

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

Institutional Learning Outcomes

Stella Maris College, an autonomous Catholic institution of higher education, is committed to the highest standards of academic excellence based on sound values and principles, where students are strengthened with whole person education to lead purposeful lives in service to the community and the nation.

The Institutional Learning Outcomes (ILOs) of Stella Maris College (SMC) reflect the broader mission and purpose of the institution. They are the overarching set of learning outcomes that all students, regardless of discipline, must achieve at graduation. All programme and course learning outcomes are mapped to the institutional outcomes, thus reflecting an overall alignment of values, knowledge and skills expected at programme completion. ILOs are designed to help guide individual departments and disciplines in the development of their programme learning outcomes.

The ILOs of SMC are formed by two components:

1. **Core commitments:** Knowledge and scholarship, values and principles, responsible citizenship, service to community
2. **Institutional values:** Quest for truth, spirit of selfless service, empowerment

Upon graduation, students of Stella Maris College will

- Display mastery of knowledge and skills in their core discipline (**Knowledge and Scholarship**)
- Exhibit in all actions and attitudes a commitment to truth and integrity in all contexts, both personal and professional (**Values and Principles**)
- Demonstrate knowledge about their role in society at local and global levels, and actively work for social and environmental justice (**Responsible Citizenship**)
- Engage in the process of self-discovery through a life-long process of learning (**Quest for truth**)
- Demonstrate readiness to serve those who are in need (**Spirit of selfless service**)
- Be able to function effectively and with confidence in personal and professional contexts (**Empowerment**)

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Programme Learning Outcomes/Intended Programme Learning Outcomes

Graduates of a Bachelor's Degree will have a broad and coherent body of knowledge in their disciplines, with a deep understanding of the underlying principles and concepts in one or more disciplines as a basis for independent lifelong learning.

At the end of an undergraduate programme students will be able to

- Describe and define critical concepts in their discipline
- Explain and discuss concepts and ideas pertaining to their discipline
- Demonstrate a broad understanding of their discipline
- Demonstrate communication skills to present a clear, coherent and independent exposition of knowledge and ideas
- Demonstrate understanding of the interconnections of knowledge within and across disciplines
- Apply knowledge, theories, methods, and practices in their chosen field of study to address real-world challenges and opportunities
- Demonstrate proficiency in experimental techniques and methods of analysis appropriate for their area of specialisation
- Generate and analyse data using appropriate quantitative tools
- Construct and test hypotheses
- Demonstrate cognitive and technical skills to synthesise knowledge in interrelated disciplines
- Demonstrate critical thinking and judgement in identifying and solving problems with intellectual independence
- Demonstrate the skills needed to be able to function successfully in their field
- Show responsibility and understanding of local and global issues
- Demonstrate through their actions and speech that they are agents of social justice and change
- Practice the discipline's code of ethics in their academic, professional and personal lives
- Practice the values of democracy and principles of human rights
- Show self-awareness and emotional maturity
- Demonstrate career and leadership readiness
- Demonstrate intercultural, interracial, interclass, inter-caste, and ethical competency
- Exhibit the ability to work in teams
- Exhibit a strong sense of professionalism in a range of contexts
- Demonstrate sensitivity and readiness to share their knowledge, experience, and capabilities with the marginalised and oppressed in their communities

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DEPARTMENT OF ZOOLOGY

PROGRAMME DESCRIPTION

The U.G programme, Advanced Zoology and Biotechnology scientifically deals with the study of animals. The subjects included are conventional papers like Invertebrata, Chordata, Cell Biology, Animal Physiology, Genetics, Developmental Biology, Animal Behaviour as well as technology-oriented papers like Immunology, Molecular Biology, Microbiology, Fundamentals of Biotechnology and Environmental Biotechnology.

Zoology is a complete study of animals, of processes from molecular to organismal levels that determine the structure, functions, development, behaviour and evolution of the animals and of interactions between animals and their environment. Students also study the various mechanisms of inheritance. Each theory paper is supplemented with a suitable practical component thereby providing hands-on experience. Another unique feature of this programme is computer simulation of dissection that provides computer-oriented skills to the students alongside the subject matter through a humane approach. Students are taken on educational visits to reputed organisations and state of the art laboratories with sophisticated lab instruments which provides them an opportunity to enhance their understanding of scientific concepts and working of instruments.

Students who possess an analytical bent of mind, data-handling capability and good written communication skills can opt for Project work as one of their course papers. Another significant aspect of the programme is the opportunity given to develop the ability to work both independently as well as in a team through mini projects. Those candidates who opt for postgraduate programme for teaching purpose at institutes and universities also benefit from the specifically designed curriculum.

The Advanced Zoology and Biotechnology degree programme serves as a foundation for higher studies (M.Sc., M.Phil., Ph.D.) in Life Sciences, Biotechnology, Bio-Informatics, Genetics, Microbiology, Wild life Biology and Anatomy.

DEPARTMENT OF ZOOLOGY

PROGRAMME SPECIFIC LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Identify the major groups of fauna and classify them within a phylogenetic framework.
- Compare and contrast the characteristics of different phyla
- Explain how organisms function at the level of the gene, genome, cell, tissue, organ and organ-systems.
- Describe the process of development and discuss the recent trends in reproduction along with ethical issues.
- Relate the physical factors of the environment to the structure of populations and communities and also distinguish between different ecosystems.
- Apply the recent techniques in biology to human welfare and evaluate related ethical issues.
- Demonstrate proficiency in the experimental techniques and methods of analysis appropriate to their area of specialization within biology.
- Analyse and interpret qualitative and quantitative biological data
- Demonstrate the ability to engage in critical, independent, and creative thinking and apply biological knowledge to other disciplines and to integrate knowledge into their personal and professional lives.
- Demonstrate proficiency in writing and speaking about biological concepts.
- Develop computer skills and a humane approach towards the study of zoology through the use of computer-simulations as alternative to dissection.
- Identify the need for animal welfare and justify biodiversity conservation

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI 600 086
B.Sc. DEGREE : BRANCH VI.A.-ADVANCED ZOOLOGY AND BIOTECHNOLOGY
COURSES OF STUDY

(Effective from the academic year 2019-2020)

CHOICE BASED CREDIT SYSTEM

C-Credit, L-Lecture Hours, T-Tutorial Hours, P- Practical Hours, Ex-Exam Hours, CA- Continous Assessment Marks, ES-End Semester Marks, M-Maximum Marks									
Subject Code	Title of Course	C	L	T	P	Ex	CA	ES	M
SEMESTER-I									
19ZL/MC/IV14	Invertebrata	4	4	1	0	3	50	50	100
19ZL/MC/P112	Invertebrata Practical	2	0	0	3	3	50	50	100
19ZL/SS/HC13	Life Skills:Health, Energy and Computer Basics	3	3	0	0	-	50	-	100
Allied Core Offered to the Department of Botany									
19ZL/AC/GZ14	General Zoology I	4	4	0	0	3	50	50	100
19ZL/AC/P111	General Zoology I Practical	1	0	0	2	3	50	50	100
CD / ET / SC	Value Education	2	2	0	0	-	50	-	100
	Life Skills:Personality Development (EL)	3	3	0	0	-	50	-	100
SEMESTER-II									
19ZL/MC/CH24	Chordata	4	4	1	0	3	50	50	100
19ZL/MC/DB23	Developmental Biology	3	3	1	0	3	50	50	100
19ZL/MC/P222	Chordata and Developmental Biology Practical	2	0	0	3	3	50	50	100
19ZL/GC/ES12	Environmental Studies	2	2	0	0	-	50	-	100
Allied Core Offered to the Department of Botany									
19ZL/AC/GZ24	General Zoology II	4	4	0	0	3	50	50	100
19ZL/AC/P221	General Zoology II Practical	1	0	0	2	3	50	50	100
	Basic Tamil I / General Elective I	2	2	0	0	-	50	-	100
SEMESTER-III									
19ZL/MC/AP34	Animal Physiology	4	4	1	0	3	50	50	100
19ZL/MC/EV33	Evolution	3	3	1	0	3	50	50	100
19ZL/MC/P332	Animal Physiology and Evolution Practical	2	0	0	3	3	50	50	100
CD / ET / SC	Value Education	2	2	0	0	-	50	-	100
	Basic Tamil II / General Elective II	2	2	0	0	-	50	-	100
SEMESTER-IV									
19ZL/MC/MB44	Microbiology	4	4	1	0	3	50	50	100
19ZL/MC/P442	Microbiology Practical	2	0	0	3	3	50	50	100
19ZL/SS/PS13	Life Skills:Personal and Social	3	3	0	0	-	50	-	100
	Major Elective I								
SEMESTER-V									
19ZL/MC/CM54	Cell and Molecular Biology	4	4	1	0	3	50	50	100
19ZL/MC/FB54	Fundamentals of Biotechnology	4	4	1	0	3	50	50	100
19ZL/MC/GN54	Genetics	4	4	0	0	3	50	50	100
19ZL/MC/P553	Cell and Molecular Biology, Genetics and Biotechnology Practical	3	0	0	6	3	50	50	100
Interdisciplinary Core Course (ZL and SC) to students of Zoology and Sociology									
19ID/IC/SZ55	Socioethnozology	5	5	1	0	3	50	50	100
	General Elective III	2	2	0	0	-	50	-	100
	SAP / SL	2	2	0	0	-	50	-	100

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(Effective from the academic year 2019-2020)

CHOICE BASED CREDIT SYSTEM

C-Credit, L-Lecture Hours, T-Tutorial Hours, P- Practical Hours, Ex-Exam Hours, CA- Continous Assessment Marks, ES-End Semester Marks, M-Maximum Marks									
Subject Code	Title of Course	C	L	T	P	Ex	CA	ES	M
SEMESTER-VI									
19ZL/MC/AB64	Animal Behaviour	4	4	1	0	3	50	50	100
19ZL/MC/EC64	Ecology	4	4	1	0	3	50	50	100
19ZL/MC/IM64	Immunology	4	4	0	0	3	50	50	100
19ZL/MC/P663	Animal Behaviour, Ecology and Immunology Practical	3	0	0	6	3	50	50	100
19VE/SS/HL63	Life Skills:An Approach to a Holistic Way of Life	3	3	0	0	-	50	-	100
	Major Elective II								
	General Elective IV	2	2	0	0	-	50	-	100

Major Elective Courses									
19ZL/ME/AZ45	Applied Zoology	5	5	0	0	3	50	50	100
19ZL/ME/PR45	Project	5	0	0	5	-	50	50	100
19ZL/ME/LT45	Medical Laboratory Technology	5	5	0	0	3	50	50	100
19ZL/ME/EB45	Environmental Biotechnology	5	5	0	0	3	50	50	100
19ZL/ME/IB45	Introduction to Marine Biology	5	5	0	0	3	50	50	100
General Elective Courses									
19ZL/GE/PC22	Pet Care	2	2	0	0	-	50	-	100
19ZL/GE/ND22	Nutrition and Therapeutic Diet	2	2	0	0	-	50	-	100
19ZL/GE/GD22	Genes, Diseases and Society	2	2	0	0	-	50	-	100
19ZL/GE/HR22	Biology of Human Reproduction	2	2	0	0	-	50	-	100
19ZL/GE/FI22	The Fascinating World of Insects	2	2	0	0	-	50	-	100
Independent Elective Courses									
19ZL/UI/WB23	Introduction to Wildlife Biology	3	0	0	0	3	-	100	100
19ZL/UI/FS23	Fundamentals of Food Science	3	0	0	0	3	-	100	100

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B.Sc. DEGREE: BRANCH VI. A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

INVERTEBRATA

CODE:19ZL/MC/IV14

CREDITS:4

L T P:4 1 0

TOTAL TEACHING HOURS:65

OBJECTIVES OF THE COURSE

- To enable students to comprehend the characteristic features of various phyla
- To enable students to understand the structure and organisation of invertebrates and strategies to conserve them
- To help students to learn the classification of each phylum up to order level with underlying principles and local examples wherever possible
- To familiarise students with the economic, medicinal and phylogenetic significance of invertebrates

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Distinguish unique characters of different phyla
- Classify the primitive and organized forms and relate their phylogenetic significance
- Explain the structural organization and functions of various invertebrates
- Describe various conservation strategies
- Identify and report the local fauna
- Recognize the economic importance of some invertebrate forms

Unit 1 (11 Hours)

- 1.1 Introduction and Outline Classification of Animal Kingdom
- 1.2 Phylum Protozoa: Characteristic Features - Type: *Paramecium caudatum*
- 1.3 Locomotion in Protozoa
- 1.4 Parasitic Protozoans: *Entamoeba histolytica* and *Plasmodium sp.*

Unit 2 (12 Hours)

- 2.1 Phylum Porifera: Characteristic Features - Type : *Sycon*
- 2.2 Canal System in Sponges – Economic Importance of Porifera – Sponge Industry – Sponge Fishing – Sponge Cultivation
- 2.3 Phylum Coelenterata: Characteristic Features - Type : *Obelia geniculata*
- 2.4 Polymorphism in Coelenterates - Corals and Coral Reefs – Environmental Impact – Conservation- Affinities of Ctenophora

Unit 3 (14 Hours)

- 3.1 Phylum Platyhelminthes: Characteristic Features - Type : *Taenia solium*
- 3.2 Helminth Parasites in Relation to Human Welfare: *Schistosoma haematobium*, *Ascaris lumbricoides*, *Echinococcus granulosus*, *Ancylostoma duodenale*, *Wuchereria bancrofti* and *Enterobius vermicularis*
- 3.3 Phylum Annelida: Characteristics Features - Type: *Hirudinaria granulosa* - Medicinal Significance-Leech therapy
- 3.4 Metamerism in Annelids – Diversity of Annelids

Unit 4 (14 Hours)

- 4.1 Phylum Arthropoda: Characteristic Features - Type : *Panurginus indicus*
- 4.2 Structure and Phylogenetic Significance of *Peripatus*
- 4.3 Mouthparts and their Modification in Insects
- 4.4 Social Life in Insects: Termites, Ants and Honey Bees

Unit 5 (14 Hours)

- 5.1 Phylum Mollusca: Characteristic Features -Type : *Pila globosa*
- 5.2 Torsion in Gastropods-Economic Importance of Molluscs
- 5.3 Phylum Echinodermata: Characteristic Features -Type : *Asterias sp.*
- 5.4 Larval Forms of Echinoderms and their Significance

BOOKS FOR STUDY

- Ayyar, Ekambaranatha M. and Ananthkrishnan. T.N. (2016). *Manual of Zoology. Vol.I, Part. I & II.* Madras: S.Viswanathan & Co
- Jordan, E. L and Verma, P.S. (2012). *Invertebrate Zoology. Vol.I.* New Delhi: S.Chand

BOOKS FOR REFERENCE

- Barnes, R. D. (1982). *Invertebrate Zoology.* Japan: Holt Saunders
- Bhamrah, H. S. and Kavita Juneja. (1991). *Recent Trends in Invertebrates. Vol.I – VIII.* New Delhi: Anmol
- Dhami, P. S. and Dhami J.K. (2015). *Invertebrate Zoology.* New Delhi: S.Chand
- Kotpal, R. L. (2019). *Modern Textbook of Zoology Invertebrates.* New Delhi: Rastogi
- Majupuria, T.C. (1985). *Invertebrate Zoology.* New Delhi: S.Nagin
- Pechenik, Jan.A. (2005). *Biology of Invertebrates.* New York: McGraw-Hill
- Siebold, C. Th.u. (2007). *Anatomy of Invertebrate.* U.S.A: Hard Press

JOURNALS

- Journal of Animal Science
- International Journal of Zoological Research
- Invertebrate Survival Journal

WEB RESOURCES

- www.iaszoology.com
- <http://www.insects.org/>
- <http://www.earthlife.net/begin.html>

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50

Duration: 90 minutes

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

Other Components: Total Marks: 50

Quiz/Assignment/Diagram Assignment/Scrap book

End- Semester Examination: Total Marks: 100

Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

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B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND
BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

INVERTEBRATA PRACTICAL

CODE:19ZL/MC/P112

CREDITS:2

L T P:0 0 3

TOTAL HOURS:39

DISSECTIONS: *Periplaneta americana*

Digestive System

Nervous System

Male and Female Reproductive Systems

COMPUTER SIMULATED DISSECTIONS

Digital Earthworm

MOUNTS

Body setae of Earthworm

Appendages of prawn - Demonstration

Mouth parts of mosquito, house fly and cockroach

VERMICULTURE

Study of life history stages of *Lampito mauritii* and *Perionyx excavatus*

Workshop on Vermitechnology

SPOTTER

Invertebrata

Identification and description of specimens of all groups of invertebrates studied under the syllabus- five under each phylum

