VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)
DEPARTMENT OF ZOOLOGY
M.Sc. DEGREE COURSE IN ZOOLOGY
CHOICE BASED CREDIT SYSTEM (OBE Pattern)
Rules and Regulations, Course Scheme and Scheme of Examination governing the
M.Sc. Degree Course in ZOOLOGY
(For those admitted in June 2018 and later)

I. COLLEGE

Vision

- ✓ To evolve into a center of excellence in higher education through creative and innovative practices to social equity for women.

Mission

- ✓ To provide sufficient learning infrastructure to the students to pursue their studies.
- ✓ To provide good opportunity for higher education and conducive environment to the students to acquire education.
- ✓ To provide quality academic programs training activities and research facilities.
- ✓ To facilitate industry-institute interaction.

II. DEPARTMENT

Vision

- ❖ Provide a sound education in basic science
- ❖ Transform society through the empowerment of women
- ❖ Provide inexpensive educational services to the weaker sections of society
- ❖ Inculcate respect for nature and concern for ethical values among students through good and scientific educational practices.
- ❖ Recognizing the essential roles of science and biology in the lives of citizens today and tomorrow, we emphasize biological literacy in our teaching and outreach programs.

Mission

- ➢ To impart to the students the contemporary advancements in life sciences.
- ➢ To impart a global perspective and such skills among students that benefit humanity.
- ➢ To promote the discovery and broad communication of knowledge about the biology of animals including their taxonomy, evolution, physiology, cell, molecular and biochemical make up, interaction with their environments and its zoogeographical realms.
- ➢ To develop research aptitude and a scientific advancement.
- ➢ Reinvent ourselves in response to the changing demands of society with high moral values as a good citizen

III. OBJECTIVES OF THE COURSE:

The objectives are…..

- To meet the academic to applied aspects in zoology suited to real problems of regional and National needs
- To expose learners to frontier and thrust areas of Biology(Zoology)
- To train learners for better performance in various competitive examination and in research careers.
- To enable the learners to acquire and develop self- study habits
- To shape the learners to become worthy citizens of the Nation in the field of Zoology and interrelated fields.

IV. PROGRAMME OUTCOME

- Attained the knowledge relating to invertebrate & chordate, developmental biology, animal physiology, Cell & Molecular biology, genetics and clinical science,
- Progression to PG education in Zoology, Aquaculture, , Environmental science, Biotechnology, bio informatics, bio chemistry, microbiology and Human genetics,
- The Students get employment by industries/self employment in poultry, veterinary and Aquaculture.

V. PROGRAMME SPECIFIC OUTCOMES

- **PSO1**: The student should acquired the knowledge with facts and figures related to various aspects in life sciences
- **PSO2**: The student to understanding the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life and the applications of Zoology in Aquaculture, Vermiculture, Sericulture, Poultry Science and Fundamentals of Clinical Science and Immunology and to create new industry in their relevant area.
- **PSO3**: The student could apply the skills to handling scientific instruments, planning and performing in laboratory experiments and also drawing logical inferences from the scientific experiments.
- **PSO4**: The students analyzed and realized how developments in any science subject helps in the development of other science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments.

VI. ELIGIBILITY FOR ADMISSION

Applications seeking admission into the M.Sc. Degree Course in Zoology should have a Bachelor's Degree in Zoology / Advanced Zoology/ Animal Sciences of the Periyar University or any of the above degree of any other university accepted by the Syndicate of the Periyar University as equivalent thereto, subject to such condition as may be prescribed therefore shall be permitted to appear and qualify for the M.Sc degree examination after a course of study of two academic years. They should have secured a minimum of 50% of marks in Part III of the degree course. In the case of SC/ST students, the required minimum marks for admission in part – III will be 45%.

VII. DURATION OF THE COURSE

The course for the degree of Master of Science in Zoology shall consist of two academic years divided into four semesters. Each semester consists of 90 working days.

VIII. REGISTRATION UNDER OBE

At the beginning of each semester, the students will be enlightened with the elective papers offered in the respective odd / even semester. The students should register their options with the parent department in writing about the choice of elective papers for that semester. The selected and elective papers should be such that the paper has not been already studied either as a full paper or a part of there and such paper should not place as core paper in their major department. The department offering a particular elective paper, will select and finalize the list of students to be admitted to that elective paper. The Principal has the discretion to fix the minimum strength for each elective paper in consultation with the Head of the department concerned.

IX. CONTINUOUS INTERNAL ASSESSMENT (CIA)

The performance of the students will be assessed continuously and the Internal Assessment Marks for theory will be as under:

1. Average of two CIA & Model Exam - 10 Marks
2. Seminar - 5 Marks
3. Assignment/Model Preparation - 5 Marks
4. Attendance - 5 Marks

Total = 25 Marks

Internal Assessment Marks for practical will be as under:

1. Attendance - 10 Marks
2. Observation Note - 10 Marks
3. Model Exam - 20 Marks

Total = 40 Marks

Attendance Breakup

THEORY:

Range	Marks
76-80	1
81-85	2
86-90	3
91-95	4
96-100	5

PRACTICALS:

Range	Marks
76-80	2
81-85	4
86-90	6
91-95	8
96-100	10

X. DISTRIBUTION OF MARKS

THEORY:

Internal Assessment - 25 marks
External Examination - 75 marks

PRACTICALS:

Internal Assessment - 40 marks
External Examination - 60 marks

XI. ATTENDANCE

Each student must put in a minimum attendance of 75% of the working days of the college in each semester so as to become eligible to appear for the Terminal Examinations. Shortage of attendance in regular classes on the part of any student, not exceeding 10% below the prescribed minimum of 75% may be condoned on medical grounds. Such condonation shall be granted by the Principal on merits. The application for condonation shall be accompanied by a condonation fee, prescribed by the Principal. If a student earns less than 75% attendance in the regular classes in a particular semester and is either ineligible for condonation of shortage of attendance or is not granted condonation, then the student will not be permitted to appear for the Terminal Examinations and the students will have to repeat that semester.

XII. PASSING MINIMUM

For a pass in each paper, a candidate should secure a minimum of 50% marks in the Terminal Examinations and a minimum of 50% marks in aggregate (i.e., internal and external marks put together).

In the Project and *viva voce*, a candidate should secure a minimum of 50% marks in Project and *viva voce* separately and an aggregate of 50% marks in Project and *viva voce* put together, to get a pass.

XIII. ELIGIBILITY CONDITION FOR GETTING THE DEGREE

A candidate undergoing M.Sc., degree course in Zoology will be eligible for the award of M.Sc., degree in Zoology, if he/she completes the entire course and earns a total of 90 credits, (comprising 70 Hard core and 20 Elective credits).

