT – I

Definition and scope: collection and analysis of data – collection and methods of sampling. Variables: discontinuous, discrete and non-discrete, continuous - classification – Presentation of data: tabulation - diagrams and graphs: line diagram – bar diagram – pie diagram – histogram – frequency polygon.

UNIT – II

Measures of central tendency: mean, median and mode. Measures of Dispersion, Range, Quartile deviation, mean deviation, Standard deviation and Standard error.

(Computations needed for all the above measures based on biological data).

UNIT – III

Testing of Hypothesis - Null and Alternative hypothesis – test of significance-goodness of fit test-Students t-test and Chi square test (Computations needed for both the tests based on biological data)

UNIT- IV

Bioinformatics – definition – Literature databases- NCBI – Pubmed, Medline, Protein and Nucleicacid sequence databases – PIR, Swiss – Prot, GeneBank, DDBJ – Structure Databases – PDB, SCOP,CATH, Structure visualization tools, RasMol, Swiss PDB viewer.

UNIT- V

Pairwise Sequence Alignment –Scoring Matrices - PAM and BLOSUM- Z-score-Dot Plot – local and global alignment – Database searching – FASTA and BLAST.Multiple sequence alignment-Clustal W- Phylogenetic Tree – PHYLIP.

Reference Books:

Gupta S.P: Statistics2013. S. Chand and Co., New Delhi.

Jerold H. Zar Biostatistical analysis [2nd edition] .Printice Hall International edition, 2012[Relevant portions]

Arthur. M. Lesk, Introduction to Bioinformatics, Oxford University Press, New Delhi, 2003

Baxevanis, A and Outllette. Bioinformatics- a practical guide to the analysis of genes and proteins,Willy – Interscience, Hoboken, NJ. USA 2005..

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year: III Year Subject Code : U15MZL502 Semester : V

Major - 6 Title: **Developmental Biology & Immunology**

Credits: 5 Max. Marks. 75

Objectives:

To study ontogenesis, the development of animals including parthenogenesis.

To study embryonic adaptations, human reproduction and reproductive technology in man.

To study the processes which help to maintain the organisms' internal environment, when challenged with foreign substances.

To understand the advances in Immunology.

UNIT – I

Spermatogenesis and Oogenesis – comparative study of invertebrate and vertebrate sperm and eggs, polarity& symmetry of eggs – Fertilization Mechanism, Physiology & theories – parthenogenesis.

UNIT – II

Cleavage: Types of animal eggs; patterns of yolk on cleavage; cleavage rules; germ layers; cell lineage. Cleavage in *Amphioxus*, frog, chick and man. Fate maps: Fate maps of frog, chick and man. Gastrulation: Morphogenetic movements; Gastrulation in frog and chick and man. Organogenesis: Development of brain and heart in frog.

UNIT – III

Embryonic adaptations; Embryonic membranes and their functions in chick – placentation inmammals. Puberty – Menstrual cycle.

Family welfare - contraception (Tubectomy and Vasectomy).

Reproductive technology: Artificial insemination-cryopreservation-IVF-Embryo transfer – Test tube babies – amniocentosis -Bioethics.

UNIT- IV

Immunity: Types of immunity – Innate and acquired, Passive and active. Lymphoid organs: Primary and secondary Lymphoid organs – Thymus, Bone marrow, Bursa of Fabricius, Spleen, Tonsil, Lymph node, Peyer's patches.

UNIT-V

Immunoglobulins: Structure, functions and biological properties of immunoglobulin classes. Interaction of antigen and antibody. Auto immune diseases. Immune cells-T-cell, B -Cell and Macrophages.

Immunoprophylaxis – Immunization schedule for children. Immuno deficiency – AIDS,Immunotechniques-Radioimmunoassay (RIA).

Reference Books:

Balinsky, B.L., 1981. Introduction to embryology. Saunders, Philadelphia.

Berril& Corp. Developmental Biology. McGraw Hill Book Company, MC.,New York.

Jayaraj M S.An Introduction to embryology.Veer BalaRastogi Publication.

Verma, P.S., V.K. Agarwal and Tyagi, 1995. Chordate embryology. S. Chand & co., New Delhi.

Majumdar, N.N. 1990. Text Book of Vertebrate embryology. Tata McGraw – Hill PublishingCompany Ltd. New Delhi.

McEwen, R.S., 1969.Vertebrate Embryology. Oxford and IBH Publishing Co., New Delhi.