Insect vectors – *Aedes* sp, *Culex* sp, *Pediculus* sp, *Xenopsylla* sp and *Sarcoptes scabiei*

Soil microarthropods – Extraction using Berlese funnel

Study of any ten Invertebrate fauna in the Stella Maris College Campus (Observation of habit, habitat and adaptive features)

Record of Microhabitat and correlation of host plant interaction (wherever possible)

Visit to Zoological Survey of India/Farm

RECORD WORK

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

PATTERN OF ASSESSMENT

Continuous Assessment Test:	Total Marks: 50	Duration: 3 hours
Question – I Dissection		20 marks
Question – II Mount and Diagram		10+5 marks
Question – III Spotters (Five)		5x2 marks
Question –IV Identification of fauna in SMC (Two)		2x 2 ^{1/2} marks

End-Semester Examination:	Total Marks: 50	Duration: 3 hours
Question – I Dissection		20 marks
Question – II Mount and Diagram		10+5 marks
Question – III Spotters (Five)		5x2 marks
Question –IV Identification of fauna in SMC (Two)		2x 2 ^{1/2} marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

**Soft Skills Course Offered to students of
B.A. / B.Sc. / B.Com. / B.B.A. / B.V.A. / B.S.W. / B.C.A. Degree Programme**

SYLLABUS

(Effective from the academic year 2019 – 2020)

LIFE SKILLS – HEALTH, ENERGY AND COMPUTER BASICS

CODE: 19ZL/SS/HC13

CREDITS: 3

L T P: 3 0 0

TOTAL TEACHING HOURS: 39

OBJECTIVES OF THE COURSE

- To sensitise students to the fact that good health lies in nature
- To create an awareness about energy obtained from different components of food and to plan for a balanced diet
- To enable students to understand the significance of energy conservation and strategies for conserving energy
- To provide a basic knowledge of computer fundamentals and Email configuration

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- identify the importance of a few plants and their health benefits
- recognise the causes and symptoms of common disorders
- calculate food energy values and follow the Recommended Dietary Allowances (RDA) and appreciate the need for them.
- conserve energy and use it responsibly
- understand computer configuration for purchase of personal computer and E mail setting

Unit 1

(13 Hours)

Food and Health

1.1 Traditional food and their health benefits

1.1.1 **Six tastes** – Natural guide map towards proper nutrition

1.1.2 Nutritional value and significance of Navadhanya (Sesame seed, Bengal gram, Horse gram, Green gram, Paddy seeds, White beans, Wheat, black gram and Chick pea) and Greens (Vallarai, Thuthuvalai, Manathakkali, Pulichakeerai, Agathi Keerai, Murungai Keerai, Karuveppilai, Puthina and Kothamalli)

1.2 Causes, symptoms and home remedies for the following ailments

Common cold, Anaemia, Hypothyroidism, Obesity, Diabetes, Mellitus, Polycystic Ovarian Syndrome, Ulcer, Wheezing and Hypertension

Unit 2 **(13 Hours)**

Food and energy balance

- 2.1 Units of Energy, Components of Total Energy Requirement – Basal Metabolic Rate, energy requirements for (work) physical activity and Thermic effect of food
- 2.2 Factors affecting Basal Metabolic Rate and Thermic Effect of food
- 2.3 Recommended Dietary Allowances and Balanced Diet, Food Energy Values- Calculation

Unit 3 **(13 Hours)**

3.1 Energy conservation

3.1.1 Needs for Energy Conservation – Power consumption of domestic appliances – Electrical Energy Audit – Strategies for Energy Conservation - Modern lighting systems– Light emitting diode (LED), Compact fluorescent lamps (CFL), Green indicators and Inverter, Green building - Home lighting using Solar cell - Solar water heaters- Water and waste management - Biogas plant

3.1.2 Safety Practices in using electronic gadgets and electricity at home – Precautions - Shock- Use of testers to identify leakage

3.2 Computer fundamentals

3.2.1 Essentials of Purchasing a Personal Computer - Fundamentals of Networks – Local Area Network, Internet, Networking in real-time scenario- Computer Hacking – Computer Forensics Fundamentals – Cyber Laws - Secure Browsing

3.2.2 Configuring Email

Configure Email Settings – Attachments – Compression – Organizing Emails – Manage Folders - Auto Reply - Electronic Business Card - Email Filters- Manage Junk Mail - Calendar - Plan Meetings, Appointments - Scheduling Emails

3.2.3 Emerging Trends in IT - 3D Printing, Cloud Storage, Augmented Reality, Artificial Intelligence, Internet of Things (IoT)

BOOKS FOR REFERENCE

Achaya K. T. *The Illustrated Foods of India*. Oxford Publications, 2009.

Guyton, A.C. *Text Book of Medical Physiology*. (12th ed.). Philadelphia: W.B. Saunders & Co., 2011.

Joe Benton, *Computer Hacking: A Beginner's Guide to Computer Hacking, How to Hack, Internet Skills, Hacking Techniques, and More!*, Createspace Independent Pub, 2015.

John Vacca, *Computer Forensics: Computer Crime Scene Investigation*, Laxmi Publications 2015.

Pradeep Sinha, Priti Sinha, *Computer Fundamentals 6th Edition*, BPB Publications, 2003.

Srilakshmi, B. *Nutrition Science* (4th Revised Edition), New Delhi: New Age International (P) Ltd., 2014.

Suzanne Le Quesne *Nutrition: A Practical Approach*, Cornwall: Thomson, 2003.

Therapeutic Index – Siddha, 1st edition, SKM Siddha and Ayurveda, 2010.

Trevor Linsley, *Basic electrical installation work*. Newnes rint of Elsevier 2011.

PATTERN OF ASSESSMENT

Continuous Assessment:

Total Marks: 50

Two to three Task based components

Task based classroom activities

Case studies

Group discussions

Group presentation

Role play

No End Semester Examination

No CA test

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**Allied Core Offered by the Department of Zoology to
Students of Plant Biology and Plant Biotechnology**

SYLLABUS

(Effective from the academic year 2019-2020)

GENERAL ZOOLOGY I

CODE:19ZL/AC/GZ14

CREDITS:4

L T P:4 0 0

TOTAL TEACHING HOURS:52

OBJECTIVES OF THE COURSE

- To familiarise students with the diversity of fauna on earth
- To enable students to understand the structure and organisation of Invertebrates and Chordates
- To help students to acquire knowledge about the economic importance of animals
- To enable students to understand the importance of conservation
- To familiarise students with the role of vectors and parasites in relation to human welfare

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Identify the diversity of fauna on earth
- Classify Invertebrates and Chordates up to class level
- Describe the organisation of Invertebrates and Chordates
- Explain the economic importance of animals and apply this knowledge to human welfare
- Discuss the different aspects of conservation and recognise the need for the same

Unit 1

(10 Hours)

- 1.1 Introduction: Outline Classification of Animal Kingdom
- 1.2 Protozoa: Characteristic Features - Type: *Paramecium caudatum*
- 1.3 Coelenterata: Characteristic Features - Corals and Coral Reefs – Conservation and Economic Importance
- 1.4 Platyhelminthes & Aschelminthes: Characteristic Features - Helminth Parasites in relation to Human Welfare: Causative Organism, Life Cycle, Mode of Transmission, Symptoms & Prophylaxis of the following: *Taenia solium*, , *Ascaris lumbricoides*, , *Wuchereria bancrofti* and *Enterobius vermicularis*

Unit 2

(11 Hours)

- 2.1 Annelida: Characteristic Features - Vermitechnology: Vermiculture, Vermicomposting, Vermiwash and Setting up of Vermipit.
- 2.2 Arthropoda: Characteristic Features - Mode of Infection and Diseases caused by the following Vectors: *Anopheles sp.*, *Aedes sp.*, *Pediculus sp.*, *Musca domestica* - Social Life in Insects
- 2.3 Mollusca: Characteristic Features – Economic Importance
- 2.4 Echinodermata: Characteristic Features - Type: *Asterias sp.*

Unit 3 (9 Hours)
3.1 Prochordata & Agnatha: Salient Features
3.2 Pisces: Characteristic Features – Parental Care and Migration in Fishes

Unit 4 (10 Hours)
4.1 Amphibia and Reptilia: Characteristic Features
4.2 Snakes of South India - Turtle Conservation
4.3 Aves: Characteristic Features – Types of Feathers - Flight Adaptations

Unit 5 (12 Hours)
5.1 Mammalia: Characteristic Features
5.2 Type: *Oryctolagus cuniculus*
5.3 Aquatic Mammals

BOOK(S) FOR STUDY

Ayyar, E. M. & Ananthakrishnan, T. N. (2016). *Manual of Zoology*. Vols. I & II Madras: S. Viswanathan.

BOOKS FOR REFERENCE

Ali, M. S., Raju, S. V. S. & Alam, M. R. T. (2015). *A Textbook of Fundamental and Applied Entomology*. New Delhi. Kalyani.

Dhami, P. S. & Dhami J.K. (2015). *Invertebrate Zoology*. New Delhi: S. Chand.

Jordan, E.L. (2012). *Invertebrate Zoology*. New Delhi: S. Chand.

Jordan, E.L. & Verma, P.S. (2013). *Chordate Zoology*. New Delhi: S. Chand.

Kotpal, R. L. (2019). *Modern Textbook of Zoology: Invertebrates*. Meerut: Rastogi.

Kotpal, R. L. (2019). *Modern Textbook of Zoology: Vertebrates*. Meerut: Rastogi.

Nair, N. C., Thangamani, A., Leelavathy, S., Prasannakumar, S., Soundarapandian, N., Murugan, T., Narayanan, L. M. and Arumugam N. (2013). *Animal Diversity (Invertebrata and Chordata)*. Nagarcoil Saras.

Singh, H. P. & Rastogi, P. (2016). *Parasitology*. Meerut: Rastogi.

Springer, J.T. & Holley, D. (2013). *An Introduction to Zoology: Investigating the Animal World*. Massachusetts. Jones & Bartlett Learning.

JOURNALS

Journal of Animal Science

Open Journal of Animal Sciences

WEB RESOURCES

www.sanctuaryasia.com

www.iaszoology.com

<http://www.earthlife.net>

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50 Duration: 90 minutes

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

Other Components: Total Marks: 50

Quiz/Assignments/Scrap book/Poster/Drawing Test/Assignment

End-Semester Examination: Total Marks: 100 Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

Allied Core Offered by the Department of Zoology to
Students of Plant Biology and Plant Biotechnology

SYLLABUS

(Effective from the academic year 2019-2020)

GENERAL ZOOLOGY I PRACTICAL

CODE:19ZL/AC/P111

CREDITS:1

L T P:0 0 2

TOTAL HOURS:26

1. **Dissections:**
Periplaneta americana –
Digestive system
Nervous system
2. **Mounts:** Mouth parts of cockroach and housefly
Ctenoid Scale -Mullet
Placoid Scales - Shark
Cycloid Scale – Koi carp
3. **Computer Simulated Dissections**
Invertebrata: Earthworm
Chordata: Frog
4. **Identification and description of the following Invertebrates and Chordates**
Protozoa : *Paramecium caudatum*
Coelenterata : *Hydra sp., Tubipora sp. and Meandrina sp.*
Annelida : *Hirudinaria sp. and Nereis sp.*
Arthropoda : *Palamnaeus sp. and Penaeus indicus*
Mollusca : *Sepia, Ostrea sp. and Xancus sp.*
Echinodermata: *Asterias sp., Holothuria sp.*
Prochordata : *Amphioxus sp., Ascidia sp.*
Pisces : *Scoliodon sp. and Notopterus sp.*
Amphibia : *Duttaphrynus melanostictus, Ambystoma sp.*
Reptilia : *Chameleon sp., Naja naja, Hydrophis and Ptyas mucosa*
Aves : *Dinopium sp. and Psittacula sp.*
Mammalia : *Manis sp., Bat.*
5. **Observation and identification of the following Parasites**
Entamoeba histolytica, Taenia solium and Ascaris lumbricoides
6. **Observation and identification of the following Vectors**
Anopheles sp., Aedes sp., Pediculus sp., Xenopsylla cheopis and Cimex sp.

Identification of any five invertebrate and five chordate fauna in the SMC Campus

Record Work

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

PATTERN OF ASSESSMENT

Continuous Assessment Test:	Total Marks: 50	Duration: 3 hours
Question – I Major Question (Dissection)		20 marks
Question – II Minor Question (Mount and Diagram)		15 marks
Question – III Spotters (Five)		10 marks
Question – IV Identification of fauna in Stella Maris College		5 marks

End-Semester Examination:	Total Marks: 50	Duration: 3 hours
Question – I Major Question (Dissection)		20 marks
Question – II Minor Question (Mount and Diagram)		15 marks
Question – III Spotters (Five)		10 marks
Question – IV Identification of fauna in Stella Maris College		5 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

CHORDATA

CODE:19ZL/MC/CH24

CREDITS:4

L T P:4 1 0

TOTAL TEACHING HOURS:65

OBJECTIVES OF THE COURSE

- To enable students to understand the organization of different groups of chordates
- To help students to learn the classification up to order level with suitable examples
- To familiarize students with the diversity and adaptability of chordates

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Distinguish between different groups of chordates.
- Describe the organ systems and functions of all classes of chordates.
- Identify the local fauna different classes of vertebrates
- Recognise the diversity and adaptations of Chordates in various environments
- Discuss the unique features of Chordates such as parental care, neoteny and migration

Unit 1 (14 Hours)

- 1.1 Introduction –Outline Classification - Characteristic Features of the Phylum Chordata (Study of Endoskeleton to be restricted to Pigeon and Rabbit)
- 1.2 Prochordates: Characteristic Features - Type: *Amphioxus* – Affinities – Retrogressive Metamorphosis In Urochordata
- 1.3 Agnatha: Cyclostomata - Characteristic Features – Type: *Petromyzon*- Affinities

Unit 2 (12 Hours)

- 2.1 Pisces: Characteristic Features
- 2.2 Type: *Scoliodon sorrakowah*
- 2.3 Accessory Respiratory Organs - Parental Care - Electric Organs

Unit 3 (12 Hours)

- 3.1 Amphibia: Characteristic Features- Neoteny in Urodela - Parental Care in Amphibia
- 3.2 Reptilia: Characteristic Features – Type: *Calotes versicolor* - Skull in Reptiles as Basis of Classification
- 3.3 Snakes of South India – Poison Apparatus and Biting Mechanism
- 3.4 Adaptive radiation in reptiles

Unit 4 (12 Hours)

4.1 Aves: Characteristic Features – Type: *Columba livia*.

4.2 Flightless Birds

4.3 Flight Adaptations and Migration

Unit 5 (15 Hours)

5.1 Mammalia: Characteristic Features – Type: *Oryctolagus cuniculus*.

5.2 Dentition in Mammals

5.3 Aquatic Mammals

BOOKS FOR STUDY

Ayyar, Ekambaranatha, M and Ananthakrishnan T.N. (2016). *A Manual of Zoology. Vol. II*
Chetpet: S. Viswanathan & Co

Jordan, E.L. and Verma P.S., *Chordate Zoology*, (2013). New Delhi: S. Chand.

BOOKS FOR REFERENCE

Kotpal, R.L. (2019). *Modern Text Book of Zoology- Vertebrates*. Meerut: Rastogi Publications

Newman, N.H. (1981). *The Phylum Chordata*. Agra: Satish Book Depot

Prasad, S. (2012). *Textbook of Vertebrate Zoology*. Chennai: New Age International Pvt. Ltd

Romer, A.S. and Parson T.S. (1986). *The Vertebrate Body*. Philadelphia: Saunders College

Saxena, R.K and Sumitra Saxena, (2016). *Comparative Anatomy of Vertebrates*, (2nd ed.).
New Delhi: Viva Books

Sedgewick A. (1960). *A Text Book of Zoology - Vol II & III*. Allahabad: Central Book Depot

Thangamani, A, Prasanna Kumar S. Arumugam N. and Narayanan L.M. (2013). *A Textbook of Chordates*. Nagarcoil Saras

Young, J.Z. (1978). *The Life of Vertebrates*. New York: Oxford University Press

JOURNALS

Journal of Animal Science

Open Journal of Animal Sciences

Animal Science Journal

WEB RESOURCES

<http://www.mcwdn.org/Animals/Animals.html>

animaldiversity.org

www.iaszoology.com

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50

Duration: 90 minutes

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

Other Components: Total Marks: 50

Seminars/Quiz/Assignments/Exhibition/Model Making

End-Semester Examination: Total Marks: 100

Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

DEVELOPMENTAL BIOLOGY

CODE:19ZL/MC/DB23

CREDITS:3

L T P:3 1 0

TOTAL TEACHING HOURS:52

OBJECTIVES OF THE COURSE

- To enable students to learn the basic concepts and theories in developmental biology.
- To enable students to understand the various phases of animal development
- To acquaint students with recent advances in the field of Developmental Biology and Bioethical issues

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Comprehend and discuss important concepts and theories in developmental biology and the mechanisms of metamorphosis and regeneration with their relevant applications.
- Describe the process of gametogenesis and fertilization.
- Describe the mechanism of blastulation and gastrulation in vertebrates and distinguish between the process in frog and chick.
- Explore experiments that demonstrate the inductive functions of organizers.
- Explain the concepts of cellular differentiation and differential activity thereby knowing the significance of germ layers from which various organs arise
- Discuss the recent trends in Assisted Reproductive Technology and ethical issues associated with it.