XIV. CLASSIFICATION OF CANDIDATES

The successful candidates will be classified as per the details given in the following table:

RANGE OF MARKS	GRADE POINTS	LETTER GRADE	DESCRIPTION
90-100	9.0-10.0	O	OUTSTANDING
80-89	8.0-8.9	D+	EXCELLENT
75-79	7.5-7.9	D	DISTINCTION
70-74	7.0-7.4	A+	VERY GOOD
60-69	6.0-6.9	A	GOOD
50-59	5.0-5.9	B	AVERAGE
00-49	0.0-4.9	U	RE-APPEAR
ABSENT	0.0	AAA	ABSENT

CLASSIFICATION:

CGPA	GRADE	CLASSIFICATION OF FINAL RESULT
9.5-10.0	O+	First Class- Exemplary
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	First Class- Distinction
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	First Class
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
0.0 and above but below 5.0	U	Re-appear

C_i = Credits earned for course in any semester

G_i = Grade Point obtained for course in any semester

n refers to the semester in which such course were credited

For a Semester:

GRADE POINT AVERAGE [GPA] = $\Sigma C_i G_i / \Sigma C_i$

$$GPA = \frac{\text{Sum of the multiplication of grade points by the credits of the course}}{\text{Sum of the credits of the courses in a semester}}$$

For the entire programme:

CUMULATIVE GRADE POINT AVERAGE (CGPA) = $\Sigma_n \Sigma_i C_{ni} G_{ni} / \Sigma_n \Sigma_i C_{ni}$

$$CGPA = \frac{\text{Sum of the multiplication of grade points by the credits of the entire programme}}{\text{Sum of the credits of the courses of the entire programme}}$$

XV. OTHER PROVISIONS

Students failing in any paper in any semester must reappear for the examination in that paper and it is necessary to repeat the course. A student who has already passed a paper will not be permitted to reappear for the purpose of improvement.

A student who fails to attend the examination can reappear in the subsequent Terminal Examinations. However, a student who cannot appear for the examination due to lack of attendance, can appear for the examination only after earning the required minimum attendance.

Repeat Examinations will be conducted for the final semester paper(s) within a month after the publication of final semester results. Hence, a student who fails in the final semester examinations can appear for the above paper only in the Repeat Examinations or in the subsequent year Even Semester Examination.

XVI. TRANSITORY PROVISION:

Candidates who were admitted to the PG course of study before 2011-2012 shall be permitted to appear for the examinations under those regulations for a period of three years i.e., up to and inclusive of the examination of April/May 2014. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

LIST OF ELECTIVE COURSES:

1. Economic Zoology
2. Medical Laboratory Techniques
3. Fishery Biology and Aquaculture
4. First Aid and Home Nursing
5. Radiation Biology
6. Health Education

LIST OF EXTRA DISCIPLINARY COURSES:

1. Sericulture
2. Eco-Toxicology
3. Cancer Biology

COURSE SCHEME AND SCHEME OF EXAMINATIONS
M.Sc. DEGREE COURSE IN ZOOLOGY
CHOICE BASED CREDIT SYSTEM (OBE PATTERN)
(For those admitted in June 2018 and later)

Sem	Subject Code	Core/ Elective	Title of the paper	HRS/ Week	Credit	Exam (Hours)	Int. Mark	Ext. Mark	Mark
I	18P1ZO01	Core-I	Taxonomy and Comparative Biology of Invertebrate and Vertebrate	5	4	3	25	75	100
	18P1ZO02	Core-II	Cell and Molecular Biology	5	4	3	25	75	100
	18P1ZO03	Core-III	Biochemistry and Biophysics	5	4	3	25	75	100
	18P1ZO04	Core -IV	Microbiology and Immunology	5	4	3	25	75	100
	18P1ZOP01	Core Practical	Practical-I	5	4	4	40	60	100
	18P1ZOE01	Elective- I	Economic Zoology	5	4	3	25	75	100
			Total	30	24		165	435	600
II	18P2ZO05	Core-V	Developmental Biology	5	4	3	25	75	100
	18P2ZO06	Core-VI	Animal Physiology	5	4	3	25	75	100
	18P2ZO07	Core-VII	Advanced Genetics	5	4	3	25	75	100
	18P2ZOP02	Core Practical	Practical-II	5	4	4	40	60	100
	18P2ZOE02	Elective- II	Medical Laboratory Techniques	5	4	3	25	75	100
	18P2ZOE03	Elective- III	Fishery Biology	5	4	3	25	75	100
			Total	30	24		165	435	600
III	18P3ZO08	Core- VIII	Animal Biotechnology	6	5	3	25	75	100
	18P3ZO09	Core- IX	General and Applied Entomology	6	5	3	25	75	100
	18P3ZO10	Core- X	Environmental Biology	6	5	3	25	75	100
	18P3ZOP03	Core Practical	Practical - III	6	4	4	40	60	100
	18P3HR01	-	Human Rights	2	1	3	25	75	100
	18P3ZOED01	EDC	Sericulture	4	4	3	25	75	100
			Total	30	24		165	435	600
IV	18P4ZO11	Core- XI	Biostatistics and Research Methodology	6	5	3	25	75	100
	18P4ZO12	Core- XII	Evolution and Taxonomy	6	5	3	25	75	100
	18P4ZOE04	Elective- IV	First Aid and Home Nursing	6	4	3	25	75	100
	18P4ZOPR01	Core- PRI	Project and Viva Voce	12	5	-	-	80+20	100
			Total	30	19	-	75	325	400
			Grand Total	120	91	-	570	1630	2200

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SEMESTER-I (For those admitted in June 2018 and later) CORE PAPER - I

TAXONOMY AND COMPARATIVE BIOLOGY OF INVERTEBRATE & VERTEBRATES - 18P1ZO01

Contact hours per week - 05 Contact hours per semester: 75

4 CREDITS

SYLLABUS

Course Objectives:

- To acquire knowledge on the animal classification based on characters
- To study the fundamentals knowledge on feeding and locomotion of invertebrates
- To study the comparative anatomy of vertebrates and invertebrates

Course Outcomes:

CO 1- Classify the animal species based on the morphological and anatomical features
CO 2- Learn the locomotion and feeding behavior of invertebrates
CO 3- Compare the functional morphology of vertebrates and invertebrates.