Jain, P.C 1998, Elements of Developmental Biology. Vishal Publication, New Delhi.

Dubey 2006 Text book of Biotechnology. S. Chand and Co., New Delhi.

Roitt.I.M 2000 Essential Immunology, Blackwell Scientific Publishers.

Paul, W.E.M. 1989, Fundamental Immunology, Raven Press, New York.

Kuby. J.1999, Immunology. W. H. Free man and Co., New York.

Current Protocols in Immunology – 3 Volumes 1994. Wiley Publications.

Roitt. I, Brostoff, J. and Male. D. 2002. Immunology, Mosby, New York.

Richard, A. Golds, Thomas I, Kindt& Barbara A. Osborne 2000. Immunology, Freeman and Co., New York.

MadhaveeLatha. P, 2012. Text book of Immunology, S. Chand & Company.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year: III Year Subject Code : U15MZL503 Semester : V

Major - 7 Title: **Animal Physiology**

Credits: 5 Max. Marks. 75

Objective:

To study the basic principles of animal physiology, chemical and physical properties of living matter.

To understand the physiology of various organs and organ systems.

UNIT – I

Basic composition of nutrients: carbohydrates – proteins – lipids – vitamins – minerals – balanced diet. Structure and functions of gastrointestinal system. Role of enzymes in food digestion – absorption – malnutrition.

UNIT – II

Structure and function of human lungs - transport of respiratory gases - respiratory quotient – oxygen debt – anaerobiosis. Structure and functions of human circulatory system – human heart – blood vessels – blood constituents – blood groups, A, B, AB, O, Rh – blood pressure, origin and conduction of heart beat – cardiac cycle – electrocardiogram (ECG).

UNIT – III

Excretion – kinds of excretory products – amniotelic, urecotelic and ureotelic animals- Structure of mammalian kidney - Mechanism of urine formation. Osmoregulation - euryhaline - stenohaline - osmoconformers - osmoregulators - osmoregulation in Crustaceans and fishes. Muscular system: Muscle tissue types-ultra structure of skeletal muscle, mechanism of muscle contraction. Muscle metabolism– Cori cycle – Theories of muscle contraction.

UNIT – IV

Nervous tissue – components of CNS- Structure and function of Neuron –types of neurons. Nerve impulse – Synapse – Synaptictransmission of impulses – Neurotransmitters. Receptors – Photo and phonoreceptors– Physiology of vision and mechanism of hearing.

UNIT- V

Sexual reproduction: in mammals (man). Male sex hormones - female sex hormones. Menstrual cycle, menopause, pregnancy & parturition. Endocrinology: Structure, function and hormones of pituitary, thyroid, parathyroid, adrenal, islets of Langerhans.

Reference Books:

Sambasivaiah, Kamalakararao and Augustine chellappa 1990. A Text book of Animal Physiology and Ecology, S. Chand & co., Ltd., New Delhi – 110 055.

Parameswaran, Anantakrishnan and Ananta Subramanyam, 1975. Outlines of Animal Physiology,S. Viswanathan [printers& Publishers] Pvt., Ltd.

William S. Hoar, 1976. General and Comparative Physiology, Prentice Hall of India Pvt., Ltd., NewDelhi. 110 001.

Wood.D.W, 1983, Principles of Animal Physiology 3rd Ed.

Prosser,C.L. Brown, 1985, Comparative Animal Physiology, Satish Book Enterprise, Agra – 282 003.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year: III Year Subject Code : U15EZL501 Semester : V

Elective - 1 Title: **Bioinstrumentation (Elective - I)**

Credits: 3 Max. Marks. 75

Objective:

To learn about the various biological instruments and their function available locally.

UNIT – I

Microscopy: Light microscopy – Phase contrast – Fluorescence& Integrated – Polarized – Scanning and Transmission electron microscopy. Camera Lucida –structure and function.

UNIT – II

Centrifugation: principle-sedimentation coefficient-types of centrifuges. Principle and types of pH measurements. Cryotechniques – cryopreservation.

UNIT – III

Chromatography: paper – thin layer – column – gas – liquid chromatography – High Performance Liquid Chromatography (HPLC). Spectrophotometry-Principle andApplications of Colorimetry and UV Spectrophotometer.

UNIT – IV

Media - preparation and sterilization. Autoclave-Principle and Application. Staining: simple and Gram staining – microbial assays – cell and tissue culture techniques.