Unit 1 (10 Hours)

- 1.1 Introduction - Brief History - Theories of Preformation, Epigenesis, Pangenesis, Recapitulation, Germplasm - Mosaic and Regulative Development - Gradient and Organisers
- 1.2 Metamorphosis in Insects and Amphibians
- 1.3 Regeneration: Mechanism and Types, Medical Applications

Unit 2 (11 Hours)

- 2.1 Gametogenesis: Spermatogenesis - Morphology and Types of sperms - Oogenesis - Eggs – Morphology, Types
- 2.2 Fertilization: Physicochemical Aspects, Theories - Parthenogenesis
- 2.3 Embryonic Adaptations: Extra - Embryonic and Foetal Membranes - Types and Functions of Placenta

Unit 3 (10 Hours)

- 3.1 Cleavage: Patterns – Factors influencing cleavage - Blastulation in Frog and Chick
- 3.2 Gastrulation: General Morphogenetic Movements in Chordate Embryos – Experiments by Spemann and Mangold -Comparative Study of Gastrulation in Frog and Chick
- 3.3 Cell-Lineage - Fate Maps and their Significance

Unit 4 (10 Hours)

- 4.1 Cell differentiation and differential activity
- 4.2 Organogenesis: Ectodermal Derivatives – Brain and Sense Organs (Eye and Ear)
- 4.3 Mesodermal Derivatives: Heart and Blood
- 4.4 Endodermal Derivatives: Digestive Tract and its Derivatives

Unit 5 (11 Hours)

- 5.1 Assisted Reproductive Technology: Induced Ovulation and its Applications – *In vitro* Fertilisation - Cryopreservation - Surrogate Motherhood – ethical issues
- 5.2 Concept of potencies: totipotency and pluripotency – nuclear transfer experiments – embryonic and haemopoietic stem cells – ethical issues
- 5.3 Teratogenesis – teratogenic agents and their impact on embryonic development

BOOKS FOR STUDY

Verma, P.S. & Agarwal, V. K. (2014). *Chordate Embryology*. New Delhi: S. Chand.
Sastry, K.V & Shukla, V. (2017). *Developmental Biology*. Meerut: Rastogi Publication.

BOOKS FOR REFERENCE

Balinsky, B.I. (2012). *An Introduction to Embryology*. Japan: Holt-Saunders.
Gilbert, S. F. (2013). *Developmental Biology*. Massachusetts: Sinauer Associates, Inc.
Rastogi, V.B. & Jayaraj, M. S. (2014). *Developmental Biology*. Meerut: Kedarnath Ramnath.
Starr, C. & Taggart, R. (2003). *Biology: The Unity and diversity of life*. California :Brooks/Cole Pub Co.
Warren, J. (2003). *Developmental Biology*. New York and Canada: Macmillan.
Wolpert, L., Tickle, C. & Arias, A. M. (2019). *Principles of Development*. London: University Press.

JOURNALS

International Journal of Developmental Biology
Journal of Developmental Biology

WEB RESOURCES

<http://www.visembryo.com/baby/index.html>
<http://www.sdbonline.org/>

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50 Duration: 90 minutes

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

Other Components: Total Marks: 50

Seminars/Presentation/Quiz/Assignments/Mini Project/Scrap Book

End-Semester Examination: Total Marks: 100 Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**B.Sc. DEGREE: BRANCH VI.A. – ADVANCED ZOOLOGY
AND BIOTECHNOLOGY**

SYLLABUS

(Effective from the academic year 2019-2020)

CHORDATA AND DEVELOPMENTAL BIOLOGY PRACTICAL

CODE:19ZL/MC/P222

CREDITS:2

L T P:0 0 3

TOTAL TEACHING HOURS:39

1. DISSECTIONS

Fish: Viscera and Digestive system

2. MOUNTS

- 1) Scales of fishes – Placoid-Shark
Ctenoid- Mullet
Cycloid –Koi Carp
- 2) Mount of Otolith in fish

3. COMPUTER SIMULATED DISSECTION

Frog – All systems

4. SPOTTER

Identification and description of specimens of all groups of chordates studied in the syllabus

5. Observation of any ten Chordate fauna in the Stella Maris College Campus

6. DEVELOPMENTAL BIOLOGY

1. Observation of prepared slides of testis and ovary of a mammal.
2. Observation of different kinds of vertebrate eggs (frog, reptile, bird and mammal).
3. Observation of different kinds of sperm (frog, bird and mammal)
4. Study of prepared slides of blastulation and gastrulation stages of Frog.
5. Observation and examination of prepared slides (whole mounts) of 13, 24, 33, 48, 72 and 96 hours chick embryo.
6. Observation of sections through brain, heart, eye and ear of frog on prepared slides
7. Observation and Identification of placenta of shark, sheep and pig.
8. Observation: Life cycle of frog

7. Field trip (Zoological park / Sanctuary/ Museum) – observation of chordates and compilation of a report

Record Work

Maintenance of a record of practical work done and the observation of campus chordate fauna is essential for continuous assessment

PATTERN OF ASSESSMENT

Continuous Assessment Test:

Total Marks: 50

Duration: 3 hours

Question – I	Dissection	15 marks
Question – II	Mount + Diagram	10+5 marks
Question – III	Spotters (Six): Chordata (2) & DB (4)	15 marks
Question – IV	Identification & description of any two fauna in Stella Maris College	5 marks

End-Semester Examination:

Total Marks: 50

Duration: 3 hours

Question – I	Dissection	15 marks
Question – II	Mount + Diagram	10+5 marks
Question – III	Spotters (Six): Chordata (2) & DB (4)	15 marks
Question – IV	Identification & description of any two fauna in Stella Maris College	5 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Core Course Offered to students of
B.A. / B.Sc. / B.Com. / B.B.A. / B.V.A. / B.S.W. / B.C.A. Degree Programme**

SYLLABUS

(Effective from the academic year 2019-2020)

ENVIRONMENTAL STUDIES

CODE:19ZL/GC/ES12

CREDITS:2

L T P:2 0 0

TOTAL TEACHING HOURS:26

OBJECTIVES OF THE COURSE

- To help students to gain the fundamental knowledge of the environment
- To create in students an awareness of current environmental issues
- To inculcate in students an eco-sensitive, eco-conscious and eco-friendly attitude

COURSE LEARNING OUTCOMES

On successful completion of this course, students will be able to

- Articulate the interdisciplinary context of environmental issues
- Adopt sustainable alternatives that integrate science, humanities and social perspectives
- Appreciate the importance of biodiversity and a balanced ecosystem
- Calculate one's carbon footprint

Unit 1 (10 Hours)

- 1.1 Introduction: The multidisciplinary nature of environmental studies;
Environmental Ethics-Role of the Individual in protecting the environment
- 1.2 Natural Resources: renewable (forests and water)and non-renewable (minerals)-
energy resources: renewable and non-renewable sources, impact of over-
exploitation
- 1.3 Ecosystems: terrestrial (forest, grassland and desert) and aquatic (ponds, oceans
and estuaries); structure and function
- 1.4 Biodiversity: India as a mega-diversity nation; threats to biodiversity; *in-situ* and
ex-situ conservation of biodiversity
- 1.5 Solid Waste Management, Source Segregation and Rain Water Harvesting

Unit 2 (10 Hours)

- 2.1 Environmental Pollution: Air, Water, Noise and Plastic Pollution: causes, effects
and control measures -Impact of over-population on pollution and health –
carbon footprint
- 2.2 The Environmental Dimension of Sustainable Development: The United Nations
Sustainable Development Goals of the 2030 Agenda

- 2.3 Climate Change and Environmental Disasters: Natural Disasters: floods, earthquakes, cyclones, tsunamis and landslides; man-made disasters: Bhopal Gas Tragedy and Chernobyl Nuclear Disaster
- 2.4 Environmental Movements: Chipko, Silent Valley and Narmada Bachao Andolan International Agreements: Montreal Protocol, Kyoto Protocol and Climate Change Conferences
- 2.5 An Overview of Environmental Laws in India: Environmental (Protection) Act 1986, Biological Act, 2002, National Green Tribunal Act, 2010, Coastal Regulation Zone Notification, 2011

Unit 3 (6 Hours)

- 3.1 A study of the eco-friendly initiatives on campus
- 3.2 A critical review of an environmental documentary film
- 3.3 Ecofeminism and the contributions of Indian Women Environmentalists
- 3.4 The highlights of Environmental Encyclical-*Laudato si*-On Care for our Common Home
- 3.5 Environmental Calendar

BOOK FOR STUDY

Bharucha, Erach. *Textbook of Environmental Studies for Undergraduate Courses*, (2nd ed.) Universities Press, 2013.

BOOKS FOR REFERENCE

Bhattacharya, K.S. Arunima Sharma, *Comprehensive Environmental Studies* Narosa Publishing House Pvt.. Ltd., New Delhi, 2015.

Saha, T.K., *Ecology and Environmental Biology* Books and Allied (P) Ltd., Kolkata 2016.

Sharma, J.P. *Environmental Studies (for undergraduate classes)* 3rd edition, University Science Press, 2016.

JOURNALS

Journal of Environmental Studies and Sciences

Journal of Environmental Studies

WEB RESOURCES

www.emn.com

www.nationalgeographic.com

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 25 Duration: 60 minutes

Section A-10 x 1 = 10 Marks (All questions to be answered) Multiple Choice Questions

Section B - 3 x 5 = 15 Marks (3 out of 6 to be answered in 150 words each)

Other Component: Total Marks: 25

Any **one** of the following for 25 marks

Quiz/Scrap Book/Assignment / Poster Making/Case Study/Project/Survey/Model-Making

No End Semester Examination

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**Allied Core Offered by the Department of Zoology to
Students of Plant Biology and Plant Biotechnology**

SYLLABUS

(Effective from the academic year 2019-2020)

GENERAL ZOOLOGY II

CODE:19ZL/AC/GZ24

CREDITS :4

L T P:4 0 0

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To enable students to learn basic concepts in Developmental Biology, Animal Behaviour, Human Genetics, Immunology and Evolution
- To help students to understand the processes and mechanisms in various subdisciplines of Zoology
- To familiarise students with the current trends in various subdisciplines of Zoology

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Describe the processes of development of animals
- Identify different patterns of inheritance
- Differentiate between the normal and abnormal behaviour in animals
- Explain the immunological response and the role of the Immune System in maintaining health and contributing to disease
- Discuss the adaptations and distribution of animals and identify the milestones in human evolution

Unit 1 (10 Hours)

- 1.1 Introduction - Gametogenesis - Fertilisation -Types of Vertebrate Eggs
- 1.2 Cleavage, Blastulation and Gastrulation in Rabbit
- 1.3 Placentation in Mammals
- 1.4 Assisted Reproductive Technology: *In Vitro* Fertilization – Bioethical Issues

Unit 2 (10 Hours)

- 2.1 Introduction- Shelter Seeking and Construction
- 2.2 Animal Associations: Commensalism, Mutualism, Parasitism and Predation
- 2.3 Behaviour and Reproduction: Courtship Behaviour – Parental Care
- 2.4 Learning Behaviour: Forms of Learning
- 2.5 Abnormal Behaviour in Domestic and Zoo Animals

Unit 3 (11 Hours)

- 3.1 Introduction – Human Chromosomes — Sex Determination in Humans – Lethal Genes: types and examples
- 3.2 Patterns of Inheritance: Autosomal Dominant (Hypercholesterolaemia), Autosomal Recessive (Albinism), X- linked Dominant (Hypophosphatemia), X-linked Recessive (Red green colour blindness), Y-linked (Hypertrichosis), Mitochondrial (Kearns Sayre Syndrome) and Multiple Allelic (A,B,O blood groups in humans) and Multiple Genic Inheritance (Skin colour in humans)
- 3.3 Inborn errors of metabolism - Genetic Counselling

Unit 4 (10 Hours)

- 4.1 Immune System: Introduction - Innate Immunity: Anatomical barriers and Inflammation
- 4.2 Acquired Immunity: Humoral and Cell Mediated Immunity - Types of Antigens - Antibody Classes and their Biological Activity
- 4.3 Hypersensitivity reactions: types - Autoimmune disorder: Rheumatoid Arthritis
- 4.4 Vaccines: Types - Vaccination schedule

Unit 5 (11 Hours)

- 5.1 Introduction to Evolution - Mimicry and Colouration - Coevolution
- 5.2 Distribution of Animals - Types, barriers and methods of dispersal of animals
- 5.3 Evolution of Man: Biological, Racial and Cultural history

BOOKS FOR REFERENCE

- Agarwal, V.K. (2009). *Animal Behaviour*. New Delhi: S.Chand, 2009.
- Balinsky, B. I & Fabian, B. C. (2012). *An Introduction to Embryology*. Massachusetts :Cengage.
- Cummings, R. M. (2012). *Human Heredity – Principles and issues*. 12th ed.Canada: Thomson Brooks/Cole.
- Hall B. K., Hallgrimsson, B & Strickberger, M. W. (2014). *Strickberger's Evolution*. Massachusetts: Jones and Bartlett.
- Klug, W. S., Cummings, M. R. & Spencer, C. (2018). *Concepts of Genetics*. (12th ed.). New Jersey: Pearson Education.
- Mathur, R. (2016). *Animal Behaviour*. Meerut: Rastogi.
- Owen, J. A., Punt, J. & Stranford, S. A. (2013). *Kuby Immunology*.New York 2013: W.H. Freeman & Company
- Rastogi, V. B. (2015). *Evolutionary Biology (Organic Evolution)*. Meerut: Kedar Nath Ram Nath.
- Rastogi, V. B. & Jayaraj, M.S. (2011). *Developmental Biology*. Meerut: Kedarnath Ramnath.
- Rao . V. C. (2016). *Immunology. Alpha Science*.
- Tomar, B. S. & Singh, S. P. (2019). *Animal Distribution, Evolution and Developmental Biology*.Meerut: Rastogi.

JOURNALS

- Journal of Human Genetics
International Journal of Zoological Research

WEB RESOURCE

www.omim.org

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50

Duration: 90 minutes

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

Other Components: Total Marks: 50

Quiz/Analysis of Mendelian traits/Assignments/Scrap book/Data collection and compilation of report

End-Semester Examination: Total Marks: 100

Duration:3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**Allied Core Offered by the Department of Zoology to Students of
Plant Biology and Plant Biotechnology**

SYLLABUS

(Effective from the academic year 2019-2020)

GENERAL ZOOLOGY II PRACTICAL

CODE:19ZL/AC/P221

CREDITS:1

L T P:0 0 2

TOTAL TEACHING HOURS:26

1. DEVELOPMENTAL BIOLOGY

- i. Observation of Different Kinds of Vertebrate Eggs: Frog and Chick
- ii. Observation of Different Kinds of Sperm: Frog and human
- iii. Study of Prepared Slides: Cleavage, Blastulation and Gastrulation Stages of Frog
- iv. Placenta: Sheep and Pig

2. ANIMAL BEHAVIOUR

- i. Animal Associations: Parasitism - *Entamoeba histolytica*, *Taenia solium*, *Ancylostoma duodenale*, *Wuchereria bancrofti*, *Hirudinaria granulosa*, *Sacculina* on Crab
Mutualism - Sea Anemone on Hermit Crab
Commensalism - *Echeneis*
Predation – Octopus
- ii. Nests of Birds

3. GENETICS

- i. ABO - Blood Grouping and Rh – Typing
- ii. Observation of normal male and female, Turner's, Klinefelter's and Down's syndrome karyotypes

4. IMMUNOLOGY

- i. Identification of immune cells
- ii. Pregnancy test: ELISA- Qualitative Test for Pregnancy

5. EVOLUTION

- i. Coevolution: Observation and Identification of a) Plant and Pollinator b) Predator and Prey
- ii. Mimicry and Colouration: Observation and Identification of a) Batesian and Mullerian mimicry b) Protective and Aggressive Colouration
- iii. Identification of stages in the evolution of man

RECORD WORK

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

PATTERN OF ASSESMENT

Continuous Assessment Test:	Total Marks: 50	Duration: 3 hours
Question – I ABO/Rh Typing/ Pregnancy Test		15 marks
Question – II Spotters (Seven)		35 marks

End-Semester Examination:	Total Marks: 50	Duration: 3 hours
Question – I ABO/Rh Typing/ Pregnancy Test		15 marks
Question – II Spotters (Seven)		35 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**B.Sc. DEGREE : BRANCH VI.A. - ADVANCED ZOOLOGY
AND BIOTECHNOLOGY**

SYLLABUS

(Effective from the academic year 2019-2020)

ANIMAL PHYSIOLOGY

CODE:19ZL/MC/AP34

CREDITS:4

L T P:4 1 0

TOTAL TEACHING HOURS:65

OBJECTIVES OF THE COURSE

- To enable students to understand the functioning of organs and organ systems and their regulatory mechanisms.
- To help students to comprehend the mechanisms of osmoregulation, thermoregulation, colour change and bioluminescence.
- To familiarise students with the pathophysiology of a few human diseases/disorders and the physiology of sports and ageing.