UNIT I CLASSIFICATION

Importance of taxonomy- Identification using taxonomic keys, General characteristics of animal phyla- Classification of animal phyla up to orders in invertebrates & Vertebrates

UNIT I NOMENCLATURE

Organization of coelom: Acoelomates, Pseudocoelomates and Colelomate groups. Zoological Nomenclature- Type: Holotype, Paratype, Lectotype, Syntype, Neotype and Allotype

UNIT III LOCOMOTION & NUTRITION IN INVERTEBRATES

Locomotion and adaptive mechanism of Invertebrates- flagellar- ciliary movement in protozoa, hydrostatic movement in Coelentrates, Annelida and Echinodermata. Nutrition and feeding mechanism in Invertebrates- Nutrition in Protozoa- Types and mode of feeding. Feeding diversity in Insects. Filter feeding mechanism in Metazoan- Crustaceans, Mollusca and Echinodermata.

UNIT IV COMPARATIVE ANATOMY OF INVERTEBRATES

Comparative study of the excretory systems, Nervous systems of invertebrates. Types of reproduction in Invertebrates

UNIT V COMPARATIVE ANATOMY OF VERTEBRATES

Comparative study on the structure and functions of alimentary canal and associated glands. Respiratory system of Fishes and Birds. Arterial and venous system of reptiles. Excretory system of reptiles and mammals; Nervous system: Brain of Amphibia and Mammals, Reproductive system of Reptiles and Mammals.

REFERENCE BOOKS

1. R.L. Kotpal, (2016). Invertebrates, 11th Edition, Rastogi Publications.
2. R.L. Kotpal, (2016). Modern Text Book of Zoology Vertebrates, Rastogi Publications.
3. Anne EM (2003) Measuring Biological Diversity, Blackwell Publications, UK
4. Hosetti BB (2002) Biodiversity, Daya Books, New Delhi.
5. Colbert H and Edwin ((1989) Evolution of the Vertebrates. 2nd Edition, Wiley Eastern Limited, New Delhi.

6. Barnes RD (1982) Invertebrate Zoology.4th Edition, Holt Saunders International Edition.
7. Barrington EJW (1979) Invertebrate Structure and Functions.2nd Edition, ELBS and Nelson.
8. Waterman AJ (1971) Chordate Structure and Function. The Macmillan Company.

WEB SOURCES:

- https://www.itis.gov/
- https://lib2.colostate.edu/wildlife/taxonomy.html
- https://en.wikipedia.org/wiki/Invertebrate
- https://en.wikipedia.org/wiki/Vertebrate
- https://www.diffen.com/difference/Invertebrate_vs_Vertebrate

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SEMESTER-I CORE PAPER - II

CELL AND MOLECULAR BIOLOGY – 18P1ZO02

(For those admitted in June 2018 and later)

Contact hours per week: 05 Contact hours per semester: 75

4 CREDITS / SYLLABUS

Course Objectives:

- To study the structure and functional characters of biomolecules
- To understand the classification of biomolecules
- To gain knowledge on nucleic acids and enzymes
- To acquire knowledge about various biophysical techniques

Course Outcomes:

CO 1- Understand the fundamental structure and functions of biomolecules

CO 2- To acquire knowledge on the principles and practices of instrumental techniques

UNIT I: BASIC TECHNIQUE & INSTRUMENTATION (15 Hours)

Microtome- Tissue Preparation, Sectioning, Mounting and Staining Techniques, Micrometry, Principles of Electron, Optical, and Phase contract Microscope, SEM, TEM, X- Ray Diffraction Analysis.

UNIT –II : CELL AND CELL SIGNALLING (15 Hours)

Introduction of cell. Plasma membrane: Structure and modifications. Functions of plasma membrane. Cell signaling. Cell coat and cell recognition- functions of cell coat. Microtubules and microfilaments – structure, functions, role in cancer formation

UNIT-III COMPONENTS OF CELLS (15 Hours)

Endoplasmic reticulum – special functions of Rough Endoplasmic Reticulum and synthesis of exportable proteins. Golgi complex – Synthesis of sphingolipids , glycoproteins, secretory process in pancreas, insulin secretion and GERL region. Lysosome - cell digestive system – functions. Mitochondria – Structure and Function, Respiratory chain, Ribosome – prokaryotic and eukaryotic ribosomes.

UNIT-IV CHROMOSOMES & CELL CYCLE (15 Hours)

Chromosomes – Eu chromatin and Hetero chromatin chromosome, giant chromosome. DNA – Structure, Replication and DNA repair. RNA – types and their role in cellular activities. Cell division- Cell Cycle– Mitosis – Amitosis – Meiosis –Synaptonemal complex and significance. Cell aging.

UNIT-V PROTEIN SYNTHESIS (15 Hours)

Protein synthesis – Transcription in Prokaryotes and Eukaryotes. RNA processing – Capping, polyadenylation, introns, exons. Translation– initiation, elongation and termination of polypeptide chain synthesis.

REFERENCE BOOKS:

1. P.S. Verma & V.K. Agarwal, (2015), Cytology, S.Chand & Co
2. Satyesh Chandra Roy, (2011), Cell Biology, New Central Books
3. Gupta, P.K. (2007) Cell and Molecular Biology, Rastogi Publications, Meerut.
4. DeRobertis, E.D.P. and E.M.F.D. DeRobertis (2007) Cell and Molecuar Biology, Lea and Fabiger International Edition, Philadelphia.

5. Watson, J.D, Basker, T.A., Bell, S.P., Gann, A., Levine, M and Losick, R (2004) "Molecular biology of the gene'', Pearson Education Pvt. Ltd., Singapore.
6. Bruce, A, Alexander, J, Julian, L, Martin, R, Keith R, and Peter, W, (2002) Molecular Biology of the Cell, Garland Science, Taylor Francis Group, New York.
7. Cooper, G.M. (2001) The cell- A Molecular Biological Approach, ASM Press, Washington.
8. Karp, G. (1985) Cell Biology, Mc Graw Hill Book Company, New York.

WEB SOURCES:

- https://www.cs.helsinki.fi/bioinformatiikka/mbi/courses/09-10/itb/Lectures_1509_and_1709.pdf
- https://molbiomadeeasy.files.wordpress.com/2013/09/fundamental_molecular_biology
- https://www.studocu.com/en/document/murdoch-university/foundations-of-cell-and-molecular-biology/lecture-notes/lecture-notes-all-lectures-comprehensive-study-notes-for-final-exam/314293/view.