UNIT – V

Electrophoresis: Poly Acrylamide Gel Electrophoresis (PAGE) – immunoelectrophoresis. Polymerase Chain Reaction (PCR), Enzyme Linked Immuno Sorbent Assay (ELISA), Southern, Northern, Western blotting techniques – sequencing of nucleic acids and proteins.

Reference Books:

1. N. Gurumani: Research methodology for biological sciences. M. J. P. Publishers.
2. S. V. S. Rana: Biotechniques. Rastogi Publications, Shivaji Road, Meerut – 250002.
3. P. Palanivelu: Analytical Biochemistry and Separation Techniques. Tulsi Book Centre. Gung complex. 1st Floor, 71, Town Hall Road, Madurai – 625 001.
4. Keith Wilson and John Walker, Practical Biochemistry. Cambridge Publishers.

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Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year:	III Year	Subject Code :	U15SZL501	Semester :	V
Skill Based - 3	Title:	**Pisciculture (SBS - III)**			
Credits:	3			Max. Marks. 60	

Objective:

To introduce basic knowledge of fish culturing methods and techniques.

Unit I

Definition, Scope of Pisciculture, Pisciculture in India – Freshwater, Coastal and marine pisciculture – candidate species and their qualities.

Unit II

Types of fish ponds – Preparation of pond for fish culture - nursery pond, rearing pond and culture pond. Water quality management.Economics of a pond and social issues.

Unit III: CULTIVATION OF SPECIES

Types of culture: extensive - semi-intensive and intensive culture – monoculture - monosex culture – polyculture - cage culture - pen culture - integrated fish farming. Breeding of Carps- Natural and Induced breeding. Ornamental Fishes-Aquarium setting and its importance.

Unit IV: FEED FORMULATION

Fish feed: artificial feed – feed formulation – need - ingredients ratio – pellets-FCR. Live feeds and their culture: *Artemia* – rotifers - microalgae.

Unit V: DISEASE MANAGEMENT

Diseases in pisciculture: viral, bacterial, fungal and parasitic pathogens of fish. Disease diagnostics-Preventive and control measures.

Reference Books:

1. Jhingran V.G. 1985, Fish & Fisheries of India, Hindustan Publishing Co. New Delhi. 666p.Trivedi K.K [Ed] 1986 Fisheries Devt. 2000 AD. Association of India fisheries industries, Oxford &IBH, New Delhi 268pp.
2. Santhanam, R., N. Sukumaran and P. Natarajan., A manual of freshwater aquaculture. Oxford & IBH Publishing Co. Pvt. Ltd., 66 Janpath, New Delhi – 110 001.
3. Sundararaj, V. and B. Srikrishnadhas, Cultivable aquatic organisms, Narendra Publishing House, 1417, Krishnan Dutt Street, Maliwara, Delhi – 110 006.
4. Pillai, T.V.R., Aquaculture and the environment. 1st edition, Fishing news Books, England, 1992.
5. Pandian, T.J., Sustainable Indian Fisheries, 2001
6. S. Paulraj., Shrimp farming techniques, problems and solutions-1995
7. Kurian, C.V and V.O. Sebastian. Prawns and prawn fisheries of India IV edition 1993

Victor, A.C., A. Chellam, S. Dharmaraj and T.S. Velayudhan, Manual on pearl oyster seed production, farming and pearl culture, CMFRI Special publication-1995.

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Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year:	III Year	Subject Code :	U15MZL601	Semester :	Vi
Major - 8	Title:	**Environmental Biology**			
Credits:	5			Max. Marks. 75	

Objective:

To realize the importance of interrelationship between every organism and environment.

To study the impact of eco factors on the morphology and distribution of organisms.

UNIT – I

Scope – concept – Branches in ecology – Autecology, synecology -Micro and macro environment – types of media and substratum and their influences on animals – Water: Properties, Forms ofwater, Soft and hard water. Air composition – properties. Substratum: Soil: Types, soil profile,soil formation and soil groups of India.

UNIT – II

Biosphere – Hydrosphere – Lithosphere – Atmosphere. Temperature: Distribution oftemperature, thermal stratification – Temperature as a limiting factor, thermal adaptations. Lightas a limiting factor. Pressure, gravity, Moisture and humidity. Liebig's law of minimum, Shelford's lawof tolerance.

UNIT – III

Structure and function of ecosystem-food chain-food web-energy flow and energy pyramids. Biogeochemical cycles – gaseous cycle [N2] -sedimentary cycle[phosphates]. Intra-specific andinter-specific animal associations: colony formation, social organization, predation, parasitism,commensalism, mutualism, interspecific competition – Competitive principle or Gause'sprinciple.