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Explain the functioning and regulation of various organs and organ systems
- Describe the mechanisms of osmoregulation and thermoregulation in various animals
- Discuss the principles and chemicals involved in colour change and bioluminescence
- Identify the causes and the pathological effects of certain human disorders/ diseases
- Analyse the physiological changes that occur during exercise and ageing.

Unit 1 (12 Hours)

- 1.1 Introduction – Types of Nutrition – Feeding Mechanisms – Types of Digestion
- 1.2 Respiratory organs and mechanism of respiration (trachea, gills, skin and lungs) – respiratory pigments
- 1.3 Adaptations to diving and high altitudes
- 1.4 Physiological effect of smoking and carbon monoxide in humans – Oxygen Therapy – Artificial Respiration

Unit 2 (12 Hours)

- 2.1 Types of Circulatory Systems (open and closed)
- 2.2 Regulation of heart beat and blood pressure in humans
- 2.3 Role of drugs / chemicals (Atropine, Pilocarpine and Digitaline) on heart rate in humans – Angiogram, Angioplasty and Echo
- 2.4 Thermoregulatory mechanisms in insects and vertebrates

Unit 3 (14 Hours)

- 3.1 Osmoregulatory mechanisms in invertebrates and vertebrates – Acid-Base balance in Mammals
- 3.2 Nitrogenous substances excreted by animals – classification of animals based on nitrogenous products excreted

- 3.3 Types of synapses (electric and chemical) – neuromuscular synapses – neurotransmitters – Neurotransmission and external agents (Drugs, toxins and pollutants)
- 3.4 Vertebrate Autonomic nervous system – Types of sensory receptors – nociception, electroreception and magnetoreception

Unit 4 (12 Hours)

- 4.1 Neural control of skeletal muscles
- 4.2 Non vertebrate endocrinology (molluscs, annelids and arthropods) – Effect of endocrine disruptor chemicals in humans
- 4.3 Chromophores: mechanism of colour change in cold blooded vertebrates
- 4.4 Bioluminescence: chemistry, mechanism and significance

Unit 5 (15 Hours)

- 5.1 Hormones in pregnancy – complications in pregnancy (ectopic pregnancy, breach, placenta previa)
- 5.2 Pathophysiology of human disorders/diseases: Anorexia nervosa, Chronic Obstructive Pulmonary Disorder, Atherosclerosis, Parkinson's, Alzheimer's, Cerebral Palsy and Poly Cystic Ovarian Disorder
- 5.3 Sports Physiology: muscles in exercise, respiration in exercise, cardiovascular system in exercise and body fluids & salts in exercise – drugs and athletes
- 5.4 Physiology of ageing: changes in major systems, causes and theories

BOOKS FOR STUDY

Verma, P.S., Agarwal, V. K. & Tyagi, B. S. (2015). *Animal Physiology*. New Delhi: S. Chand.

BOOKS FOR REFERENCE

Guyton, A.C. (2011). *Text Book of Medical Physiology*. (12th ed.). Philadelphia: W.B. Saunders & Co.

Hill, R. W. Wyse, G. A. and Anderson. M. (2016). *Animal Physiology* (4th ed.). U.K: Oxford University Press.

Hoar, W.S. (1975). *General and Comparative Physiology*. New Delhi: Prentice Hall of India Pvt. Ltd.

Prosser, C.L. (1973). *Comparative Animal Physiology*. Philadelphia: W.B. Saunders Co.

Randall, D., Burggren, W. and French, K. (2015). *Eckert Animal Physiology*. (6th ed.). New York: W.H. Freeman and Company.

Sherwood, L. (2016). *Human Physiology – From Cells to Systems*. (9th ed.). USA: Wadsworth Publishing Company.

Sherwood, L., Klandorf, H. and Yancey, P. (2011). *Textbook of Animal Physiology*. New Delhi: Cengage Learning India Pvt. Ltd. New Delhi.

Sobti, R.C. (2008). *Animal Physiology*, New Delhi: Narosa Publishing House.

JOURNALS

Indian Journal of animal Physiology

Extreme Physiology and Medicine

Web Resources

www.physiology.com

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50

Duration: 90 minutes

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

Other Components: Total Marks: 50

Seminars/Quiz/Assignments/Poster making/Exhibition

End-Semester Examination: Total Marks: 100

Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**B.Sc. DEGREE: BRANCH VIA. - ADVANCED ZOOLOGY
AND BIOTECHNOLOGY**

SYLLABUS

(Effective from the academic year 2019-2020)

EVOLUTION

CODE:19ZL/MC/EV33

CREDITS :3

L T P:3 1 0

TOTAL TEACHING HOURS:52

OBJECTIVES OF THE COURSE

- To enable students to understand the evolutionary process which includes a general account of theories and evidences
- To help students to comprehend the genetic basis of the evolutionary process as seen from the study of population genetics
- To familiarise students with evolutionary patterns, speciation and animal distribution
- To enable students to understand the biological and cultural evolution of man

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Discuss the evolutionary process in the light of theories, evidences and population genetics
- Draw a timeline of the history of life on earth, highlighting when major biological events occurred
- Explain the various patterns of evolution
- Identify the milestones in the evolution of horse and man
- Analyse evolutionary relationships between taxa by reading/creating phylogenetic trees

Unit 1 (12 Hours)

- 1.1 Introduction - Origin of Life
- 1.2 Evidences in support of evolution from the fields of comparative morphology and anatomy, physiology, biochemistry, embryology and biogeography
- 1.3 Theories of evolution: Lamarckism, Neo-Lamarckism, Darwinism, Neo-Darwinism: Heredity and Evolution, Modern Synthetic theory of Natural Selection, Mutation theory of De Vries

Unit 2 (9 Hours)

- 2.1 Geological Time Scale and Stratification
- 2.2 Fossilisation: dating of fossils - Indian fossils - living fossils
- 2.3 Extinction: five major extinctions and role of extinction in evolution

Unit 3 (11 Hours)

- 3.1 The genetic basis of evolution: Variation, Mutation, Genetic Drift, Founder Effect and Migration
- 3.2 Types of Natural selection: stabilising selection, directional selection, disruptive selection and group selection

3.3 Species concept: Speciation (Allopatric and Sympatric)- Subspecies - Sibling Species - Isolation in Speciation

Unit 4 (10 Hours)

- 4.1 Convergent and divergent evolution - Adaptive radiation in birds and mammals
- 4.2 Mimicry and Colouration - Coevolution
- 4.3 Micro, macro and megaevolution
- 4.4 Distribution of Animals: Types, Barriers and Methods of Dispersal of Animals

Unit 5 (10 Hours)

- 5.1 Evolution of Horse and Significance
- 5.2 Evolution of Man – Biological, Racial and Cultural History
- 5.3 Molecular Evolution: Molecular Clocks – Phylogenetic trees - Systematics: Phenetics and Cladistics

BOOKS FOR STUDY

Gopalakrishnan, T.S., Sambasiviah, I. & Rao, A.P.K. (2000). *Principles of Organic Evolution*. Himalaya
Rastogi, V. B. (2015). *Evolutionary Biology (Organic Evolution)*. Meerut: Kedar Nath Ram Nath.

BOOKS FOR REFERENCE

Bromhan, L. (2016). *An Introduction to Molecular Evolution and Phylogenetics*. UK: Oxford University Press.
Colbert, E.H. (2001). *Evolution of the Vertebrates*. New Delhi: Wiley Eastern.
Darwin, C. (1909). *The Origin of Species*. London: John Murray.
Dodson, E.O. (1985). *Evolution Process and Product*. New York: Reinhold.
Foley, R. A. & Lewin, R. (2013). *Principles of Human Evolution*. Massachusetts: John Wiley & Sons.
Futuyma, D. J. & Kirkpatrick, M. (2017). *Evolution*. U.S.A: Sinauer.
Hall B. K., Hallgrimsson, B & Strickberger, M. W. (2014). *Strickberger's Evolution*. MA: Jones and Bartlett, 2014.
Moody, P.A. (1978). *Introduction to Evolution*. New York: Harper.
Rastogi, V. B. & Jayaraj, M.S. (1998). *Animal Ecology and distribution of animals*. Meerut: Kedar Nath Ram Nath.
Shapiro, J. A., (2011). *Evolution: A View from the 21st Century*. London: Pearson Education.
Tomar, B. S. & Singh, S. P. (2017). *Evolutionary Biology*. Meerut: Rastogi.

JOURNALS

Journal of Evolutionary Biology

WEB RESOURCES

<http://ncse.com/evolution>

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50 Duration: 90 minutes

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

Other Components: **Total Marks: 50**
Seminars/Quiz/Assignments/Presentation/Exhibition

End-Semester Examination: **Total Marks: 100**
Section A – 10 x 3 = 30 Marks (All questions to be answered)
Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)
Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

Duration: 3 hours

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY
AND BIOTECHNOLOGY**

SYLLABUS

(Effective from the academic year 2019-2020)

ANIMAL PHYSIOLOGY AND EVOLUTION PRACTICAL

CODE:19ZL/MC/P332

CREDITS:2

L T P:0 0 3

TOTAL HOURS:39

PHYSIOLOGY

1. Oxygen consumption in an aquatic animal with reference to body weight.
2. Detection of nitrogenous waste products, qualitative estimation of Ammonia, (fish) Uric acid (bird excreta) and Urea (mammalian kidney)
3. Determination of amylase activity in relation to temperature
4. Determination of amylase activity in relation to pH
5. Assessing digestion of proteins, carbohydrates and fats using Physio Ex 8.0
6. Study of frog cardiovascular physiology using Physio Ex 8.0.
7. Salt loss and salt gain in fish
8. Measurement of BP and Pulse

Demonstration:

Estimation of Na and K content in food samples by Flame Photometry

EVOLUTION

1. Observation and identification of the following:
 - i) Different modes of fossilisation
 - ii) Living fossils
 - iii) Coevolution (Plant-pollinator and Predator-prey)
 - iv) Mimicry (Batesian and Mullerian) and Colouration (Protective and Aggressive)
2. Observation of stages in the evolution of man
3. Construction/interpretation of phylogenetic tree

RECORD WORK

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

PATTERN OF ASSESSMENT

Continuous Assessment Test:	Total Marks: 50	Duration: 3 hours
Question – I	25 marks	
Question – II	10 marks	
Question – III Spotters (Five)	15 marks	
End-Semester Examination:	Total Marks: 50	Duration: 3 hours
Question – I	25 marks	
Question – II	10 marks	
Question – III Spotters (Five)	15 marks	

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY
AND BIOTECHNOLOGY**

SYLLABUS

(Effective from the academic year 2019-2020)

MICROBIOLOGY

CODE:19ZL/MC/MB44

CREDITS :4

L T P:4 1 0

TOTAL TEACHING HOURS:65

OBJECTIVES OF THE COURSE

- To enable students to have an overview of microbial classification and techniques; study the functional morphology, growth and reproduction of bacteria and viruses
- To help students to acquire a knowledge of microbial diseases and their control
- To enable students to understand the role of microbes in everyday life.

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Describe and demonstrate the different techniques used in microbiology.
- Differentiate between prokaryotes and eukaryotes and to classify organisms belonging to both categories.
- Describe the structure of different kinds of bacteria and viruses and explain concepts relating to their growth and multiplication.
- correlate the microbe with the type of environment in which it is found including microbes that are normally found in the human body.
- identify causative organisms of some important diseases, their mode of transmission, control measures and treatment of the diseases.
- apply their knowledge of useful and harmful microbes in their daily life in storage and usage of food and milk and certain materials such as textiles, paper and cosmetics.

Unit 1

(12 Hours)

- 1.1 Introduction - History and Scope of Microbiology
- 1.2 Outline Classification of Microorganisms with Special Reference to Bacteria and Viruses - Characteristic Features of Prokaryotes and Eukaryotes
- 1.3 Microbiological Techniques: Microscopy, Specimen Preparation and Staining Techniques - Media Preparation and Types of Culture Media – Preservation of Culture – Pure Culture Techniques

Unit 2

(15 Hours)

- 2.1 Viruses: General Properties – Isolation and Cultivation of Viruses - Structure and Reproduction of T₄ Phage – Structure and Multiplication of an Animal Virus – Subviral Particles (Viroids and Prions)
- 2.2 Archaea – Characteristics (Brief Outline)

- 2.3 Bacteria: Gross Morphology of Bacterial Cells - Size, Shape and Arrangement- Structure of a Bacterium: Cell Wall, flagellum – flagellar arrangement - Chemical Composition and Characteristics of Gram Positive and Gram Negative Bacteria – Molecular Structure of Nucleoid –Types and Functions of Plasmids- cytoplasmic inclusions.
- 2.4 Bacterial Growth: Reproduction and Growth of Bacterial Population - Growth Curve – Measurement of Microbial Growth

Unit 3 (13 Hours)

- 3.1 Physical Conditions Required for Growth of Bacteria: Temperature, Oxygen and pH - Nutritional Requirements - General Nutritional Classification of Bacteria
- 3.2 Recombination in Bacteria: Transformation, Conjugation and Transduction
- 3.3 Microbial Control: Importance, Control of Micro-Organisms by Physical and Chemical Agents – Antibiotics and Their Mechanisms of Action

Unit 4 (13 Hours)

- 4.1 The Normal Micro-Biota of the Human Body: Skin, Mouth and Oropharynx, Stomach, Small Intestine, Large Intestine, Vagina and Urethra (Brief Study)
- 4.2 Disease Cycle of a Communicable Disease – Disease Progression - Epidemiology
- 4.3 Causative agents, symptoms, pathogenicity and control measures of the following Infectious Diseases: Airborne (Influenza, Pneumonia and Measles)- Food and Water Borne (Hepatitis A, Typhoid, and Polio) — Infection Through Body Fluids (Hepatitis B and Ebola) - Sexually Transmitted Diseases (Genital Herpes, Gonorrhoea and Syphilis) - Zoonotic (Swine Flu, Dengue Fever and Leptospirosis) - Nosocomial and Fomite Borne

Unit 5 (12 Hours)

- 5.1 Microbiology of Food: Sources and Types of Microorganisms In Milk – tests for bacterial contamination of milk -Pasteurization of Milk - Dairy Products (Fermented Milk, Cheese) - Fermented Food – Probiotics -Spoilage of Food and its Control — Indicator Organisms- Food Poisoning
- 5.2 Microbial Damage of Materials: Natural Fabrics, Paper and Cosmetics
- 5.3 Soil Microbiology: Role of Micro-organisms in Soil Fertility – Nitrogen Cycle - Sulfur Cycle

BOOKS FOR STUDY

- Dubey, R.C. & Maheshwari. D.K. (2013). *A Text Book of Microbiology*. New Delhi: S.Chand.
- Pelczar, M. J., Chan, E.C.S. & Krieg, N. R. (2001). *Microbiology*. New York city: McGraw Hill.

BOOKS FOR REFERENCE

- Bergquist L.M., & Barbara, P. (2002). *Microbiology – Principles and Health Science Applications*. Philadelphia:W.B. Saunders Company.
- Baumam, R.W. (2017). *Microbiology with Diseases by body system*. London: Pearson.
- Cornellisen, C. N. & Hobbs, M. M. (Ed.). (2019). *Lippincott Illustrated Reviews: Microbiology*. Netherlands : Wolters Kluwer.
- Kanungo, Reba (Ed.). (2015). *Anantanarayan and Paniker's textbook of Microbiology*. Universities Press.