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DEPARTMENT OF ZOOLOGY/**M.Sc. DEGREE COURSE IN ZOOLOGY**
SEMESTER-I CORE PAPER - III

BIOCHEMISTRY AND BIOPHYSICS - 18P1ZO03

(For those admitted in June 2018 and later)

Contact hours per week - 05 Contact hours per semester: 75

4 CREDITS/SYLLABUS

Course Objectives:

- To provide students with relevant knowledge and skills on instrumentation techniques
- To study principles and types of cell communication and adhesion
- To acquire advanced knowledge of molecular biology of prokaryotes, and eukaryotes.

Course outcomes:

CO 1- Able to familiarize the instrumental principles and their techniques
CO2 - Learn the types of cell communication and the structures associated.
CO3- Describe the structures and various cellular functions associated with the macromolecules found in cells.
CO 4- Learn the principles and mechanism of protein synthesis

UNIT -I BIOCHEMICAL COMPOUNDS (15 Hours)

Structure of Atoms, Molecules and chemical bonds, stabilizing interactions (Van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction, Electrostatic Force). Biological Importance of Water, pH and Buffers.

UNIT II BIOMOLECULES I (15 Hours)

Carbohydrates - Classification, structure, function and properties. Metabolism of carbohydrates, TCA Cycle, Glycolysis, HMP Shunt.

Proteins–Classification, Structural organization of proteins (Primary, secondary, tertiary and quaternary structures). Amino acids- Definition, Classification and properties,

UNIT -III BIOMOLECULES II (15 Hours)

Lipids –Classification, structure, function and properties of simple and compound Lipids. Biological importance of sterols, cholesterols, Bile acids. Fatty acid Biosynthesis and Beta oxidation of fatty acids.

UNIT -IV NUCLEIC ACIDS & ENZYMES (15 Hours)

Nucleic acids: Composition and Properties of nucleic acids. Enzymes- Definition, Classification and functions of enzymes – Co-enzymes, Iso-enzymes, Allosteric enzymes, Abzymes – Bioenergetics, oxidative phosphorylation, coupled reaction, group transfer, biological energy transducers.

UNIT – V: BIOPHYSICAL TECHNIQUES (15 Hours)

Separation Methods – Sedimentation – Chromatography methods. Spectroscopes. Introduction and applications of FTIR and Mass spectroscopy. Nuclear Magnetic Resonance (NMR); Radiation Bio physics – Introduction and medical applications.

REFERENCE BOOKS:

1. Satyanarayana,U, (2015), Essentials of Biochemistry, Books and Allied (P) Limited, Kolkata.
2. Avinash Upadhyay, Kakoli Upadhyay and Nirmalendu Nath, (2019), Biophysical Chemistry, Himalya Publkications
3. Satyanarayana, U and Chakrapani, U (2009), Essentials of Biochemistry, Books and Allied (P) Limited, Kolkata.
4. Jain, J.L. (2007), Fundamentals of Biochemistry, S. Chand & Co. Ltd., New Delhi.

5. Stryer, L. (2006), Biochemistry, W.H. Freeman and Co., New York.
6. Chatterjee, H.N. and Spindle, R. (2005), Text Book of Medical Biochemistry, Jaypee Brothers, New Delhi.
7. Nelson, D.I. and Cox, M.M. (2004), Lehninger Principles of Biochemistry, III Edition, Mac Millon Worth Publishers, New York.
8. Devlin, T.M. (2003), Biochemistry, Wiley-Liss, New York.

WEB SOURCES:

- http://www.agrimoon.com/wp-content/uploads/Fundamentals-of-Biochemistry.pdf
- https://www.researchgate.net/publication/221657258_Fundamental_Concepts_in_Biophysics
- http://www.himpub.com/BookDetail.aspx?BookId=1117&NB=&Book_TitleM=Biophysical%20Chemistry%20(Principles%20and%20Techniques)
- https://www.britannica.com/science/nucleic-acid

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SEMESTER-I CORE PAPER - IV

MICROBIOLOGY AND IMMUNOLOGY- 18P1ZO04

(For those admitted in June 2018 and later)

Contact hours per week: 05 Contact hours per semester: 75

4 CREDITS/ SYLLABUS

Course Objectives:

- Acquire knowledge on the culture, isolation and control of microorganisms
- Learn the food preservation techniques and study microbes in food and water
- Study the organs of immune system and the innate and adaptive immunity
- To gain knowledge on antigens, antibodies and their production mechanism
- To study the antigen antibody reactions and immunological disorders

Course outcomes:

CO 1- Familiarize the culture techniques of microorganisms
CO 2- Learn the food and water microbes and food preservation techniques
CO 3-Techniques on development of monoclonal antibodies
CO 4- Learn to understand the antigens and antibodies
CO 5- Gain knowledge on the immunological disorders

UNIT – I (15 Hours)

Culture of Microorganism- Pure culture techniques- Isolation and Culture of Microbes and Staining Techniques. Microbial control: Physical agent: Moist heat, dry heat HEPA filter, chemical agent: Phenol, formaldehyde and alcohol.

UNIT – II (15 Hours)

Food microbiology- Preservation of Food, Contamination, Food Borne diseases- Salmonella, Amoebiasis, Botulism and Aspergillus, Causes, Sources, Mode of Transmission, Symptoms and Control measures. Water Microbiology- Microbes in Water, Water borne diseases - Microbial analysis in potable water- SPC, MPN and membrane filter techniques. Methods of sewage treatment and disposal.

UNIT - III (15 Hours)

Cells involved in the immune system, innate immunity- factors involved in innate immunity, active and passive acquired immunity. Lymphoid organs: Thymus, Bursa of Fabricius and bone marrow, lymph node, spleen, MALT, GALT, Payer's patches, Tonsils.

UNIT IV (15 Hours)

Humoral immunity: Primary and secondary immune response; Mechanism of antibody production, cell mediated immunity, MHC Classes and Structure. General Structure and Function of Immunoglobulin.

UNIT – V (15 Hours)

Antigen- antibody reaction; immune complex, specificity, binding sites, binding forces, Bonus effect and cross reaction. Hypersensitivity: Factors, types and classification. Transplantation Immunology- Auto immune diseases – Myasthenia gravis, Pernicious anemia, Rhematoid arthritis, Systemic lupus erythematosus (SLE), Vaccines- principles & types of vaccine - significance.

REFERENCE BOOKS:

1. Venkateshwar Reddy .A & Jayaveera K.N, (2014), Pharmaceutical Microbiology, S.Chand & Co Publications.
2. Purohit, S.S., (2006) Microbiology, V Edition, Agrobios (India) Publishers, Jodhpur.