UNIT – IV

Population: Definition – characteristics – Natality, Mortality, age distribution, Population growthforms, population fluctuation. Community, Ecotone and edge effects – ecological succession.Conservation - Wild life management, Preservation – laws enforced – sanctuaries, National parks.Natural resources management: renewable and non-renewable.

UNIT – V

Environmental degradation and Pollution – deforestation, urbanization, population explosion and otherenvironmental hazards –Types of pollution: air, water, soil, noise and radioactive-depleting natural resources and relationship between poverty andenvironmental degradation and vice versa. Environmental ethics and laws – Earth summits – roleof governmental agencies for environmental monitoring.

Reference Books:

Kotpal. R.L, and N.P. Bali, 1986. Concepts of Ecology, Vishal Publications, New Delhi – 7.

Rastogi V.B, and M.S. Jayaraj, 1988 – 1989. Animal Ecology and Distribution of animals, Kedarnath, Ram Nath Meerut – 250 001.

Clark, G.L. 1954, Elements of Eology, John wiley& Sons Inc., New York, London.

Ananthakrishnan, T.N, and S. Viswanathan, Principles of Animal Ecology.

Eugene P. Odum, 1971. Fundamentals of ecology, Saunders International Student Edition, W.B.Saunders Company, Philadelphia London, Toronto.

Verma, P.S and Agarwal 1986, Environmental Biology, S. Chand & Co Ltd.Richard, Manual of wild life conservation

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Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year: III Year Subject Code : U15MZL602 Semester : VI

Major - 9 Title: **Economic Zoology**

Credits: 4 Max. Marks. 75

Objectives:

To encourage young learners to take up the small scale industries.

To generate motivation for self-employment.

To disseminate information on economic aspects of zoology.

To inculcate knowledge on useful animals to Mankind.

To satisfy the learners with modern techniques of animal culture.

UNIT – I

Vermiculture: Methods of composting

Economic Entomology:Apiculture - Species of Honeybees –Honey extraction – Economics of Apiculture and management.

Sericulture – Nature and economic importance of sericulture in India. Lac culture.

UNIT –II

Economics of aquatic animals-fishes (larvivorous),ornamental. Prawn [*Macrobrachiumrosenbergii*&*Penaeusmonodon*).

Pearl culture: Formation and nature of Pearls – Commercial importance of Pearl Culture in India.

Techniques of induced breeding in fishes, crabs and lobsters, commercial culture of catla&Indian catfish, by–products of fishes and their commercial values.

UNIT – III

Economics of Poultry keeping. Morphology of different breeds of Chicken – Brooding and Rearingof Chicks – Processing of Egg, Meat and by–Products of Poultry.

UNIT – IV

A]: Dairy farm management, Milch breeds. Draft Breeds, Dual Purpose breeds and New crossBreeds of Cows and Buffaloes in India.

B]: Sheep farming: Indigenous and Exotic breeds of sheep

UNIT – V

Future strategies for Livestock Development –Genetic.

Improvement for best Breeds – Economic importance of Dairy, Leather, Wool, Fur. Medicinal products from animals.

Reference Books:

Sukla, G.S. and Upadhyay, V.B., 2000, Economic Zoology – ISBN – 81- 7133 -137 -8

Rastogi Publication, Meerut, India.

Jawaid Ahsan and Subhas Prasad sinha – 2000, A Handbook on Economic Zoolgy - ISBN – 81 – 219-0876 – 0, S. Chand & co., Ltd., New Delhi.

Ashok Kumar and Prem Mohan Nigam, 1991, Economic and Applied Entomology, Emkay Publication, New Delhi.

Shammi,Q.J. and Bhatnagar, S., 2002, Applied Fisheries: ISBN – 81 – 7754 – 114 – 5, Agrobios [India], jodhpur – India.

Major Hall, C.B. 2005, Ponds and Fish culture – ISBN – 81 – 7754- 146 – 3, Agrobios [India], Jodhpur - India

Keith Wilson, N.D.P., 2005, A Handbook of Poultry Practice – ISBN – 81 – 7754 -0- 69- 6

Agrobios [India], Jodhpur– India.

Banerjee, G. C. 1992, Poultry – III – Edition – ISBN – 81 – 204 – 008 – 4, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Banerjee, 1988, A text book of Animal Husbandry – VIII- Edition – ISBN – 81- 204 – 1260 -5, Oxford & IBH Publishing co. Pvt. Ltd., New Delhi.