Michael, M. T. & Bender, K. S. (2018). *Brock Biology of Microorganisms*. U.S.A: Pearson Publication.

Nester, E. W., Anderson, D. G., Evans, R. C. & Nester, M. T. (2005). *Microbiology – A Human Perspective*. New York: Mc Graw Hill.

Pommerville, J. C.(2004). *Alcamo's Fundamentals of Microbiology*. U.S.A: Jones and Bartlett.

Prescott, L.M., Harley, J. P. & Klein, D. A. (2005). *Microbiology*. New York: McGraw Hill.

Tortora, G. J., Funk, B. R. & Case, C. L. (2016). *Microbiology – An Introduction*. San Francisco: Pearson - Benjamin Cummings.

JOURNALS

International Journal of Microbiology

Journal of Applied Microbiology

WEB SOURCES

<http://archives.microbeworld.org/microbes/>

<http://www.bioedonline.org/>

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50

Duration: 90 minutes

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

Other Components: Total Marks: 50

Seminars/Quiz/Assignments/Case studies/Exhibition/Poster making

End-Semester Examination: Total Marks: 100

Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

MICROBIOLOGY PRACTICAL

CODE:19ZL/MC/P442

CREDITS:2

L T P:0 0 3

TOTAL TEACHING HOURS:39

Identification of Microbes – Prepared Specimens

1. Instruments Used in Microbiology Laboratory – Microscope, Incubator, Hot Air Oven, Autoclave, Laminar Flow, Colony Counter
2. Observation of Bacterial Motility – Hanging Drop Preparation
3. Preparation of Nutrient Agar, MacConkey Agar – Agar Slant
4. Isolation of Bacteria by Pure Culture - Streak Plate
5. Examination of Soil Bacteria using Pour Plate Method
6. Coliform Count in Drinking Water Samples by Membrane Filter Technique
7. Gram Staining and Examination of Bacteria
8. Spoilage of Food Items viz., Milk - Bread - Fruits and Vegetables – (Observation)
9. Examination of Milk - Methylene Blue Reduction Test
10. Winogradsky Column – Observation of Bacterial Diversity
11. Antibiotic Sensitivity Test - Kirby Bauer Diffusion Method
12. Collection and Classification of Antibiotics Based on their Biological Origin, Mode of Action and their Applications

RECORD WORK

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50 Duration: 3 hours

Question – I	25 marks
Question – II	15 marks
Question – III Spotters (Four)	10 marks

End-Semester Examination: Total Marks: 50 Duration: 3 hours

Question – I Major Question	25 marks
Question – II Minor Question	15 marks
Question – III Spotters (Four)	10 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

**Soft Skills Course Offered to students of
B.A. / B.Sc. / B.Com. / B.B.A. / B.V.A. / B.S.W. / B.C.A. Degree Programme**

**SYLLABUS
(Effective from the academic year 2019 - 2020)**

LIFE SKILLS: PERSONAL AND SOCIAL

CODE: 19ZL/SS/PS13

CREDITS: 3

L T P: 3 0 0

TOTAL TEACHING HOURS: 39

OBJECTIVES OF THE COURSE

- To enable students to understand the working of Indian Governance and laws
- To empower students as citizens by teaching them how to use the RTI, the PIL and the FIR
- To provide students an insight into the strengths and virtues essential to improve wellbeing
- To bring about awareness of societal dynamics
- To create awareness, impart knowledge and hone skills necessary to make sound financial decisions

COURSE LEARNING OUTCOMES

On successful completion of this course, students will be able to

- demonstrate knowledge of the working of the government
- file RTIs, PILs and FIRs
- improve their quality of life
- exhibit social consciousness
- exhibit prudent behaviour in managing personal finance

Unit 1 (13 Hours)

Legal Literacy

- 1.1 Structure of Government- Central and State, Urban and Rural
- 1.2 Laws pertaining to Women (CEDAW) and Children (POCSO)
- 1.3 Right to Information Act 2005, drafting and filing an RTI
- 1.4 Introduction to PIL, Landmark PIL cases -Vishaka Vs. State of Rajasthan, Hussainara Khatoon Vs. State of Bihar, MC Mehta Vs. Union of India
- 1.5 Importance of FIR and lodging an FIR

Unit 2 (13 Hours)

2.1 Understanding Self

- 2.1.1 Psychological wellbeing - meaning, components and barriers
- 2.1.2 Gratitude- meaning, nature and expression
- 2.1.3 Resilience- meaning, nature, benefits and simple techniques for building resilience.

2.2 Understanding Society

- 2.2.1 Concepts of class, caste, gender, disability, race, culture, religion, ethnicity, context and language
- 2.2.2 Importance of societal analysis
- 2.2.3 Social indicators of development – HDI, GDI, Poverty Index, Hunger Index
- 2.2.4 Issues and challenges for social change in India

Unit 3

(13 Hours)

Personal Financial Planning

- 3.1 Meaning, Need and Importance of Personal Financial Planning
- 3.2 Core concepts in Financial Planning – Budget, Savings and Investment
- 3.3 Converting non-essential expenditure into Savings and Investment
 - 3.3.1 Forms of Savings – Deposits, Insurance
 - 3.3.2 Types of Investments – Securities, Real Estate and Gold
- 3.4 Digital transformation in Finance
 - 3.4.1 De-Mat Account
 - 3.4.2 Net Banking and Mobile Banking

BOOKS FOR REFERENCE

Agarwal, R.C. Constitutional Development and National Movement of India. New Delhi: S. Chand, 1988.

Ahuja Ram. Social Problems in India. Rawat Publications. 3rd Edition, 2014

Allan, R. Modern Politics and Government. New York: Palgrave MacMillan, 2000.

Baumgardner, S., & Crothers, M. Positive Psychology. Chennai: Pearson. 1st Edition, 2015.

Grenville-Cleave, B. *Positive Psychology A practical Guide*. United Kingdom: Icon Books Ltd, 2012.

Pandey, J.N. Constitutional Law of India. Allahabad: Central Law Agency, 2014.

Weiner, M. The Indian Paradox. New Delhi: Sage , 1989.

PATTERN OF ASSESSMENT

Continuous Assessment:

Total Marks: 50

- Two to three Task based components
- Task based classroom activities
- Case studies
- Group discussions
- Group presentation
- Role play

No End Semester Examination

No CA test

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

CELL AND MOLECULAR BIOLOGY

CODE:19ZL/MC/CM54

CREDITS:4

L T P:4 1 0

TOTAL TEACHING HOURS:65

OBJECTIVE OF THE COURSE

- To enable the students to understand the structure and function of various cellular organelles.
- To enable students to acquire knowledge on various stages of cell cycle, its regulation and disruption.
- To introduce students to advanced knowledge on DNA, its replication, repair and gene expression in prokaryotes and eukaryotes.

COURSE LEARNING OUTCOME

On successful completion of the course, students will be able to

- Describe the structure of a eukaryotic cell with its component organelles and cytoskeleton.
- Discuss the origin of eukaryotic cells from prokaryotic cells
- Describe structure of the cell membrane and discuss transport of molecules across cell membranes.
- Discuss eukaryotic cell cycles, describe the events of interphase and distinguish between different types of cell division.
- Explain the characteristics of cancerous cells and the genetic basis of cancer
- Differentiate between the replication and repair of DNA in both prokaryotes and eukaryotes along with associated biochemical processes.
- Integrate the concepts of cell and molecular biology with related fields in biology.

Unit 1 (13 Hours)

- 1.1 Introduction – Prokaryotic and Eukaryotic Cells
- 1.2 Origin of Eukaryotic Cells – Endosymbiont Theory
- 1.3 Cell Membrane: Structural Organization, Asymmetry and Fluidity, Specializations in Structure - Transport Across Membranes
- 1.4 Cytoskeleton: Microtubules, Actin Filaments and Intermediate Filaments

Unit 2 (13 Hours)

- 2.1 Cytoplasmic Vacuolar System: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes: Structure, Polymorphism, Functions and Diseases - Peroxisomes
- 2.2 Mitochondria: Structure and Functions
- 2.3 Ribosomes: Structure, Types, Functions
- 2.4 Nuclear Organization
- 2.5 Cell Receptors and Signal Transduction

Unit 3 (13 Hours)

- 3.1 Chromosomes – Structure, Types and Functions
- 3.2 Cell Cycle: Mitosis, Meiosis, Regulation
- 3.3 Apoptosis
- 3.4 Cancer Biology: Characteristics of a Cancer Cell – Altered Cell Cycle in Cancer Cell- Genetic Basis: Protooncogenes, Oncogenes, Tumour Suppressor Genes

Unit 4 (14 Hours)

- 4.1 Nucleic Acids : Types, Molecular Structure and Functions
- 4.2 DNA Replication: Theta model in prokaryotes (in detail), Rolling Circle Model - Replication in Eukaryotes
- 4.3 DNA Repair mechanisms – Mismatch Repair, Photoreactivation, Nucleotide Excision Repair, Base Excision Repair, SOS Repair, Non-Homologous End Joining (NHEJ)

Unit 5 (12 Hours)

- 5.1 Organization of Prokaryotic and Eukaryotic Genes
- 5.2 Regulation of Gene Expression in Bacteria – *Lac* Operon Model
- 5.3 Transcription: Biosynthesis of RNA – Transcription Factors – Post Transcriptional Modifications
- 5.4 Mechanism of Translation: Genetic Code - Post Translational Modifications in Collagen and Insulin – RNA interference

BOOKS FOR STUDY

- Gupta, P.K. (2018). *Cell and Molecular Biology*. Rastogi Publications, 2018
Rastogi, V B.(2015). *Introductory Cytology*. Meerut: Kedarnath Ramnath,2015.

BOOKS FOR REFERENCE

- Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K. & Walter. P. (2014). *Molecular Biology of the Cell*. (6th ed.). New York: Garland.
Cooper, G.M. and Hausman. R. E. (2004). *Cell – A Molecular Approach*.U.K: Sinauer Associates.
Karp, G., Iwasa, J. & Marshall. W. (2018). *Karp's Cell Biology*. USA: John Wiley.
Karp, G. (2010). *Cell and Molecular Biology: Concepts and Experiments*. New Jersey: John Wiley.
Lodish, H., Berk, A. , Kaiser, C. A., Krieger, M. & Bretscher, A. (2016). *Molecular Cell Biology*. New York: W.H. Freeman.
Watson, J.D., Baker, T. A., Bell, S. P., Gann, A., Levin, M. and Losick, R. (2007). *Molecular Biology of the Gene*. California: The Benjamin Cummings.
Wolfe, S. I. (1995). *An Introduction to Cell and Molecular Biology*. California: Wadsworth.

JOURNALS

- Journal of Cell and Molecular Biology
Journal of Molecular Cell Biology

WEB RESOURCES

- www.cellbio.com
<http://www.ibiblio.org/virtualcell/index.htm>

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50
Section A – $6 \times 2 = 12$ (All questions to be answered)
Section B – $3 \times 6 = 18$ (3 out of 5 to be answered)
Section C – $1 \times 20 = 20$ (1 out of 2 to be answered)

Duration: 90 minutes

Other Components: Total Marks: 50
Quiz/Assignments/Molecular Role Play/Models / Posters

End-Semester Examination: Total Marks: 100
Section A – $10 \times 3 = 30$ Marks (All questions to be answered)
Section B – $5 \times 6 = 30$ Marks (5 out of 7 to be answered)
Section C – $2 \times 20 = 40$ Marks (2 out of 4 to be answered)

Duration: 3 hours

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

FUNDAMENTALS OF BIOTECHNOLOGY

CODE:19ZL/MC/FB54

CREDITS:4

L T P:4 1 0

TOTAL TEACHING HOURS:65

OBJECTIVES OF THE COURSE

- To enable students to understand the basic concepts of Biotechnology
- To help students to comprehend the principles, tools and applications of Biotechnology
- To familiarise students with the ethical issues relating to techniques in Biotechnology

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Explain the basic concepts of biotechnology
- Describe the various steps/processes involved in biological techniques
- Discuss various applications of Biotechnology
- Critique the societal and ethical issues relating to Biotechnology
- Analyse the significance of Human Genome Project

Unit 1 (12 Hours)

- 1.1 Definition and Areas of Biotechnology
- 1.2 Tools of Genetic Engineering: Enzymes, Recombinant DNA Technology, Passenger DNA, Cloning Vectors - cDNA Library - Gene Bank
- 1.3 Electrophoresis, Northern, Southern and Western Blots - PCR Technique

Unit 2 (14 Hours)

- 2.1 Cloning in Prokaryotes and Eukaryotes
- 2.2 Methods of Transfer of Foreign DNA into Cells: Electroporation, Particle Bombardment Gun, Ultrasonication, Liposome-Mediated Transfer and Microinjection
- 2.3 Site - Directed Mutagenesis

Unit 3 (12 Hours)

- 3.1 Gene Cloning in Medicine: Insulin and Somatotropin
- 3.2 Diagnosis and Treatment: DNA Probe, ELISA Technique, Hybridoma Technology, Vaccines, DNA Finger Printing and Gene Therapy
- 3.3 Genetically Modified Organisms (Microorganisms, Plants and Animals)
- 3.4 Benefits and Hazards of Genetic Engineering

Unit 4 (13 Hours)

4.1 Animal Cell and Tissue Culture Techniques – Culture Media – Natural and Artificial – Primary and Secondary Cell Lines – Culture Methods – Merits and Demerits

4.2 Stem Cell Culture: Applications and Ethical Issues

4.3 Biotechnology & Intellectual property: Intellectual property rights (IPR) & Intellectual Property protection (IPP)-patenting of biological materials

Unit 5 (14 Hours)

5.1 DNA sequencing- Sanger method & applications

5.2 Human Genome Project & its significance

5.3 Basic Concept of Bioinformatics: Proteomics and Genomics

5.4 Enzyme Technology: Production, Immobilisation and Application

BOOK FOR STUDY

Dubey, R.C. (2014). *A Text Book of Biotechnology*. New Delhi: S.Chand

BOOKS FOR REFERENCE

Pranav Kumar and Usha Mina *Biotechnology* (2017). - *A problem approach* (5th ed.).

Gurugram: Pathfinder Publication

Singh, B.D. (2015). *Biotechnology : Expanding Horizons*. Chennai: Kalyani Publishers

Ashim, K. Chakravarty, (2013). *Introduction to Biotechnology*, U.K: Oxford Press

Godbey, W.T (2014). *An introduction to Biotechnology*, Netherlands: Academic Press

Thieman, (2014). *Introduction to Biotechnology*, (3rd ed.). U.K :Pearson Publications

Mcgiffen, Steven P. (2005). *Biotechnology*. USA: Pluto Press

Mahesh, S. (2006). *Biotechnology IV*. India: New Age International

Nicholl, Desmond, S.T. (2002). *An Introduction to Genetic Engineering*. UK: Cambridge University Press

Sathyanarayana, U. (2013). *Biotechnology*. New Delhi: Books and Allied Private Limited

JOURNAL

Journal of Biotechnology

The Scitech Journal

Indian Journal of Biotechnology

WEB RESOURCES

<http://www.ncbi.nlm.nih.gov/>

<http://www.hhmi.org/biointeractive>

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50

Duration: 90 minutes

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

Other Components: Total Marks: 50

Seminars/Quiz/Assignments/Scrap book

End-Semester Examination: Total Marks: 100

Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND
BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

GENETICS

CODE:19ZL/MC/GN54

CREDITS:4

L T P:4 0 0

TOTAL TEACHING HOURS:52

OBJECTIVES OF THE COURSE

- To enable students to understand the concepts and rules of genetic inheritance
- To help students to have a comprehensive and detailed understanding of the mechanisms of genetic inheritance
- To enable students to apply the acquired knowledge to analyse and solve problems

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Identify the different patterns of genetic inheritance
- Describe and discuss the mechanisms of genetic inheritance
- Recognise, interpret and analyse real time data relating to genetic inheritance
- Distinguish between different types of mutations and genetic disorders
- Construct pedigree charts and calculate allelic frequencies

Unit 1

(11 Hours)

- 1.1 Introduction: Mendel and his Experiments - Law of Dominance, Law of Segregation and Law of Independent Assortment - Back Cross / Test Cross
- 1.2 Interaction of Genes : Incomplete Dominance – Co dominance - Lethal Genes - Epistasis – (Dominant and Recessive) - Penetrance and Expressivity
- 1.3 Extra Chromosomal Inheritance : Criteria for Extra Chromosomal Inheritance - Cytoplasmic Inheritance (Plastid Inheritance in *Mirabilis jalapa*) - Maternal Influence (Shell Coiling in *Limnaea*) – Mitochondrial Inheritance (Kearns - Sayre Syndrome)

Unit 2

(10 Hours)

- 2.1 Multiple Genic Inheritance: Characteristics – Eg. Skin Colour in Humans - Transgressive Variation (Weight in Chicken)
- 2.2 Multiple Allelic inheritance: Characteristics – Eg. Human Blood Groups (A, B, AB, O) - Rh Factor: Inheritance and Significance
- 2.3 Linkage and Crossing Over: Complete and Incomplete Linkage in *Drosophila* - Cytological Proof of Crossing Over, Eg. *Drosophila* – Linkage Mapping

Unit 3 (9 Hours)

- 3.1 Sex Determination: Chromosomal Mechanisms of Sex Determination - Sex Determination in *Drosophila* - Sex Determination in Humans - Barr Body - Male Haploidy - Environmental Factors Affecting Sex Determination
- 3.2 Sex Linkage: *Drosophila*, Eye Colour – Humans, Haemophilia - Incomplete Sex Linkage - Y- Linked Genes - Sex Influenced and Sex Limited Genes in Humans

Unit 4 (11 Hours)

- 4.1 Mutations: Different Types - Point Mutations, Molecular Basis - Mutagens
- 4.2 Chromosomal Aberrations - Numerical Variations
- 4.3 Inborn Errors of Metabolism - Genetic Counselling

Unit 5 (11 Hours)

- 5.1 Population Genetics: Gene Pool and Gene Frequency, Hardy - Weinberg Law and Factors Influencing Allele Frequency
- 5.2 Genetic Regulation of Development in *Drosophila*: Developmental Stages – Three Major Classes of Developmental Genes (Maternal Effect Genes, Segmentation Genes and Homeotic Genes)
- 5.3 Epigenetics: Definition – Mechanisms – Epigenetics and cancer, imprinting, nutrition and ageing.
- 5.4 Conservation Genetics:- *Ex Situ* Conservation : Captive Breeding and Gene Banks- *In Situ* Conservation : Population Augmentation

BOOKS FOR STUDY

Verma, P.S. & Agarwal. V. K. (2013). *Genetics*.9th (ed.). New Delhi: S. Chand

BOOKS FOR REFERENCE

Cummings, M. R. (2012). *Human Heredity – Principles and issues*.(10th ed.). Canada: Thomson Brooks/Cole.