3. David, Brostoff and Roitt (2006) Immunology, 7th Edn., Mosby & Elsevier Publishing, USA.
4. Dubay, R. C. and Maheshwari D. K. (2005) Text Book of Microbiology, S. Chand & Co. Ltd., New Delhi.
5. Prescott, L.M., Harly, J.P. and Ulein, B.A. (2004) Microbiolgy (IV Edi). WMC, Broun Publisher, USA.
6. Pelczar, M.J. (2002) Microbiology, McGraw-Hill Education India Ltd., New Delhi.
7. Kuby, J. (1997) Immunology, W.H. Freeman &Co., New York.

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- http://microbiologyonline.org/
- http://periobasics.com/basic-microbiology.html
- https://en.wikipedia.org/wiki/Immunology
- http://www.dphu.org/uploads/attachements/books/books_5451_0.pdf
- http://missinglink.ucsf.edu/lm/immunology_module/prologue/prologue_syllabus_2008.PDF

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SEMESTER-I CORE PRACTICAL –I

BIOCHEMISTRY, CELL AND MOLECULAR BIOLOGY, MICROBIOLOGY AND IMMUNOLOGY- 18P1ZOP01

(For those admitted in June 2018 and later)

Contact hours per week: 05 Contact hours per semester: 70 Hours

4 CREDITS/ SYLLABUS

I- Biochemistry

1. Quantitative estimation of Carbohydrate, Protein and Lipids
2. Estimation of Haemoglobin content in Blood, Differential count
3. Urine Analysis- Qualitative analysis of Sugar, Albumen and Ketone Bodies.

II- Cell and Molecular Biology

3. Micrometry -measurement of cell size.
4. Study of mitotic cell divisions- Onion Root tip squash preparations.
5. Temporary squash preparation of salivary gland in Chironomous larva – Giant Chromosome.

III- Microbiology

6. Simple staining and gram staining techniques.
9. Study of bacterial motility by hanging drop method.
10. Preparation of Media for Bacterial Culture
11. Bacterial Analysis of Milk- Methylene Blue reduction test

IV. Immunology

12. Autoclaving, Electrophoresis techniques- Demo.
13. Demonstration of Antigen- Antibody reaction by interfacial ring test.

Spotters

1. Colorimeter, pH Meter, Mitosis and Meiosis Stages, Entameoba, Salmonella Typhi, Bacillus sp.
2. Tour report of the visit to food preservation, food fermentation and dairy industries

REFERENCE BOOKS:

1. Aneja, K.R. (2014), laboratory Manual Microbiology And Biotechnology, Medtec Publications
2. Pattabiraman,T.N, (2003), Laboratory manual in Biochemisty, All India Pub Distributed.
3. Wilson, K. and Walker, J. (1994) Principles and Techniques of Practical Biochemistry, Cambridge University Press, Cambridge.
4. Jayaraman, J. (1981) Laboratory Manual of Biochemistry, New Age International (P) Ltd., Publishers, New Delhi.
5. Bowen, W.C. (1980) Experimental Cell Biology, Mac Millan Publishing Co., New Delhi.
6. Dewit, W.C. (1977) Biology of the Cell- Lab Explorations, Saunders Co., New Delhi.
7. Alkamo, P.A. (2003) Manual of Microbiology, V.H.A. Publishers, New York.
8. Gunasekaran, P. (2001) Laboratory Manual in Microbiology, New Age International (P) Ltd., Chennai.
9. State level Workshop on Immunological Techniques (2000) PG and Research Department of Zoology, American College, Madurai.
10. Wilson, K and Walker, J. (1994) Practical Biochemistry Principles and Techniques Cambridge University Press, USA.

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DEPARTMENT OF ZOOLOGY/**M.Sc. DEGREE COURSE IN ZOOLOGY**
SEMESTER-I ELECTIVE – I

ECONOMIC ZOOLOGY - 18P1ZOE01

(For those admitted in June 2018 and later)

Contact hours per week: 05 Contact hours per semester: 75

4 CREDITS - SYLLABUS

Course Objectives:

- To study the economic importance of apiculture
- To study the importance of animal husbandries and aquaculture
- To know practices and economic importance of vermicast
- To learn recent developments in pharmaceuticals and animal health

Course Outcomes:

CO 1- Understand the significance apiculture for the uplift of rural economy
CO 2- create the self-employment opportunities to rural students through animal husbandry, aquaculture Vermiculture and Sericulture
CO 2- Know how to isolation of pharmaceuticals product from the animal sources

UNIT I: APICULTURE & LAC CULTURE

Types of honey bees – Diseases and pests of bees – Harvesting and processing of honey – Types of Honey, Maintenance of Apiary, Instruments used in Apiculture.

Lac Culture : Types of Lac; Life cycle of Lac insect, Harvesting and Extraction of Lac; Uses and Enemies of Lac. Economic Importance

UNIT II: POULTRY

Types of birds for poultry – Bio-security measures followed in Poultry farms, Diseases and pests – Egg and meat production – Types of breeds rearing in animal husbandry (Cow, Sheep and Goats, Pigs) – Disease and parasites of animal husbandry. Economic importance.

UNIT III: AQUACULTURE

Aqua culture- Site selection and Construction, Pre stocking and post stocking management of Nursery, rearing and stocking ponds, Fish byproducts.

Prawn culture - Methods of prawn fishing, Preservation - Fish and Prawn, Marketing of Prawn.

UNIT IV: VERMICULTURE

Species of earthworm used in vermiculture- Raw materials for vermiculture- Compost Production. Natural enemies and their control measures-Harvesting of vermicompost and worms -Role of vermicompost in agriculture.

UNIT V: PHARMACEUTICALS

Sericulture – Types of Silk worms, Rearing techniques, Diseases – Bacterial, Fungal and Protozoan - their managements, reeling and Byproducts.

REFERENCE BOOKS:

1. Banerjee, G.C. (2015), Animal Husbandry, Navyug Book International Publications
2. Jawaid, A. and Sinha, S. P. (2008) A Handbook of Economic Zoology. S. Chand Group Publishers, New Delhi.
3. Khan, A. A. (2007) Encyclopedia of Economic Zoology. 2 vols. Anmol Publications Pvt. Ltd., New Delhi.
4. Upadhyay, V.B. (2006) Economic Zoology. Rastogi Publications, Meerut, India.
5. Nigam, H.C. (2006) Modern Trends in Biology & Economic Zoology, Vishal Publishing. Co., Jalandhar.