Kaushish, S.K., 2001, Trends in livestock Research – ISBN – 81 – 7754 – 112 – 9, Agrobios [India], Jodhpur– India.

Ismail, S.A1997. Vermicology the Biology of Earthworm. Orient Longman, India.

Mary Violet chrishty 2008 Vermitechonology MJP Publ. Chennai.

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Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year: III Year Subject Code : U15MZL603 Semester : VI

Major - 10 Title: **Evolution**

Credits: 4 Max. Marks. 75

Objectives:

To comprehend the scientific concepts of animal evolution through theories and evidences.

UNIT – I

Origin of Life-Theories-Evidences: The need of evidences for the fact of evolution – Morphological, Anatomical, Embryological, Physiological, Biochemical and Paleontological evidences.

UNIT – II

Theories: Lamarckism, NeoLamarckism, Darwinism, NeoDarwinism, DeVries concept of Mutation,Modern concept of Mutation theory.

UNIT – III

Natural selection:Types, stabilizing and diversifying directional selection, Variation: Types ofvariation.

UNIT-IV

Mimicry and colouration – Batesian and Mullerian mimicry and evolution, living fossils. Geographical distribution of animals.

UNIT – V

Isolation – Premating and post mating isolating mechanism, speciation, Evolution of man –Biological and cultural.

Reference Books:

Agarwal, V.K and Usha Gupta – Evolution and animal distribution, Chand and Co.

Dodson,E.O. 1990. Evolution, Reinhold, Newyork.

Francisco, J.Ayla – Evolution, Surject publication.

Gopalakrishnan,T.S. IttaSambasivaiah and A.P.Kamalakara Rao. Principles of organic Evolution,Himalaya publishing house.

T.K.Ranganathan, Evolution. 1994 Rainbow Printers, Palayankottai.

Veer BalaRastogi. Organic Evolution, Meerut Publications.

Arumugam, N. Organic Evolution, 2009. Saras Publishers,.Nagarcoil, Kanyakumari Dt.

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Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year: III Year Subject Code : U15EZL601 Semester : VI

Elective - 2 Title: **Biochemistry (Elective - II)**

Credits: 3 Max. Marks. 75

Objective:

To define and explain the basic principles of biochemistry.

UNIT – I

Introduction – structure of an atom, molecule – chemical bonds — pH and buffers– Structure and properties of water - hydrogen ion concentration, acids and bases and theirconcept.

UNIT – II

Enzymes and co-enzymes – classification and nomenclature -functions, substrate specificity, factors influencing the enzyme action – Structure of haemoglobin and its function.

UNIT – III

Carbohydrates – classification, structure, properties and functions-metabolic pathways-glycolysis, Kreb's cycle and electron transport chain.

UNIT – IV

Protein – classification, structure, properties and functions– amino acids – classification, structure, properties and functions– metabolism of protein – deamination, transamination – trans deamination - Inborn errors in amino acids metabolism – Structure and function of purines and pyrimidines.

UNIT – V

Lipids – classification, structure, properties and functions - fatty acids, triglycerides, wax and their properties. Lipid metabolism – ß-oxidation-role of liver in fat metabolism – metabolism of cholesterol.

Reference Books:

1. Shanumugam, A., 1977. Fundamentals of biochemistry for medical students. Navabharat Printers and Traders, Madras-86.
2. Stryer, L., W. H., 1995. Biochemistry. Freeman and Company, San Francisco.
3. Lehninger, A. L., 1993. Principles of biochemistry. CBS Publishers and Distributors, New Delhi-32.

4. Murray, R. K., Granner, D. K., Mayes, P. A. and Rodwell, V. W., 1996. Harper's biochemistry (24th edition). Prentice Hall of Japan, Inc., Tokyo.
5. West E. S., Todd, W. R., Mason, S. H. and Van Bruggen, J. T., 1974.Textbook of biochemistry (4th edition). Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi-2.
6. Kuchel P.W & G. B. Ralston, 2003. Schaum's outlines of biochemistry (2nd edition). Tata McGraw-Hill Edition.

S. C. Rastogi. 2003. Biochemistry (2nd edition). Tata McGraw-Hill Publishing Company Ltd.

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Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year: III Year Subject Code : U15EZL602 Semester : VI

Elective - 3 Title: **Nanotechnology In Life Science (Elective - III)**

Credits: 3 Max. Marks. 75

Objectives:

To impart current knowledge in Nanotechnology

To create fundamental understanding of usage of Nanometerial in life sciences.

