SYLLABUS

MANONMANIAM SUNDARANAR UNIVERISTY, TIRUNELVELI-12

PG - COURSES – AFFILIATED COLLEGES

Course Structure for

M.Sc. Zoology

(Choice Based Credit System)

(with effect from the academic year 2017- 2018 onwards)

Semester-IV				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
	Core XI	Immunology	PZOM41	4
	Core XII	Genetics	PZOM42	4
	Core XIII	Aquaculture	PZOM43	4
	Elective	Sericulture	PZOE41	3
	Core Practical VII	Practical VII (4.1, 4.2)	PZOL41	2
	Core Practical VIII	Practical VIII (4.3& Elective)	PZOL42	2
	Project	Project	PZOP41	8

IMMUNOLOGY

Preamble :

The students will be able to identify the cellular and molecular basis of immune responsiveness. To describe the role of immune system in both maintaining health and contributing to diseases. The course material help to understand the ability of our immune system to defend against invading pathogens.

Unit I :

Scope of Immunology. Innate Immunity :

First line of defense – Second line of defense - Third line of defense. Inflammatory response. Mechanism of innate immune recognition. Acquired immunity : Naturally acquired passive immunity, Artificially acquired passive immunity, Naturally acquired active immunity, Artificially acquired active immunity. Cells of immune system : Lymphoid lineage –- Myeloid lineage – Organs of immune system : Primary lymphoid organs - Secondary lymphoid organs.

Unit II :

Antibodies (immunoglobulins) :

Immunoglobulin structure and function -Immunoglobulin classes Major histocompatibility complex (MHC) : Structure and types. Antigen –antibody interaction and hypersensitivity : Types of antigen – antibody interactions Hypersensitivity - Type I, II, III, IV and V Complement system : Classical complement pathway, Alternative complement pathway,

Unit III :

B -cell maturation, activation and differentiation :

B Cell maturation, Bone marrow micro environment, Ig –gene rearrangements and formation of pre B-Cells receptor, selection of immature self reactive B Cells, B Cell activation and proliferation. T–cell maturation activation and differentiation : T – Cell maturation, discrete stages in early T cell development, Thymic selection of T cell repertoire, T cell activation, costimulation in T cell response, T cell clonal anergy. Antigen processing and presentation :Cytosolic pathway of antigen presentation, Endocytic pathway of exogenous antigen presentation. Effectors responses of cell mediated and humoral immunity : Cell mediated direct cytotoxic response, Natural killer cell mediated cytotoxicity, Antibody dependent cell mediated cytotoxicity, Regulation of immune effectors response, Immunological memory.

Unit IV :

Immune response infectious diseases :

Immune response against viral infection, bacterial infection, protozoan parasites and helminthine parasites. Autoimmune diseases. Immuno deficiency diseases.

Unit V :

Transplantation immunology :

Classification of grafts, Method of graft rejection, Graft versus host reaction, Tissue and organ transplantation, Immuno suppressive therapy during transplantation, Immunological tolerance –Mechanism of tolerance. Immunology of tumors : Tumor antigens, Immune response to tumor antigens, Immunological surveillance, Immune therapy of cancer. Vaccines : Vaccines from whole organisms, Polysaccharide vaccines, Outer membrane protein vaccines, Toxoid vaccines, Vaccines from recombinant vectors, DNA as vaccines, Vaccines from synthetic peptides.

Text books:

1. C.V.Rao, An Introduction to Immunology Narosa Puplishing House, 35, Greams Road, Thousand light, Chennai -600006.
2. Immunology, 2007. I.Kannan. MJP Publishers, Chennai.

Reference books:

1. Janis Kuby, Immunology W.H.Freeman and Company, New York.
2. Klans.D.Elgert, Immunology Wiley –Liss Pub. Co. U.S.A.
3. R.M.Coleman, M.F.Lomb and R.E.S.Cord Fundamental Immunology 2nd Edn. W.C.Brown Publishers U.S.A.
4. I.M.Roitt, Essential Immunology E.L.B.S.

5. Donald M.Weir and John Shewart Immunology Churchill Livingston 9th Edn.
6. Geroge Pinchuk 2004.Schum's Outlines Immunology Tata McGraw –Hill.
7. Aruna Bhatia Manual of Practical Immunity Vikas Pub. House Ltd., New Delhi.
8. Talwar .G.P. A hand book practical immunology - Third edition ,Backwell scientific publication-ISBN 0-632-01491-1

GENETICS

Preamble :

To learn and apply concepts of modern transmission and molecular genetics. To solve transmission of genetics problem, make accurate prediction about inheritance of genetic traits and map the location of the genes. To understand the patterns of inheritance, autosomal recessive, autosomal dominant and sex linked traits.