6. Jabde and Pradip V (2005) Text Book of Applied Zoology, Discovery Publishing House, New Delhi.
7. Shukla, G.S. and Upadhya, V.B. (2005) Economic Zoology, Rastogi Publications, Meerut, India.
8. Tomar, B.S. (2004) Introduction to Economic Zoology, Emkay Publications, New Delhi.
9. Yadav, M (2003) Economic Zoology. Discovery Publishing House, Rastogi Publications, Meerut.
10. Ravindranathan, K.R. (2003) Economic Zoology, Dominant Publishers & Distributors, New Delhi.
11. Jangi, B. S. (1991) Economic Zoology. CRC, first edition, New York.

WEB SOURCES:

- http://www.iaszoology.com/insect/
- http://download.nos.org/srsec314newE/PDFEL35B.pdf

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M.Sc. DEGREE COURSE IN ZOOLOGY

SEMESTER-II CORE PAPER –V

DEVELOPMENTAL BIOLOGY – 18P2ZO05

(For those admitted in June 2018 and later)

Contact hours per week: 05 Contact hours per semester: 75

4 CREDITS

SYLLABUS

Course Objectives:

- To understand the structure of gametes and the events of gametogenesis
- Acquire knowledge on the fertilization and morphogenetic movements in the developing embryo
- To understand organogenesis related to mechanisms of embryo developmentextra embryonic membrane and placenta in various animals.
- To learn the metamorphosis and regeneration
- To understand the embryonic organizer, inductions and differentiation.

Course outcomes:

CO1- Understand basic knowledge on gametogenesis

CO2- Learn the process of fertilization, organogenesis, differentiation, metamorphosis and regeneration in animals

UNIT– I: GAMETES (15 Hours)

Gametogenesis: Spermatogenesis- Types of Sperm, Ultra structure of Human sperm, Sperm motility and role of sperm in egg activation. Oogeneis- Types of Eggs and egg membranes, Ultra structure of Mammalian egg.

UNIT– II: FERTILIZATION & CLEAVAGE (15 Hours)

Fertilizatation– Process and significance – Post – fertilization changes. Parthenogenesis (Natural and Artificial). Cleavage – Chemical changes during cleavage – Pattern and plane of cleavage –Fate map.

UNIT – III: ORGANOGENESIS (15 Hours)

Morphogenetic movements – Nucleocytoplasmic interactions in morphogenesis – Gastrulation in Frog and Mammal- (animal name). Organogenesis – (Limb, heart, kidney and brain), Foetal membranes – Placenta – classification and physiology.

UNIT – IV: METAMORPHOSIS & REGENERATIN (15 Hours)

Morphological and biological changes associated with metamorphosis – Hormonal control of amphibian metamorphosis – Neuro-endocrine control of insect metamorphosis. Regeneration –Types of regeneration -Experimental evidence for Regeneration.

UNIT – V: DIFFERENTIATION (15 Hours)

Embryonic fields and embryonic induction, Types of Differentiation – Genes in differentiation – Inductors and organizers.

REFERENCE BOOKS:

1. Lewis Wolpert (2007) Principles of Development (III edition) Oxford University Press, UK.
2. Gilbert, S.F. (2006) Developmental Biology, 8th edition, Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
3. Gilbert, F.S. (2003) Developmental Biology, 7th Edition, Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
4. Balinsky, B.I. (2004) An Introduction to Embryology, 5th edition, Thomas Asia Pvt. Ltd, Chennai.
5. Balinsky, B.L, (1981) An Introduction to Embryology, Vth Edition, Saunders Co., Philadelphia.
6. Berrill, N.J. (1986) Developmental Biology, Tata McGraw Hill Publication Co. Ltd., New Delhi.
7. Longo, F.T. (1987) Fertilization, Chapman and Hall, New Delhi.
8. Saunders, J.W. (1982) Developmental Biology, Mc Millan Pub. Co., New York.

WEB SOURCES:

- https://study.com/academy/topic/basics-of-developmental-biology.html
- https://gurukpo.com/Content/Bsc-biotech/Development_Biology.pdf
- https://www.khanacademy.org/science/biology/developmental-biology/development-and-differentiation/a/introduction-to-development
- https://www2.bc.edu/christopher-kenaley/bio3030/Wolpert.Ch1.pdf

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M.Sc. DEGREE COURSE IN ZOOLOGY

SEMESTER-II CORE PAPER –VI

ANIMAL PHYSIOLOGY -18P2ZO06

(For those admitted in June 2018 and later)

Contact hours per week: 05 Contact hours per semester: 75

4 CREDITS

SYLLABUS

Course Objectives:

- To study the process of digestion, excretion and circulatory system,
- To acquire knowledge on the respiration and nervous system
- To understand the sense organs

Course Outcomes:

CO 1- To gain knowledge on digestive, respiratory and circulatory system
CO 2- Acquire knowledge on function of kidney and thermoregulation
CO 3-Basic functions of ear, eyes and main function of nervous system and muscles

UNIT – I: DIGESTION (10 Hours)

Introduction – Physiology of digestion - carbohydrates, proteins and lipids – Physiology of absorption and Assimilation. Balanced diet. Nutrition requirement for Pregnant women and Infant.

UNIT – II RESPIRATION & CIRCULATION (15 Hours)

Types of Respiration – Physiology of respiration in Man – Respiratory pigments and their role in O_2 and CO_2 transport in animals.

Circulation: Types of hearts- Working Mechanism of Heart, Cardiac cycle, Electrocardiogram. Factors influencing circulation and coagulation of blood.

UNIT – III EXCRETION (20 Hours)

Nature and types of excretory products – Ammonotelism, Urotelism, Uricotelism, Patterns of excretion– Excretory organs- invertebrates and chordates – Physiology of excretion in Mammals – Regulation.

Thermoregulation- Homeotherms, Poikilotherms and Heterotherms, Aestivation and Hibernation.

UNIT – IV NERVOUS & MUSCULAR (15 Hours)

Types of neurons –Structure of typical nerve cell. Transmission of Nerve impulses Axonomic and Synaptic Transmission - Reflex action - Autonomic nervous system organization and functions.

Muscles and types, Ultra structure of skeletal muscles – Chemical composition – Mechanism of muscle contraction – Regulation and energetics of Muscle contraction.

UNIT – V SENSE ORGANS (15 Hours)

Chronobiology – Biological clock and Photoperiodism.

Physiology of Photoreceptor - mammalian eye. Physiology of Phonoreceptors- Mammalian ear. Physiology of Migration in fishes and birds.