Hartl, D. L. (2013). *Essential Genetics & Genomics*. (7th ed.). USA: Jones & Bartlett Learning.

Klug, W. S., Cummings, M. and Spencer, C. (2018). *Concepts of Genetics*.(12th ed.). New Jersey: Pearson Education

Pierce, B. A. (2016). *Genetics – A conceptual approach*.(6th ed.). New York: W. H. Freeman.

Russel, P. J. I. (2011). *Genetics – A molecular approach*. San Francisco: Benjamin Cummings.

Snustad, P. D. and Simmons, M. J. (2012). *Principles of Genetics*. (6th ed.). New York: John Wiley.

JOURNALS

Journal of Genetics and Genomics

Journal of Human Genetics

WEB RESOURCES

www.ncbs.res.in

www.omim.org

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50

Duration: 90 minutes

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

Other Components: Total Marks: 50

Quiz/Problem solving/Group projects/Pedigree construction and analysis/Data collection and interpretation/Assignment

End-Semester Examination: Total Marks: 100

Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

CELL AND MOLECULAR BIOLOGY, GENETICS AND BIOTECHNOLOGY PRACTICAL

CODE:19ZL/MC/P553

CREDITS:3

L T P:0 0 6

TOTAL TEACHING HOURS:78

CELL AND MOLECULAR BIOLOGY

Camera lucida
Micrometry
RBC Count
WBC Count
Mitosis - in onion root tip
Meiosis - in grasshopper testis
Chironomus - Salivary gland chromosome - squash preparation
Total RNA extraction
Genomic DNA extraction – Group practical

GENETICS

Drosophila culture techniques
Drosophila mutants
Squamous epithelium squash preparation – Barr body
ABO Blood Grouping and Rh typing
Pedigree Analysis of some human inherited traits
Study of any five Mendelian Traits
Observation of normal male and female, Turner's, Klinefelter's and Down's syndrome karyotypes
Hardy -Weinberg Equilibrium – Calculating Gene Frequency and Genotypic Frequency using bead experiments-calculation of Allelic frequency

BIOTECHNOLOGY

Agarose Gel Electrophoresis – Group practical
Isolation of Plasmid DNA – Demonstration and Group practical
SDS-PAGE - Demonstration
Polymerase Chain Reaction – Demonstration

Visit to a Molecular Biology/Biotechnology Laboratory

RECORD WORK

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

PATTERN OF ASSESSMENT

Continuous Assessment Test:

Total Marks: 50

Duration: 3 hours

Question – I	Major Question	20 marks
Question – II	Minor Question	15 marks
Question – III	Spotters (Six)	15 marks

End-Semester Examination:

Total Marks: 50

Duration: 3 hours

Question – I	Major Question	20 marks
Question – II	Minor Question	15 marks
Question – III	Spotters (Six)	15 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**Interdisciplinary Core Course Offered by the Departments of Zoology and Sociology
to B.Sc. Advanced Zoology and Biotechnology and B.A. Sociology Degree Programmes**

SYLLABUS

(Effective from the academic year 2019 – 2020)

SOCIOETHNOZOOLOGY

CODE: 19ID/IC/SZ55

CREDIT: 5

L T P: 5 1 0

TOTAL TEACHING HOURS: 78

OBJECTIVES OF THE COURSE

- To enable students to understand the sociology of human – animal relationships
- To familiarize students with various aspects of ethnozoology
- To help students to comprehend social evolution, organization and communication in humans and animals

COURSE LEARNING OUTCOMES

On successful completion of this course, students will be able to

- Synthesize the wide ranging relationships between humans and animals
- Discuss the importance of animals as food and in medicine and also other useful animal products
- Explain the social evolution and organization in humans and animals
- Discuss the different modes of communication and their functions in humans and animals

Unit 1

Introduction

(15 Hours)

- 1.1 Meaning of ethnobiology and ethnozoology- Basic definitions- Qualities of Sociality- Animals as zooindicators of weather and climate
- 1.2 Role of animals in human culture: Biological predisposition and individual differences in human attitudes towards animals - Animal Mythology in the Indian context
- 1.3 Meaning of Ethnology; Sociology; Sociobiology
- 1.4 Interdisciplinary Approach in understanding Human-Animal Relationship

Unit 2

Sociology of Human and Animal Relationship

(16 Hours)

- 2.1 Significance of Sociology of Human-Animal Relationship
- 2.2 Scope of Sociology of Human-Animal Relationship
- 2.3 Sociological Perspective on Human Animal Relationship: Symbolic Interactionism Theory and Conflict Theory
- 2.4 Social Relationships and Social Organizations.

Unit 3
Ethnozoology (16 Hours)

- 3.1 Historical and Sociological significance of animal domestication
- 3.2 Animals as food: Arthropods – Molluscs – Echinoderms - Vertebrates
- 3.3 Animals in medicine : Traditional and Contemporary
- 3.4 Historical, Economical and Sociological importance of animals and their products
- 3.5 Animals as zo indicators of weather and climate

Unit 4
Social Evolution (16 Hours)

- 4.1 Meaning of Social Evolution; Cooperation; coordination and division of labour
- 4.2 Social Groups: Altruism and kin selection: Dominance and Hierarchy
- 4.3 Social System and Fitness - The evolution of social organization
- 4.4 Aggregates and Socialization - Coloniality: Adaptive basis of coloniality – Adaptive significance of roles – Optimization of Caste Systems - Social insects: Organization of insect societies, Social Wasps, Ants, Bees and Termites – Primates: Social traits, Ecology of Social Behaviour, Social Behaviour in Chimpanzee – Other Social species : Colonial invertebrates – cold blooded vertebrates – Birds
- 4.5 The Theory of Parental Investment - Ecology of Parental Care – Parent-Offspring conflict – Alloparental care

Unit 5
Verbal and Nonverbal Communication (16 Hours)

- 5.1 Origin of human language – Forms of communication
- 5.2 Verbal and non-verbal communication and its functions
- 5.3 Non-verbal communication in animals : Discrete versus graded signals - Signal specificity-Signal economy
- 5.4 Modes of communication in animals with examples – functions, advantages and disadvantages

BOOKS FOR REFERENCE

Adrian Franklin, (1999) *Animals and Modern cultures-A Sociology of Human Animal Relations in Modernity*. London: Sage Publications,

Anderson, E.N and Deborah Pearsall, (2011) *Ethnobiology*, Wiley Blackwell

Kay Peggs (2012). *Animals and Sociology*. U.K: Palgrave Macmillan.

Romulo Romer, Nobrega Alves and Paulino Albuquerque, (2017) *Ethnozoology: Animals in our lives*. Academic Press

Wilson, E.O. (2000) *Sociobiology : The New synthesis* (25th anniversary ed.). Cambridge: Harvard University Press

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50 Duration: 90 minutes

Part One – 25 marks (Sociology)

Part Two -25 marks (Zoology)

Section A- Objective Quiz - 6 Marks (All questions to be answered)

Section B – 3 x 3 = 9 marks (3 out of 5 questions to be answered in 100 words each)

Section C – 1 x 10 = 10 marks (1 out of 2 questions to be answered in 500 words each)

Other Components: Total marks : 50

Seminar/Quiz/Assignments/Role Play/Mini projects/Scrapbook

End Semester Examination Total Marks: 100 Duration: 3 hours

Part One – 50 marks (Sociology)

Part Two -50 marks (Zoology)

Section A – Objective Quiz - 12 marks (All questions to be answered)

Section B – 6 x 3 = 18 marks (6 out of 10 questions to be answered in 100 words each)

Section C – 2 x 10 = 20 marks (2 out of 4 questions to be answered in 1200 words each)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

ANIMAL BEHAVIOUR

CODE:19ZL/MC/AB64

CREDITS:4

L T P:4 1 0

TOTAL TEACHING HOURS:65

OBJECTIVES OF THE COURSE

- To enable students to understand the concepts and various behavioural patterns exhibited by animals.
- To help students to learn the scientific methods of observing animal behaviour.
- To enable students to apply ethological concepts in observing and recording patterns of behaviour.
- To sensitise students to the welfare of animals through behavioural observations.

COURSE LEARNING OUTCOME

On successful completion of the course, students will be able to

- Explain the concepts that form the base for animal behaviour studies.
- Describe the various behavioural patterns exhibited by animals
- Construct ethograms and data sheets based on observations and analyse behaviour based on collected data.
- Distinguish between normal and abnormal behaviour in animals.
- Contribute to animal conservation strategies.
- Assess welfare of pet, domestic and zoo animals based on behavioural observation.

Unit 1

(13 Hours)

- 1.1 Introduction: Behaviour - Causes and Significance - Ethology – History
- 1.2 Concepts and Terminology: Motivation - Fixed Action Pattern (FAP) - Sign Stimulus - Innate Releasing Mechanism (IRM) - Action Specific Energy (ASE) - Concept of Behavioural Genetics - Evolution of Behaviour
- 1.3 Methods of Studying Behaviour: Studies in Laboratories and in the Wild: Identification and Location of Individuals, Observation, Description, Recording and Cataloguing, Constructing Ethogram, Interpreting and Presenting Data

Unit 2

(14 Hours)

- 2.1 Basic and Maintenance Behaviour: Maintenance and Related Behaviour - Foraging and Caching - Shelter Seeking, Nests and other constructions
- 2.2 Finding a Place to Live: Habitat Selection and Territory – Homing – Chronobiology, Rhythms- Sleep
- 2.3 Play: General Attributes of Play, Examples / Descriptions of Play Behaviour, Theories

Unit 3 (14 Hours)

- 3.1 Animal Communication - Modes and Mechanisms: Chemical, Auditory, Visual, Tactile and Electrical
- 3.2 Animal Learning - Different forms of Animal Learning
- 3.3 Behaviour and Reproduction: Breeding Patterns, Courtship
- 3.4 Interspecific Behaviour: Aggregations, Commensalism, Mutualism, Parasitism and Predation

Unit 4 (12 Hours)

- 4.1 Psychoactive Drugs and Human Behaviour
- 4.2 Pre-Menstrual Syndrome and Peri-Menopausal Behaviour
- 4.3 Abnormal Behaviour in Humans – Neurotic Disorder (Anxiety Disorder): Phobic and Obsessive-Compulsive Disorder – Psychotic Disorder: Schizophrenia, Depression, Suicidal tendencies and Bipolar Disorder

Unit 5 (12 Hours)

- 5.1 Science, Ethics and Law in Human Welfare
- 5.2 Welfare Assessment in Animals – Five Freedoms – Concept of Needs
- 5.3 Recognition of Normal Behaviour in Animals – Abnormal Behaviour in Pet, Domestic and Zoo Animals – Possible causes for Abnormal Behaviour – Prevention of abnormal behaviour – Behavioural Enrichment – Animal Protection Laws

BOOKS FOR STUDY

- Mathur, R. (2016). *Animal Behaviour*. Meerut: Rastogi.
- Shukla, J.P. (2009). *Fundamentals of Animal Behaviour*. Chennai: Atlantic Publishers and Distributors (P) Ltd.

BOOKS FOR REFERENCE

- Alcock, J. (2013) *Animal Behaviour - An Evolutionary Approach*. Massachusetts: Sinauer Associates.
- Grier, J. W. (1992). *Biology of Animal Behaviour*. Iowa: William C Brown Publication.
- Kalat, J. W. (2017). *Introduction to Psychology*. Boston: Cengage Learning.
- Manning, A. & Dawkins, M. S. (2012). *An Introduction to Animal Behaviour*. U.K: Cambridge University.
- Raven, P. H., Johnson, G. B., Mason, K., Losos, J. & Singer. S. (2017). *Biology*. USA: McGraw Hill Education.
- Scott, G. (2005). *Essential Animal Behaviour*. USA: Blackwell.
- Slater, P.J.B. (1989). *An Introduction to Ethology*. U.K : Cambridge University Press.
- Sridhara S. (2009). *Recent trends in Animal Behaviour*. New Delhi: NIPA Books.

JOURNALS

- The British Journal of Animal Behaviour
- Journal of Ethology

WEB RESOURCES

- www.animalbehaviorsociety.org
- <http://www.sanctuaryasia.com>

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50
Section A – 6 x 2 = 12 (All questions to be answered)
Section B – 3 x 6 = 18 (3 out of 5 to be answered)
Section C – 1 x 20 = 20 (1 out of 2 to be answered)

Duration: 90 minutes

Other Component: Total Marks: 50
Quiz /Project/Poster/Presentation

End-Semester Examination: Total Marks: 50
Section A – 10 x 3 = 30 Marks (All questions to be answered)
Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)
Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

Duration: 3 hours

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

ECOLOGY

CODE:19ZL/MC/EC64

CREDITS:4

L T P:4 1 0

TOTAL TEACHING HOURS:65

OBJECTIVES OF THE COURSE

- To enable students to comprehend the biotic and abiotic factors governing the ecosystem
- To help students acquire knowledge on the interrelationship of biological and physical systems
- To familiarize students with basic principles of biostatistics and their applications

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Discuss the key ecological interactions and processes, the distribution and abundance of organisms
- Describe the structure and functions of ecosystems
- Explain the physico-chemical characteristics of freshwater, marine and estuarine ecosystems
- Discuss the policies and laws pertaining to conservation ecology and biodiversity conservation
- Apply statistical principles to interpret biological data.

Unit 1 (12 Hours)

- 1.1 Introduction to Ecology- Soil formation-texture-profile-classifications-properties.
- 1.2 Abiotic factors: Temperature- Thermal stratification, Range of temperature tolerance. Light- composition, light on land and water. Biological effects of light on aquatic and terrestrial organisms and role of pH.
- 1.3 Limiting factors: Liebig's law of minimum – Shelford's law of tolerance. Biogeochemical cycle – Gaseous cycle: Oxygen, Carbon, Sedimentary cycle - Phosphorus
- 1.4 Attributes of population: Density, Natality, Mortality and Age distribution.