Unit I :

Principles of genetic transmission:

Concepts and definitions – Mendelian principles – Allelic and non-allelic interactions – Pleiotropy – Penetrance andexpressivity – Phenocopies – Multiple alleles – Polygenic inheritance – Linkage and Crossing over – tetrad analysis – ClB technique – Sex determination – Sex linked inheritance – Non-disjunction.

Unit II :

Gene Concept:

Fine Structure of gene - Simple and split genes – Intron, Cistron, muton and Recon – Chemical composition of gene - Genes and protein synthesis – Genetic code - works of Khorana and Kornberg – wobble hypothesis - Regulation of gene action – Transposable elements – IS elements – DNA replication – Chemistry of DNA – Geme action related diseases.

Unit III :

Mutation and Extra chromosomal inheritance:

DNA damage and repairing mechanism – Gene mutation – molecular basis of mutaion – mutagens – causes of mutation – Extra chromosomal inheritance – Kappa particles in Paramecium – Shell coiling – Inbreeding, out breeding and hybrid vigour.

Unit IV :

Population Genetics:

Mendelian population – Gene pool and gene frequency – Hardy Weinberg law, Applications of Hardy-Weinberg law in calculating gene frequencies in a population – Calculation of gene frequencies for sex linked genes – Factors affecting Hardy - Weinberg equilibrium.

Unit V :

Human Genetics:

Pedigree analysis – Aminocentesis – Inborn errors metabolism – Sickle cell anemia – Karyotype – Twins – Chromosonal abnormalities – Genetic Pregnosis – Genetic Counselling – Gene Therapy – Drugs on Human heredity – simple Mendelian traits in man – genetic analysis of complex traits – Threshold traits – DNA finger printing and dermatoglyphics. Eugenics, Euthenics and Euphenics.

Reference books :

1. Elof Axel Carlson, 1985. Human Genetics. Tata Mc Graw-Hill Publishing Co., New Delhi.
2. Jain, H. K., 1999. Genetics : Principles, concepts and implications, Oxford & Publishing Co., New Delhi.
3. Benjamin Lewin, 1997. Genes VI, Oxford University Press, Oxford.
4. Sandhya Mitra, 1994. Genetics – A blueprint of life. Tata Mc Graw Hill Publishing Co., New Delhi.
5. Strickberger, M. W., 1996. Genetics, 3rd Edn., Prentice Hall of India, New Delhi.
6. Gardner et al., 1991. Principles of Genetics, 8th Edn., John Wiley & sons Inc., New York.
7. Stansfield, W. D., 1991. Schaum's Outline of theory and problems of Genetics, 3rd Edn., Schaum's Outline Series, Mc Graw Hill Inc., New York.
8. Stent, G. S. and Calender, R., 1986. Molecular Genetics : An introductory narrative, 2nd Edn., CBS Publishers & Distributors, New Delhi.
9. Goodenough, U., 1984. Genetics, 3rd Edn., Saunders College Publishing, New York.
10. Miglani, G. S., Fundamentals of Genetics, Narosa Publishing House, New Delhi.
11. Lewis, Genes X – Jones and Bartlett Publishers, Oxford Publication.
12. Michael R. Commings, Genage Learning Pvt. Ltd., New Delhi.

AQUACULTURE

Preamble :

To promote, facilitate and influence the best possible standards of fisheries management. To provide the technical and general knowledge necessary for competent fisheries management. The basic ideas were studied at UG level and detailed study are carried in the present course.

Unit I :

Aquaculture: history, definition, scope & importance, fishery resources of India in general & Tamil Nadu in particular, a biotic and biotic factors of water necessary for fish life, ecological characteristics of lakes & rivers, general ecological characteristics of reservoirs of India.

Unit II :

Fish culture: mono, poly, mixed & composite fish culture, fresh water and marine prawn culture and its prospects in India, culture of mussels, clams, oysters and pearl culture, sewage fed fish culture, paddy cum fish culture, frog culture, sea weed culture.

Unit III :

Fish breeding in natural conditions, bundh breeding, hypophysation & stripping, transport of live fish and seed, different types of crafts and gears used for fish catching, plankton – its definition, culture & identification, common weeds of fish ponds& methods of their eradication, production of mono sex and sterile fishes, transgenic fishes, hybridization , polyploidy , role of bio technology in conservation of fishes.

Unit IV :

Fresh water fish farm: selection of site, construction of fish farm and soil chemistry, designing layout and construction of different types of fish ponds, setting and management of fresh water aquarium, preservation and processing of fish, fish by products industry and their utility.

Unit V :

Water pollution, its effects on fisheries and methods of its abatement, common fish diseases(bacterial, viral, fungal and nutritional deficiency diseases), biochemical composition and nutritional value of fish, fisheries economics and marketing, fisheries managements and extension.