REFERENCE BOOKS:

1. Moyes, C.D. and Schulte, P. M. (2006) Principles of Animal Physiology, Pearson Education Inc. Chennai.
2. Tortora, G. J. and Derrickson, B. (2006) Principles of Anatomy and Physiology, 11th edition, John Wiley and Sons Inc. USA.
3. Richard W. Hill, Gordon A. Wyse (2004) Animal Physiology, Second Edition, Sinauer Associate, Inc Publishers, USA.
4. Guyton, A.C. (2001) Text book of Medical Physiology 10th edition W. B. Saunders Company, Philadelphia.
5. Prosser, C.L. (1973) Comparative Animal Physiology, 3rd Edtion, W.B. Saunders & Co. Philadelphia.

WEB SOURCES:

- http://nptel.ac.in/courses/102104042/#
- http://www.dphu.org/uploads/attachements/books/books_1984_0.pdf
- http://www.uvm.edu/~bio1and2/lab/Lab%20manuals%20Spring%202012/Animal%20Physiology.pdf
- https://www.pdfdrive.net/plant-and-animal-physiology-e1735854.html

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M.Sc. DEGREE COURSE IN ZOOLOGY

SEMESTER-II CORE PAPER –VII

ADVANCED GENETICS -18P2ZO07

(For those admitted in June 2018 and later)

Contact hours per week: 05 Contact hours per semester: 75

4 CREDITS – SYLLABUS

Course Objectives:

- To understand fine structure of gene and their metabolic pathways
- Human karyotyping and chromosomal disorders
- To provide knowledge on the genetic makeup of microorganisms
- To get an overview on the gene interactions
- To study the application of genetics in animal breeding

Course outcomes:

CO 1- To understand the organization of genes and its metabolic pathways
CO 2- Learn the techniques involved in human karyotyping and the disorders in chromosomes
CO 3- To learn the microbial genetics and operon concept
CO 4- Acquire knowledge on Transgenic animals

UNIT – I: GENES & SYNDROMES (15 Hours)

Gene concept – fine structure of gene – one gene one polypeptide concept.

Human Genetics

Gene and metabolic pathways. Inborn errors of metabolism in man. Haemoglobin disorders – sickle cell anemia and thalessemia.

Human karyotype preparation and chromosomal syndromes in man – Down, Turner's and Klinefelter's syndromes.

UNIT – II: MICROBIAL GENETICS (20 Hours)

Evidence of genetics materials in Bacteria – genetic exchange and recombination in bacteria – conjugation, transformation and transduction. Viral genetics – bacteriophage.

Enzyme – regulatory mechanism – operon concept – GAL and LAC operon system – gene regulation in protein synthesis in prokaryotes and eukaryotes.

UNIT – III: COMPLEMENTARY GENES (10 Hours)

Multiple alleles and sex-linked gene. Gene Interactions. Genetics of races and species formation – genetic load – genetic polymorphism. Dosage compensation – X inactivation – genomic imprinting. Immunogenetics.

UNIT – IV: GENOMICS (15 Hours)

Chromosomal and point mutation, spontaneous and induced mutation, mutagens: physical, chemical and biological – genetic changes in Neoplasia in man.

UNIT – V: MUTATION (15 Hours)

Applied Genetics

Application of genetics in animal breeding – application of genetics in crime and law – DNA finger printing. Genetics basis of twins.

REFERENCE BOOKS:

1. L.M.Narayanaa & A. Mani, 2014. Genetics and Genetic Engineering, Saras Publications
2. B.D. Pandey, 2012. Cytology, Genetics and Molecular Genetics, Mcgraw Hill
3. Klug, W.S., Cummings, M.R., Spencer, C and Palladino, M.A. (2008) Concepts of Genetics, 9th edition (2008), Benjamin Cummings, Canada.
4. Benjamin Lewin (2008) Genes IX, 9th edition, Jones and Barlett Publishers Inc. London.
5. Snustad D. Peter and Simmons J. Micheal, (2006) Principles of Genetics, 4th edition, John Wiley and Sons. Inc., USA.
6. Daniel J. Fairbanks, W. Ralph Andersen (1999) Genetics, Brooks/Cole Pub Co., USA.
7. Eldon J. Gardner, D.P. Snustad, M.J. Simmons, and D. Peter Snustad (1991) Principles of Genetics, 8th edition, John Wiley and Sons. Inc., USA.
8. David Freifelder (1987) Microbial Genetics, Jones & Bartlett Co., USA.
9. Leon A. Snyder, David Freifelder, Daniel L. Hartl (1985) General Genetics, Jones and Bartlett., London.
10. Monroe W. Strickberger, (1968), Genetics, 3rd edition, Macmillan Publishing Co. Bangalore.

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- https://ocw.mit.edu/courses/biology/7-03-genetics-fall-2004/lecture-notes/
- http://www.bionet.nsc.ru/ICIG/CHM/books/Hartl_Jones_Genetics.pdf
- http://www.bionet.nsc.ru/ICIG/CHM/books/Hartl_Jones_Genetics.pdf
- https://www.bio.bg.ac.rs/materijali_predmeta/med-eng-griffiths-an-introduction-to-genetic-analysis.pdf
- http://gsi.semmelweis.hu/files/ebook/Genetics%20genomics_en.pdf
- https://www.thesisscientist.com/docs/Study%20Notes/12a79a12-7a79-4d08-8f16-a84e0d70b65d.

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DEPARTMENT OF ZOOLOGY

M.Sc. DEGREE COURSE IN ZOOLOGY

SEMESTER-II ELECTIVE –II

MEDICAL LABORATORY TECHNIQUES -18P2ZOE02

(For those admitted in June 2018 and later)

Contact hours per week: 05 Contact hours per semester: 75

4 CREDITS/ SYLLABUS

Course Objectives:

- To acquire knowledge on the laboratory safety issues and the precautionary methods for the waste disposal
- Diagnosis of blood, urine and microbial analysis under different pathological conditions
- To learn the techniques involved in molecular diagnosis

Course Outcomes:

CO1 -Learn the safety issues in laboratory conditions and acquire knowledge on the safety disposal of waste materials

CO2- To familiarize techniques for the analysis of blood, urine and microbes under disease conditions

CO3- Acquire knowledge on the use of RIA, ELISA, WESTERN BLOT, WIDEL TEST and DNA Finger Printing

UNIT – I LABORATORY & SAFETY (15 Hours)

The laboratory: Safety, Contaminants- Physical, Chemical, Biological Contaminants. – Universal work precautions (NWP) for laboratory personnel. Disposing of Biomedical waste.

UNIT – II HEMATOLOGICAL PARAMETERS (15 Hours)

Haemoglobin content, Differential Count, Haematocrit, packed cell volume, MCH, MCHC, MCV, Erythrocyte sedimentation rate, RBC fragility test, platelet count. Reticulocytocrit, haemorrhagic disorders, clotting time, Bleeding time, prothrombin time.