Unit 2 (14 Hours)

- 2.1 Habitat ecology: Terrestrial habitat: Biomes, tundra, grassland, forest (coniferous, tropical, temperate and deciduous) – Ecotones (Shola forest)
- 2.2 Deserts: Fauna, adaptations of animals inhabiting deserts and caves
- 2.3 Ecosystem: Productivity – Carbon sequestration – Biomass
- 2.4 Exobiology : Space ecology – Microbiota – Extra terrestrial life – Cosmic life

Unit 3 (13 Hours)

- 3.1 Fresh water ecology: Physico-chemical nature of freshwater-biotic communities – Lotic habitats (rivers), Lentic habitats(Lakes-Pulicat Lake and Ponds)
- 3.2 Marine Ecology : Physico-chemical characteristics-biotic communities of pelagic and benthic zone
- 3.3 Estuarine systems: Physico – chemical characteristics – biotic communities

Unit 4 (14 Hours)

- 4.1 Ecosystems – Definition – Classification – Functions - Processes – Water cycle. Biodiversity: Definition - Magnitude – Laws related to biodiversity
- 4.2 Biodiversity of India - Magnitude – Distribution – Conservation: Biosphere Reserves – National Parks – Wildlife Sanctuaries

Unit 5 (12 Hours)

- 5.1 Analysis of ecological data using Biostatistics – Collection of Data – Census and sampling methods. Variable : Discrete and continuous
- 5.2 Presentation of data : Classification and tabulation – Diagrams and graphs : Bar, Pie, Histogram, Line graph – Concept of statistical population and sample characteristics of frequency distribution.
- 5.3 Measures of Central tendency: Mean, Median, Mode and Weighted Arithmetic Mean. Measures of Dispersion: Range, Quartile deviation, Mean deviation and Standard deviation, Correlation and Regression

BOOKS FOR STUDY

Kormondy, Edward J. (2017). *Concepts of Ecology*, (4th ed.). New Jersey: Pearson Education
Sharma, P.D. (2017). *Ecology and Environment*, (13th ed.). Meerut: Rastogi Publication

BOOKS FOR REFERENCE

Bernard Rosner, (2010). *Fundamentals of Biostatistics*, (7th ed.). Boston: Cengage Learning
Eugene Odum, Murray Barrick, and Gary W. Barrett, (2005). *Fundamentals of Ecology*, (5th ed.). Boston: Cengage Learning
Michael Cain *et al.* (2011). *Ecology*, (2nd ed.). U.S.A: Sinauer Associates Inc, Sunderland, Massachussets
Michael. L. McKinney *et al.* (2006). *Environmental Science*, (5th ed.).USA: Jones and Bartlett Learning
Neeraj Nachiketa, (2018). *Environment and Ecology – A dynamic approach*, (1st ed.). Noida: GKP Publication
Ranjith, Daniels and Jagadish, Krishnamurthy, (2009). *Environmental studies*, New Jersey: Wiley Publication
Robert Leo Smith and Thomas M. Smith, (2015). *Elements of Ecology*, (9th ed.).New Jersey: Pearson Education
Timothy Morton, (2018). *Being Ecological*, Penguin UK
Veer Bala Rastogi and Jayaraj, M.S. (1998). *Animal Ecology and distribution of animals*, (8th ed.). Meerut : Kedar Nath Ram Nath

JOURNALS

International Journal for Ecology and Development
Journal of Global Ecology and Conservation

WEBSITES

www.ecology.com

<http://www.nhptv.org/natureworks/nw4.htm>

www.deepspaceecology.com

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50

Duration: 90 minutes

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

Other Components: Total Marks: 50

Seminars/Quiz/Assignments/Presentation/Exhibition/Scrapbook/Project

End-Semester Examination: Total Marks: 50

Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

IMMUNOLOGY

CODE:19ZL/MC/IM64

CREDITS:4

L T P:4 0 0

TOTAL TEACHING HOURS:52

OBJECTIVES OF THE COURSE

- To enable students to understand the basic concepts and organisation of the immune system
- To help students to acquire knowledge on various immune responses and reactions
- To enable students to comprehend the causes of various immune disorders and preventive measures for infectious diseases

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Describe the structure and functions of different types of cells and organs of the immune system
- Explain the different types of antigen-antibody interactions and their applications
- Describe the mechanisms of hypersensitivity reactions
- Differentiate various immunological responses and the ways in which they are triggered and regulated
- Recognise the types and mechanisms of vaccines
- Connect the infectious diseases with their respective preventive measures

Unit 1 (12 Hours)

- 1.1 Introduction - History and Basics of Immunology
- 1.2 Cells and Molecules of the Immune System: Types, Source and Salient Functions
- 1.3 Primary and Secondary Lymphoid Tissues / Organs
- 1.4 Types of Immunity: Natural and Acquired Immunity - Cellular and Humoral Immunity - Active and Passive Immunity with Examples

Unit 2 (10 Hours)

- 2.1 Antigens: Definition, Classification, Properties of Immunogens
- 2.2 Antibody: Primary Structure, Classification and Functions
- 2.3 Antigen - Antibody Reaction: Types - Applications

Unit 3 (10 Hours)

- 3.1 Complement System: Three major pathways - functions
- 3.2 Hypersensitivity Reactions: Types and Immune Reactivity
- 3.3 Transplantation: Types of Transplant/Graft, Causes For Graft Rejection - Immuno-Suppression

Unit 4 (11 Hours)

- 4.1 Cytokines: Definition, Properties, Classification and functions
- 4.2 Cytokine receptors - Signal Transduction through Cytokine receptors – therapeutic uses of Cytokines
- 4.3 Immune Reactions in Viral, Bacterial and Parasitic Infections

Unit 5 (9 Hours)

- 5.1 Autoimmune Disorders: Systemic Lupus Erythematosus and Rheumatoid Arthritis
- 5.2 Vaccines: Principles and Types
- 5.3 Common Infectious Diseases and Vaccines – Immunisation schedule

BOOKS FOR STUDY

Rao, V. C. (2016). *Immunology*. Alpha science International Limited.
Paul. A. (2016). *Textbook of Immunology*. Kolkata: Books & Ailled (P) Ltd.

BOOKS FOR REFERENCE

Coico, R., Sunshine, G. & Benjamini, E. (2013). *Immunology*. New Jersey: John Wiley & Sons.
Delves, P. J., Seamus, J. M., Burton, D. R. & Roitt, I. M. (2017). *Roitts' Essential Immunology*. (13th ed.). UK: Wiley BlackWell.
Fatima, D. and Arumugam, N. (2013). *Immunology*. Chennai: Saras.
Gangal, S. and Sontakke, S. (2013). *Textbook of Basic and Clinical Immunology*. Orient Blackswan.
Khan, F. H. (2009). *The Elements of Immunology*. USA: Pearson Education.
Murphy, K. & Weaver, C. (2017). *Janeways' Immunobiology*. (9th ed.). New York: Garland Science.
Owen, J. A., Punt, J. & Stranford, S. A. (2013). *Kuby Immunology*. (7th ed.). New York: W.H. Freeman & Company
Wise, D.J and Carter, G. R. (2012). *Immunology – A Comprehensive Review*. New Jersey: Blackwell Science.

JOURNALS

The Journal of Immunology
Journal of Clinical & Cellular Immunology

WEB RESOURCES

www.immunologylink.com
<http://www.proimmune.com>

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50 Duration: 90 minutes

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

Other Components: Total Marks: 50

Seminars/Quiz/Assignments based on research articles/Poster making

End-Semester Examination: Total Marks: 100 Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

ANIMAL BEHAVIOUR, ECOLOGY AND IMMUNOLOGY PRACTICAL

CODE:19ZL/MC/P663

CREDITS:3

L T P:0 0 6

TOTAL HOURS:78

ANIMAL BEHAVIOUR

Animal Associations – Mutualism, Commensalism, Parasitism, Predation (Two examples for each type)
Identification of Bird Nests
Methods of Studying Animal Behaviour – Workshop
Observation of animal behaviour - making ethogram and data sheets
Study of Circadian patterns in humans (daily eating, sleep and temperature patterns)

ECOLOGY

Estimation of the following parameters in different water samples:
Dissolved Oxygen
pH
Salinity
Calcium
Total alkalinity - Free CO₂, CO₃ and HCO₃
Qualitative Field tests for Soil Nitrates and Carbonates.
Spotters - Rocky Shore and Sandy Shore Fauna
Observation and Identification of Marine Plankton

IMMUNOLOGY

VDRL Slide Flocculation Test for Syphilis
ELISA – Qualitative Test for Pregnancy
Radial Immunodiffusion Test (Demonstration)
Ouchterlony Double Immunodiffusion Test (Demonstration)
Observation of Plates – Immune Cells
Demonstration – Anatomical Location of Various Immune Tissues and Organs in Fish

RECORD WORK

Maintenance of a record of practical work done is essential for continuous Assessment.

PATTERN OF ASSESSMENT

Continuous Assessment Test:	Total Marks: 50	Duration: 3 hours
Question – I	20 marks	
Question – II	15 marks	
Question – III Spotters (Five)	15 marks	
End-Semester Examination:	Total Marks: 50	Duration: 3 hours
Question – I	20 marks	
Question – II	15 marks	
Question – III Spotters (Five)	15 marks	

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

DEPARTMENT OF VALUE EDUCATION

SYLLABUS

(Effective from the academic year 2019–2020)

LIFE SKILLS : AN APPROACH TO A HOLISTIC WAY OF LIFE

CODE:19VE/SS/HL63

CREDITS:3

L T P:3 0 0

TOTAL TEACHING HOURS:39

OBJECTIVES OF THE COURSE

- To help students grow in spirituality and to experience themselves as integrated persons
- To help students understand themselves as relational beings and appreciate their role in family and society
- To help students recognize the commonality and differences of the different religions in India
- To help students grow in an awareness of the protective laws regarding women
- To prepare students to make informed choices in family and career

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Appreciate themselves as integrated persons
- Recognize their role in family and society and become aware of the different protective laws in favour of women
- Make prudent choices for career and family
- Manage work life balance
- Live a harmonious life and be a channel of peace

Unit 1

Spiritual Self (10 Hours)

- 1.1 Understanding spirituality-Understanding the Spiritual side of oneself
- 1.2 Role of religious practices and growing in spirituality
- 1.3 Acceptance of self – self-identity, self-worth, self-respect, self-appreciation and self- presentation
- 1.4 Nurturing self - being at home with self, being able to connect with the inner self
- 1.5 Relationship with the Divine:
Discovering the Divine in self, creation, and others – St. Francis of Assisi-
Canticle of creatures Seeking the Divine through meditation, prayer and
worship

Unit 2

Relational Self: Women in the family (17 Hours)

- 2.1 Understanding one's self in the context of family
- 2.2 Family networks
- 2.3 Family time – prayer, meals, and relaxation

- 2.4 Family and social values: respect for others, understanding individual needs and responsibilities – give and take
- 2.5 Understanding different parenting styles – authoritarian, permissive and democratic
- 2.6 Appreciating the gift of womanhood – foundress-Mary of the Passion’s vision of womanhood
- 2.7 Opting for marriage, single, religious or a life committed to a cause
- 2.8 Marriage and family, choice of life partner, marital relationships, planning of family
- 2.9 Other types of relationships - pre-marital relationships, live-in relationship and LGBT issues
- 2.10 Roles and responsibilities of women as home makers and career woman, work life balance (WLB)
- 2.11 Marriage as a sacred bond and fidelity in marriage

Unit 3

Integrated Self

(12 Hours)

- 3.1 Integrating the spiritual, relational, social/political self
- 3.2 Integrating one’s past with the present and the future for holistic living
- 3.3 Social Issues- crimes against women, harassment, gender discrimination, dowry, abortion, separation, divorce and cyber-crimes
- 3.4 Legal rights of women-property, marital and adoptive rights
- 3.5 Sensitization to different religions and religious practices in family and society
- 3.6 Challenges of inter caste and inter religious marriages
- 3.7 Integration of self with family, community and society

Retreat/Workshop – Required for course completion.

BOOKS FOR REFERENCE

Davidar(Eds). Human Values. All India Association of Christian Higher Education. (AIACHE) New Delhi: 2013.

James, G.M. et.al. In Harmony-Value Education at College Level. Chennai: Prakash, 2011.

James, G.M. Personality Development For Life Issues and Coping Strategies. Chennai: 2011

Teaching / Learning Methods

Lectures /Group Discussions/Presentations/Seminars/Guest Lectures

PATTERN OF ASSESSMENT:

Marks: 50

Task based/Seminars/Poster Making/Scrap book/Assignment

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

APPLIED ZOOLOGY

CODE:19ZL/ME/AZ45

CREDITS:5

L T P:5 0 0

TOTAL TEACHING HOURS:65

OBJECTIVES OF THE COURSE

- To enable students to understand the economic value of animals and learn their rearing techniques
- To help students acquire knowledge about different types of aquaculture and methods of aquafarming
- To familiarise students with the different types of pests and their management
- To enable students to take up entrepreneurship

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Explain the economic importance of beneficial and harmful animals
- Discuss the types and scope of Aquaculture
- Identify common insect pests and describe their bionomics and control
- Summarise the methods used in animal husbandry
- Set up small scale industries

Unit 1 (14 Hours)

- 1.1. Types of Aquaculture: Mono, Poly, Extensive, Semi-Intensive, Intensive, Super Intensive, Monosex, Sewage-fed culture and Integrated Fish Farming (Paddy-cum-fish culture)
- 1.2 Culture of Prawn, Lobster, Edible Oyster and Live Feed Animals (*Artemia sp.*, *Daphnia sp.*, and Rotifers)
- 1.3 Preservation and Processing of Fish and Prawn: Chilling, Freezing, Freeze-Drying, Smoking, Salting and Canning – By products of Fishing Industry
- 1.4 Aquarium setting and maintenance: ornamental fishes, safety measures and devices - prospects of Ornamental fisheries - export potential

Unit 2 (13 Hours)

- 2.1 Sericulture Industry in India - Central Silk Board - Silk Research Institutes in India
- 2.2 Insect Pests: Salient Features, Nature of Destruction and Control Measures of the following pests: Pests of Paddy, Cotton, Sugar Cane and Stored Food Grains (Any Three Major Pests of each Crop/Stored Food Grains)
- 2.3 Identification, damage and control of any three Common Pests of Fruits and Vegetables
- 2.4 Integrated Pest Management

Unit 3 (13 Hours)

- 3.1 Economically Important Soil Animals: Soil Microarthropods, Millipedes, Centipedes, Snails and Slugs – Their Importance in Soil Ecosystem
- 3.2 Termites: Characteristics of Mound Soils – Decomposition of Organic Matter – Termitophiles – Termite Damage to Crops and Buildings – Control Measures
- 3.3 Soil Microarthropods: Sampling Methods and Identification of any five soil microarthropods extracted using Berlese Funnel

Unit 4 (14 Hours)

- 4.1 Medicinal Significance of Sponges, Corals, Scorpion venom, Bee venom, Shells and Snake venom
- 4.2 Poultry Science: Quail Farming - Different Breeds - Selective Breeding, Housing and Rearing - Role of Nutrition in Egg Laying - Common Diseases - Economic Importance
- 5.1 Economic Importance of Mammals: Indirect and Direct Value of Mammals - Rabbit farming, Piggery and Dairy.

Unit 5 (11 Hours)

- 5.1 Role of women in small scale industries
- 5.2 Government and Research organisations: CIBA, ZSI, CMFRI, IARI, ICAR, CRRI, FAO, MSSRF, IIBAT and FSI
- 5.3 Entrepreneurial Skills: Marketing and Financial Support - Branding - Promotion

BOOKS FOR STUDY

Ahsan, J. & Sinha, S.P. (2009). *Handbook of Economic Zoology*. New Delhi: S. Chand.
Shukla, G.S. & Upadhyay, V. B. (2017). *Economic Zoology*. Meerut: Rastogi.

BOOKS FOR REFERENCE

Ayyar, T.V. R. (2014). *Handbook of Economic Entomology*. Madras: Narendra.
Banerjee, G.C. (2008). *Poultry*. New Delhi: Oxford and IBH.
Daugherty, L. S. (2012). *Principles of Economic Zoology*. Memphis; General Books.
David, V. B. (1992). *Pest Management and Pesticides*. Madras: Namrutha Publications.
Ignacimuthu, S. & David, B. V. (2009). *Ecofriendly Insect Pest Management*. Bhopal: Elite.
Ismail, S.A. (2005). *The Earthworm Book*. Goa: India.
Jhinghran, V.G. (1982). *Fish and Fisheries of India*. New Delhi: Hindustan Publishing Corporation.
Pandey, K. & Shukla, J. P. (2019). *Fish and Fisheries*. Meerut: Rastogi.
Pillay, T. V. R. & Kutty, M. N. (2005). *Aquaculture Principles and Practices*. Wiley India.
Singh, R. (2018). *Elements of Entomology*. Meerut: Rastogi.
Smith, D. J. (2016). *Aquarium Keeping*. New York City: Amazon Digital Services.
Vasanthraj, B. & Ananthakrishnan, T.N. (2004). *General and Applied Entomology*. Bombay: Tata McGraw Hill.