Reference Books (latest editions):

1. T.V.R.Pillay & Dill: Advances in Aquaculture
2. Agarwal & S.C.Narendra: A Hand Book of Fish Farming
3. R.K.Rath: Fresh water Aquaculture
4. Schonder: Hypophysation in Indian Major Carp
5. C.B.Hall: Ponds & Fish Culture

6. C.B.L.Srivastava: Fishes of India
7. Jhingaran: Fish and Fisheries of India
8. S.S. Khanna: An Introduction to Fishes
9. B.S.Rath: Fresh Water Aquaculture
10. Gopalji Srivastava: Fishes of U.P.& Bihar
11. H.D.Kumar: Sustainability & Management of Aquaculture & Fisheries
12. A.J.K.Mainan: Identification of Fishes
13. R.Sanatam: A Manual of Fresh Water Aquaculture
14. S.K.Gupta: Fish and Fisheries

SERICULTURE

Preamble :

The main objective of this course is to identify the disease and pests of the mulberry plants and also involves a through knowledge about the cultivation of mulberry, maintenance of the farm, seeds technology, silk worm rearing and silk reeling.

Unit I:

Introduction- Scope and importance of sericulture –Sericulture in India. Role of Central Silk Board. Life cycle of Bombyx mori – morphology, egg, larva, pupa, adult, silk gland- classification based on number of larval moults and voltinism cocoon colour shape. Non mulberry silkworm.

Unit II:

Morphology of mulberry plant – high yielding varieties- optimum conditions for mulberry growth- planting- irrigation- manuring- pruning- harvesting and storing of mulberry leaves- Common diseases of mulberry-causative agent, symptoms and treatment.

Unit III:

Egg breeding stations procedure in grainage – silkworm rearing- rearing house –rearing appliances – rearing operations –sericulture products.

Unit IV:

Diseases of silkworm – causative agents, symptoms and treatment for bacterial,fungal, viral and protozoan diseases. Genetic resistance of the silkworm – silkworm transgenesis and application.

Unit V:

Silk reeling – cocoon marketing –characteristics of cocoon – cocoon stifling types and storage of stifled cocoons – reeling operations – reeling appliances – country charka, cottage basin, multi-end reeling machine – raw silk testing.

REFERENCES

1. Ganga, G and I. Sulochana Chetty. An Introduction to Sericulture. Oxford and IBH publishing co.pvt. ltd. New Delhi. 1991
2. Hisao Aruga. Principles of Sericulture. Oxford and IBH publishing co.pvt. ltd. New Delhi.
3. G. Rangaswamy etal . Mulberry cultivation – Central Sericultural Research and Training Institute. Mysore (1972)
4. Ullal, S.R and M.N. Narsimhanna –Hand Book of practical Sericulture – Central Silk Board. Bombay.

PRACTICAL -7
Practicals

1. ABO blood grouping by haemagglutination technique.
2. Immuno-diffusion technique.
3. Counting of white blood corpuscles and red blood corpuscles.
4. Primary and secondary lymphoid organs in man (chart).
5. Lymphoid organs in rat (chart).
6. Cells of immune system – (slides).
7. Immunoglobulin G (chart).
8. Monoclonal antibody preparation (chart).
9. Histology of lymphoid organs: Primary organs – Thymus, Bone marrow. Secondary organs – Lymph node, Spleen. (slides).

Practicals

1. Analysis of simple mendelian inheritance in a small population.
2. Breeding experiments to be demonstrated with the help of colour beads – Monohybrid cross. (using chi-square test).
3. Breeding experiments to be demonstrated with the help of colour beads – Dihybrid cross. (using chisquare test).
4. Estimation of gene and genotype frequencies in the light of Hardy-Weinberg law based on facial traits.
5. Estimation of gene and genotype frequencies in the light of Hardy – Weinberg law based on ABO blood groups.
6. Random genetic drift – using colour beads.
7. Analysis of dermatoglyphic patterns.
8. Charts, models and flash cards pertaining to theory syllabus
   a. DNA replication
   b. Karyotyping
   c. Operon concept
   d. Transposable elements.
   e. Syndrome
   f. Inborn errors of metabolism.
   g. Sex-linked inheritance

PRACTICAL -8
Practicals

1. Morphometry of a pond
2. Estimation of fish population using mark and recapture method
3. Estimation of primary productivity of macrophyte
4. Physical chemical analysis of dissolved oxygen, salinity and alkalinity in any two water samples
5. Study of fish pathology
6. Taxonomic description of cultivable fishes(Indian major carps, 3exotic carps, Heteropneustes fossilis, Oreochromis mossambicus
7. Morphological feature of paenaid and non paenaid prawn
8. Determination of age of fishes.

Practicals

1. Dissection : Silkworm digestive system , silk gland
2. Morphology of larva pupa and moth, sex separation in pupa and moth
3. Mouth parts of silkworm
4. Identification and study of sericulture products
5. Rearing appliances : rearing tray, leaf chamber
6. Mountage – Chandrike
7. Diseases of Silkworm –bacterial, fungal
8. Types of mulberry leaves (MR2, K2)and diseases of mulberry (fungal and nematode

MAJOR PROJECT