UNIT – III URINE TESTS (15 Hours)

Knowledge and skill in the study and analysis of urine. Physical parameter,- Colour, odor, p^H, Density. Chemical parameters – Sugar, Albumin, Ketone bodies and their clinical significances pregnancy tests.

UNIT – IV MICROBIAL PARAMETERS (15 Hours)

Microbial analysis of Blood, Urine, Faeces, Sputum. Parasitic analysis in Blood and Faeces, Analysis of semen, and cerebrospinal fluid for clinical investigation.

UNIT – V MODERN ANALYSIS (15 Hours)

Molecular diagnostic techniques – RIA, ELISA, WESTERN BLOT, WIDEL TEST and DNA finger printing.

REFERENCE BOOKS:

1. Sood and Ramnik (2009) Medical Laboratory Techniques, Jaypee Brothers, New Delhi.
2. Kanai L. Mukherjee and Swarajit Ghosh (2009) Medical Laboratory Techniques, , Tata Mc Graw Hill Publishing Company Ltd., New Delhi.
3. B. S. Chauhan (2009) Principles of Biochemistry and Biophysics, first edition, Luxmi publishers, New Delhi.
4. Garrod, L.P. (2008) Medical Laboratory Techniques, BMJ publishers, USA.
5. Estridge, B.H., Reynolds, A.P. and Walters N.J. (2007) Basic Clinical Laboratory Techniques, Cengage Learning, Hyderabad.
6. Singh, A. and Singh, R (2004) Biophysical Chemistry (Principles and Techniques) Campus Books International, New Delhi.

WEB SOURCES:

- http://www.who.int/medical_devices/publications/manual_health_lab_tech/en/
- http://idsp.nic.in/WriteReadData/OldSite/manual_lab_techniques.pdf

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SEMESTER-II ELECTIVE –III

FISHERY BIOLOGY - 18P2ZOE03

(For those admitted in June 2018 and later)

Contact hours per week: 05 Contact hours per semester: 75

4 CREDITS

SYLLABUS

Course Objectives:

- To study the types of fish culture and the techniques involved in rearing
- To study the recent techniques of fish rearing under controlled conditions
- To learn recent trends in harvesting and marketing of fishes.
- To know the handling techniques of post-harvest technology and value added fish products
- To identify the parasitic diseases and nutritional disorders for the sustainable fish production

Course Outcomes:

CO 1- Learn the fish culture techniques
CO 2 –To acquire knowledge on fish farming and breeding techniques
CO 3 –Gain more knowledge about fish byproducts and value added products
CO 4 –Disease diagnosis and treatment techniques

UNIT I: TYPES OF FISH CULTURE (10 Hours)

Introduction – importance of fisheries. Aim of fish culture Qualities of culturable fishes. Types of fish culture – monoculture – composite culture- Integrated fish culture – paddy cum fish culture.

UNIT II: FARMING (15 Hours)

Construction and maintenance of fish farm – Type of fish ponds – Management of Fish culture – Breeding – Types of breeding- Induced breeding.

UNIT III: FISHING METHODS (15 Hours)

Harvesting – Methods of fishing – Electric fishing. Gears and Crafts, Transportation and marketing – Structure of a Fish market. Cooperative system – Fish copfed, Benfish, Sangams.

UNIT IV: BY PRODUCTS (20 Hours)

Fish handling, quality and processing. Preservation and processing methods, Fishery byproducts. Fish spoilage – Rigor mortis. Post harvest technology.

UNIT V: DISEASE (15 Hours)

Fish diseases- Parasitic and Non- Parasitic diseases, Protozoan disease, and Nutritional disorder. Symptoms and Treatment methods.

REFERENCE BOOKS:

1. Jawaid, A. and Sinha, S. P. (2008) A Handbook of Economic Zoology. S. Chand Group Publishers, New Delhi.
2. Shukla, G.S. and Upadhya, V.B. (2005) Economic Zoology, Rastogi Publications, Meerut, India.
3. Kamaleswar pandey and. Shukla, J.P. (2005) Fish and Fisheries, Rastogi Publications, Meerut.
4. Yadav, M (2003) Economic Zoology. Discovery Publishing House, Rastogi Publications, Meerut.
5. Shanmugam, K. (1992) Fishery Biology and Aquaculture, Leo Pathippagam, Chennai.
6. Jingran, V.G. (1983) Fish and Fisheries of India, 2nd Edition, Hindusthan Publications, New Delhi.

WEB SOURCES:

- http://himachal.nic.in/WriteReadData/l892s/4_l892s/1402134883.pdf
- https://www.aquariumconnection.com/pdf/fw_disease_rx.pdf
- http://www.guammarinelab.org/publications/uogmltechrep104.pdf

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
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SEMESTER-II CORE PRACTICAL –II

DEVELOPMENTAL BIOLOGY, ANIMAL PHYSIOLOGY AND ADVANCED GENETICS - 18P2ZOP02

(For those admitted in June 2018 and later)

Contact hours per week: 05 Contact hours per semester: 75

4 CREDITS

SYLLABUS

I: Developmental Biology

1. Staining and mounting of chick blastoderm of various stages.
2. Study of different types of placenta (Specimen).
3. Amphibian metamorphosis: Evaluation of Progressive and Retrogressive changes.

II. Animal Physiology

4. Survey of digestive enzymes in cockroach
5 Determination of rate of salt loss in fish using salt loss & gain in fishes
6.Determination of Urea, Uric Acid, Ammonia and Creatine in the urine sample.

III: Advanced Genetics

7. Schemes of Pedigree analysis
8. Drosophila culture techniques
9. Drosophila – observation of mutant wings and eyes.
10. Localization of Barr bodies, in the buccal smear.
11. Isolation of DNA Crude method.

IV. Spotters.

Kymograph, Types of Placenta, Types of Egg, Human Sperm, Human Ovary, Pituitary Gland, Adrenal Gland, Adipose Tissue, Smooth Muscle, Striated Muscle, Karyotype.

REFERENCE BOOKS:

1. Benjamin Lewin (2008) Genes IX, 9th edition, Jones and Barlett Publishers Inc. London.
2. Gilbert, S.F. (2006) Developmental Biology, 8th edition, Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
3. Moyes, C.D. And Schulte, P. M. (2006) Principles of Animal Physiology, Pearson Education Inc. Chennai.
4. Balinsky, B.I. (2004) An Introduction to Embryology, 5th edition, Thomas Asia Pvt. Ltd, Chennai.
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