UNIT I:

Definition-History and scope of nanotechnology - Nanoparticles and their properties - Types of nanoparticles- lipids, polymers, proteins and DNA.

UNIT II:

Top down & Bottom up process – Ball Milling, co-precipitation, sol-gel and electrodeposition

Application of Electron Microscopy-TEM & SEM, - X-Ray diffraction-FTIR-AFM.

UNIT III:

Definition - New Forms of Carbon – Types of Nanotubes – Formation of Nanotubes – Uses for nanotubes – Biological Applications.

UNIT IV:

Nano biosensors - microfluidic devices - Tissue engineering with biocompatible nanostructures, soft lithography

UNIT V:

Application of nanotechnology in Agriculture and environment.

Nanomedicine – Magic Bullet – Quantum dots – Cancer therapy – Nanodrugs and their loading and delivery – Nucleic acids (DNA & RNA), Liposome-mediated drug delivery – Medical implants.

Reference Books:

Shanmugam, S.2009: Nanotechnology, MJP-Publ. Chennai – India.

Kumar,U, W008 : Nanotechnology – A Fundamental Approach – Agrobios – India

Ratner, 2008: Nanotechnology-A Gentle Introduction to next big idea Tamilnadu Book House,Chennai – India.

Goodshell, D.S, 2004 – Biotechnology: Lessons from Nature – John Wiley & Sons (Asla) Publ.Ltd,Singapore.

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Syllabus for B.Sc. Zoology effective from the Batch 2015-2016

Year:	III Year	Subject Code :	U15SZL601	Semester :	VI
Skill Based - 4	Title:	**Medical Laboratory Techniques (SBS - IV)**			
Credits:	3			Max. Marks. 60	

Objectives:

To impart awareness on Clinical Lab Technology.
To create knowledge on Self-Employment Opportunity.

UNIT – I:

Scope of Medical Lab Technology – Medical laboratory personnel – code of conduct - laboratory management and safety measures - safe disposal of hospital waste - laboratory requirements. Sterilization: dry heat - hot air oven, moist heat - autoclave, pressure cooker, ultraviolet radiation, chemical sterilization. Laboratory equipments: spectrophotometer, inoculator, refrigerator, autoanalyser, microcentrifuge, automatic pipettes.

UNIT – II:

Collection of blood samples, composition of blood. Blood groups - ABO group and Rh factor, Packed Cell Volume (PCV), Erythrocyte Sedimentation Rate (ESR). RBC count, WBC count, Reticulocyte count, total count, differential count, Heamoglobin estimation, blood sugar estimation. Basic principles of blood transfusions.

UNIT – III:

Clinical diagnosis of diseases and detection techniques: Typhoid,Cholera, Tuberculosis, Polio, Measles, Amoebiasis and Filariasis.

UNIT – IV:

Urine: Physical examination, blood cells, urinary glucose, urinary albumin, bile salts, ketone bodies, Urine culture – Antibiotic susceptibility test, Pregnancy test (detection of hCG) – Faeces (stool): Components of faeces, their characteristics, factors affecting faecal composition. Parasites of intestine – identification of infection – *Ascaris*, Pinworm, *Entamoeba*, *Giardia*, Occult blood in stool. Sputum: Analysis of sputum – Pathological conditions that can be detected in sputum – their causes.

UNIT – V:

Cerebrospinal fluid: formation, composition, function, conditions altering its composition – their causes – Semen: Sperm count, abnormal sperms, common pathological conditions detected in semen – their causes. Amniotic fluid: sex determination, amniocentesis.

Reference Books:

Samuel, K.M. 1992: Notes on Clinical Lab Techniques. M.K.G. Iyyer& Sons Publ. Co., Chennai – India.

Dubey, R.C., and Maheswari, D.K.2007; A text book of Microbiology, S. Chand and Co. Publ. NewDelhi – India.

Purohit, S.S. 2005: Microbiology – Fundamentals and Applications [6th Edition], Student Edition – Jodhpur – India.

Mukherjee, 2006: Medical Laboratory Technology Vol. I, II & III – Tata McGraw Hill Publ.Co., Noida– India.

Ochei, 2000: Medical Laboratory Science – Theory and Practice – Tata McGraw Hill Publ, Co., - Noida – India.