JOURNALS

The Journal of Basic and Applied Zoology
Zootecnia Tropical
Fishery Technology

WEB RESOURCES

<https://www.karnataka.gov.in/sericulture/>

<http://www.epa.gov/>

<http://www.vegetableipmasia.org/index>

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50

Duration: 90 minutes

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

Other Components: Total Marks: 100

Scrap book/Poster/model making/Quiz/Assignment

End-Semester Examination: Total Marks: 100

Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

(Effective from the academic year 2019-2020)

PROJECT

CODE:19ZL/ME/PR45

CREDITS:5

OBJECTIVES OF THE COURSE

- To enable students to carry out an independent study on a topic of their choice
- To help students to acquire a spirit of scientific inquiry
- To enable students to learn research methodology and data interpretation

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Identify a scientific problem to carry out a project work
- Review relevant scientific literature
- Design experiments
- Collate, Analyse and Interpret data
- Compile and present their findings

Criteria for Selection of Candidates

- The student should have research aptitude
- The student should possess good analytical skills, computer skills, good writing skills and the ability to interpret and discuss scientific data
- An eligibility test will be conducted

Guidelines

- Each student will present a list of topics in the area of her interest
- One of the topics will be approved by the Supervisor
- Weekly interaction with the supervisor is mandatory
- The project work will require
 - Practical work
 - Submission of project report
 - Viva-voce
- Project report should be submitted at the end of the semester on the stipulated date.

Evaluation

Continuous Assessment – 50 marks

End semester evaluation of project work and viva voce- 50 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

MEDICAL LABORATORY TECHNOLOGY

(Skill development course)

CODE:19ZL/ME/LT45

CREDITS :5

L T P:5 0 0

TOTAL TEACHING HOURS:65

OBJECTIVES OF THE COURSE

- To enable students to learn the foundations of clinical theory and practice
- To enable students to develop specific skills in Laboratory Techniques
- To help students to understand the importance of good lab practices and biomedical waste management.

COURSE LEARNING OUTCOME

On successful completion of the course, students will be able to

- Discuss the need for Good Lab Practices
- Explain the procedure involved in various laboratory techniques
- Identify the various parameters checked in a lab and interpret the results obtained.
- Develop skills in performing clinical tests
- Describe procedures in Biomedical Waste Management

Unit 1

(11 Hours)

- 1.1 Good Lab Practices (GLP)
- 1.2 Sterilisation of Laboratory Items - Preparation of Reagents - Preparation of R.B.C & W.B.C. Fluids, Normal Saline and Leishman's Stain
- 1.3 Venous and Capillary Blood Collection Techniques – Anticoagulants: Modes of Action and Uses
- 1.4 Biomedical Wastes: Classification, Characteristics and Potential Health Hazards, Biomedical Waste Management: Rules and Regulations

Unit 2

(14 Hours)

- 2.1 Red Blood Corpuscle: Structure (Normal & Abnormal), Erythropoiesis, Total Count, Packed Cell Volume - Wintrobe's and Microhaematocrit Techniques, Total Reticulocyte Count - Erythrocyte Sedimentation Rate: Westergren's Method - Haemoglobin Estimation: Sahli's, Drabkin's Methods (Practicals) - Types of Anaemia – Polycythemia
- 2.2 White Blood Corpuscle: Types, Leucopoiesis, Total W.B.C Count - Preparation of Blood Smear For Differential Count - Leucocytosis – Leukemia - Leucopenia
- 2.3 Blood Platelets – Thrombopoiesis - Platelet Counting

Unit 3 (13 Hours)

- 3.1 Immunohaematological Studies – importance - Blood Groups and Rh-Types – methodology of blood grouping and Rh typing
- 3.2 Transfusion of Blood and Blood Components – Tests For Compatibility
- 3.3 Blood Coagulation: Factors - Process and Theory – Bleeding Time - Clotting Time - Prothrombin Time (Practicals)

Unit 4 (14 Hours)

- 4.1 Urine: Macroscopic, Microscopic and Chemical Analysis
- 4.2 Examination of Blood Smear for Malarial Parasites and Microfilariae – Motion Analysis for Common Protozoan and Helminthic Intestinal Parasites
- 4.3 Analysis of Cerebrospinal Fluid and Seminal Fluid
- 4.4 Mode of Infection, Pathological Changes and Symptoms of Acquired Immuno Deficiency Syndrome (AIDS), Hepatitis and Tuberculosis (TB)

Unit 5 (13 Hours)

- 5.1 Test for Glucose, Urea and Cholesterol – Ranges in Health and Disease and Interpretation (Practical)
- 5.2 Physiology and Biochemistry of the Serum Enzymes – Aspartate Transaminase (AST) and Alanine Transaminase (ALT)
- 5.3 Laboratory Pregnancy Tests – PAP Smear and its significance
- 5.4 Visit to advanced laboratory / internship

BOOKS FOR STUDY

Sood, R. (2015). *Concise Book of Medical Laboratory Technology: Methods and Interpretations*. New Delhi: Jaypeedigital.

BOOKS FOR REFERENCE

- Baker, F.J., Silvertown, R.E. & Pallister, C.J. (2001). *Baker and Silvertown's Introduction to Medical Laboratory Technology*. London: Hodder Arnold.
- Bauer, J.D. (1990). *Clinical Laboratory Methods*. New Delhi: B.I.
- Estridge, B.H., Reynolds, A.P. & Walters, N.J. (2002). *Basic Medical Laboratory Techniques*. Africa and Australia: Delmar Thomas Learning.
- Hall, J. E. (2016). *Guyton and Hall Text Book of Medical Physiology*. UK: Elsevier
- McPherson R.A & Pincus, M. R. (2011). *Henry's Clinical Diagnosis and Management by Laboratory Methods*. Philadelphia: W.B. Saunders.
- Ramakrishnan, S & Sulochana, K. N. (2012). *Manual of Medical Laboratory Techniques*. New Delhi: Jaypee Brothers Medical.
- Raphael, S.S. (1983). *Lynch's Medical Laboratory Technology*. Philadelphia: W.B. Saunders Co.

JOURNALS

Journal of Clinical Laboratory Analysis
American Journal of Medical Technology

WEB RESOURCES

www.csmls.org
<http://www.nlm.nih.gov/medlineplus>

PATTERN OF ASSESSMENT

Continuous Assessment Test:

Total Marks: 50

Duration: 90 minutes

Section A – 6 x 2 = 12 (All questions to be answered)

Section B – 3 x 6 = 18 (3 out of 5 to be answered)

Section C – 1 x 20 = 20 (1 out of 2 to be answered)

Other Components:

Total Marks: 50

Seminars/Quiz/Case studies/Poster presentation

End-Semester Examination:

Total Marks: 100

Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

ENVIRONMENTAL BIOTECHNOLOGY

CODE:19ZL/ME/EB45

CREDITS:5

L T P:5 0 0

TOTAL TEACHING HOURS:65

OBJECTIVES OF THE COURSE

- To help students to acquire knowledge on the application of principles of biotechnology to environmental problems and issues
- To enable students to comprehend the methodologies involved in bioremediation and water treatment
- To familiarise students with current technologies employed in environmental sustainability

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Discuss the need for environmental monitoring
- Explain the importance of microbial diversity in environmental systems
- Describe existing and emerging technologies that are important in the area of environmental biotechnology
- Relate the principles and techniques underpinning the application of different disciplines to the environment
- Recognise biotechnological solutions which will address environmental issues including pollution, mineral resource mining, renewable energy and water recycling

Unit 1

Environmental Monitoring

(13 Hours)

- 1.1 Introduction – Need for Monitoring
- 1.2 Sampling and Analysis – Air, Soil and Water
- 1.3 Determination of Biodegradable Organic Material - Monitoring Pollution
- 1.4 Toxicity Testing Using Biological Material - Bio indicators, Biomarkers and Biosensors

Unit 2

Bioremediation

(14 Hours)

- 2.1 Introduction : Synthetic Compounds – Petrochemical Compounds and Inorganic Wastes in The Environment (A Brief Outline)
- 2.2 Bioaugmentation using Genetically Modified Organisms - Bioremediation Strategies: Phytoremediation and Bioaugmentation, Metal and gaseous Bioremediation
- 2.3 Bioremediation Techniques

2.4 Case Studies : Taj Mahal(Agra), Lotus temple (Delhi), Golden Temple(Amritsar) and Charminar (Hyderabad)

Unit 3 (15 Hours)

Waste Treatment

- 3.1 Sewage Treatment Methods : STP - Sludge Treatment and Disposal; Anaerobic Digestion
- 3.2 Treatment of Agricultural Wastes - Removal of Nitrogen and Phosphorus
- 3.3 Treatment of Industrial Effluents: ETP - Distillery, Dairy, Tannery, Textile and Sugar Industries

Unit 4 (12 Hours)

Towards Sustainable Development

- 4.1 Biofertilizers in an Agro Ecosystem
- 4.2 Biopesticides: Types and Mode of Action of *Bacillus thuringiensis*
- 4.3 Biofuels: Biogas, Biodiesel, Ethanol and Hydrogen

Unit 5 (11 Hours)

Resource Recovery

- 5.1 Introduction – Need for Recovery of Resources
- 5.2 Oil Recovery: Enhanced Oil Recovery and Microbially Enhanced Oil Recovery
- 5.3 Bioleaching: Extraction of Copper, Uranium and Gold

BOOKS FOR STUDY

Scragg, Alan. (2007). *Environmental Biotechnology*. New York: Oxford University Press

BOOKS FOR REFERENCE

- Allen K. (2005). *Environmental Biotechnology*. New Delhi : CBS Publishers
- Bruce Rittmann and Perry Mc Carty, (2017). *Environmental Biotechnology: Principles and Applications*, Chennai: Tata Mc Graw Hill
- Chatterji, A.K. (2011). *Introduction to Environmental Biotechnology*, (3rd ed.).Delhi : PHI Publication
- Evans, Gareth, M. and Judith C. Furlong, (2012). *Environmental Biotechnology: Theory and Applications*. New Jersey: Wiley – VCH
- Hans – Joachim Jordening and Joseph Winter, (2005). *Environmental Biotechnology: Concepts and Applications*. New Jersey: Wiley – VCH
- Indu Shekhar Thakur, (2013). *Environmental Biotechnology-Basic Concepts and Applications* (2nd ed.).New Delhi: TK Publishers
- Mishra, C. S. K and Asha A. Juarkar, (2007). *Environmental Biotechnology*. Delhi : P. H. Corporation
- Mohapatra, Pradipta Kumar, (2006). *Textbook of Environmental Biotechnology*. New Delhi: I.K.International
- Pramod Kumar and Vipin Kumar, (2019). *Textbook of Environmental Biotechnology*, Delhi : WPI Publishers
- Viswanath Buddolla, (2016). *Environmental Biotechnology: Basic Concepts and Applications*, New Delhi: Narosa Publisher

JOURNALS

- Journal of Environmental Biotechnology
- International Journal of Environmental Biotechnology

WEB RESOURCES

<http://www.environmentalbiotechnology.org/>

<http://www.biodesing.asu.edu>

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 50

Duration: 90 minutes

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

Other Components: Total Marks: 50

Seminars/Quiz/Assignments/Case studies/Project

End-Semester Examination: Total Marks: 100

Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

INTRODUCTION TO MARINE BIOLOGY

CODE:19ZL/ME/IB45

CREDITS:5

L T P:5 0 0

TOTAL TEACHING HOURS:65

OBJECTIVES OF THE COURSE

- To enable an understanding of basic knowledge of oceans and the marine environment and its associated ecosystems.
- To familiarise students with various threats to the oceans and marine biodiversity and create awareness on the need for conservation.
- To enable students to learn about the economic importance of the ocean and its inhabitants

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Explain the diversity, distribution and adaptations of marine organisms
- Relate the physical and chemical processes of the oceans with the biology of organisms
- Distinguish between coastal, estuarine and marine ecosystems.
- Identify some of the more common marine species
- Discuss the impact of habitat disturbance on marine organisms and subsequent ecosystem-level consequences
- Describe the economic importance of select marine fauna.

Unit 1 (13 Hours)

- 1.1 Oceanography - Geologic history of oceans – seas – continental shelf – continental slope
- 1.2 Oceanic currents – oceanic water masses and circulation – waves and tsunamis – tides: origin – hydrothermal vents – polar seas
- 1.3 Marine instrumentation: echosounder, side scanning sonar, marine navigator, underwater camera
- 1.4 Ocean resources and exploration – expeditions – bioresources of the sea: food, mineral and petroleum resources

Unit 2 (15 Hours)

- 2.1 Marine zoogeography - Marine biodiversity: definition, importance, assessment techniques – marine invertebrates and chordates (general) – biodiversity at regional and global level
- 2.2 Pelagic organisms: plankton and nekton - benthic fauna – deep sea life: adaptations, factors affecting populations

2.3 Coastal biodiversity: intertidal, littoral, sublittoral – seagrass and other halophytes – Mangroves – fauna associated with mangroves – coral reefs – fauna associated with reefs - Marine microfauna (foraminiferans and radiolarians)

2.4 Sea Birds and Marine mammals: Diversity, Adaptations and Unique behaviours

Unit 3 (15 Hours)

3.1 Threats to marine biodiversity: physical alteration and habitat loss, overexploitation, Pollution, alien species, climate change, acidification

3.2 Ocean pollution: kinds and quantities of pollutants entering oceans – sewage and nutrients from rivers and estuaries – trace metals – heavy metals - nuclear waste – fate of pollutants – toxic effects

3.3 Plastic pollution in the marine environment: nature of plastics, impact – oil spills, impact

3.4 Biofouling: definition, biofouling organisms, problems due to biofouling – pollution due to antifouling paints – biofouling control – Case study

Unit 4 (11 Hours)

4.1 Mariculture: definition, importance, present status in India, types of culture (general)-commercial marine fishery sources of India and Tamil Nadu

4.2 Marine ornamental aquatic organisms: crustaceans, molluscs, fishes – their suitability for aquaria

4.3 Marine fossils: Coelenterates, Trilobites, Gastropods, Cephalopods, Pelecypods, Brachiopods, Echinoderms and Ichthyosaurs

Unit 5 (11 Hours)

5.1 Marine microbes: bacteria, fungi and protozoans

5.2 Microbial biofilms – carbohydrate products and derivatives – nitrogenous compounds – Production and applications of marine microbial products – pigments: Astaxanthin, β carotene – bioadhesives and thermostable enzyme – Probiotic bacteria and their importance in aquaculture.

5.3 Drugs from marine animals: Sources, Importance - Antibiotic compounds Steroids, carotenoids and Sterols from marine forms

5.4 Toxins from marine animals: Types, Functional properties – Venom in marine animals: sea snake, fish and molluscs - Pharmacological and toxicological properties of venom

BOOKS FOR STUDY

Biswas, K.P. (2013). *Marine Biology*. New Delhi: Daya Publishing House.

BOOKS FOR REFERENCE

Barnes, R.S.K and Hughes, R.N. (1999). *An Introduction to Marine Ecology*. New Jersey: Blackwell Science.

Beiras, R. (2018). *Marine Pollution. Sources, Fate and Effect of Pollutants in Coastal Ecosystems*. Netherlands: Elsevier.

Harper, J. (2017). *Marine and Aquatic Sciences*. USA: Callisto Reference.

Kim, S. K. (2015). *Handbook of Marine Biotechnology*. U.K : Springer Handbook.

Niver, H. M. (2017). *Marine Fossils*. USA: Powerkids.

Odum, E.P. (2017). *Ecology*. U.K :Oxford and IBH Publishing Co. Pvt. Ltd.
Ross, D. A. (1995). *Introduction to Oceanography*. Noida: Harper Collins.
Townsend, D. W. (2012). *Oceanography and Marine Biology: An Introduction to Marine Science*. USA: Sinauer Associates.

JOURNALS

Journal of Marine Biology
Marine Biodiversity

WEB RESOURCES

www.life.bio.sunysb.edu/marinebio
www.worldoceanobservatory.org/content/online-resources-marine-biology

PATTERN OF ASSESSMENT

Continuous Assessment Test: **Total Marks: 50** **Duration: 90 minutes**
Section A – $6 \times 2 = 12$ (All questions to be answered)
Section B – $3 \times 6 = 18$ (3 out of 5 to be answered)
Section C – $1 \times 20 = 20$ (1 out of 2 to be answered)

Other Components: **Total Marks: 50**

Seminars/Quiz/Case studies/Poster

End-Semester Examination: **Total Marks: 100** **Duration: 3 hours**

Section A – $10 \times 3 = 30$ Marks (All questions to be answered)
Section B – $5 \times 6 = 30$ Marks (5 out of 7 to be answered)
Section C – $2 \times 20 = 40$ Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by the Department of Zoology to
B.A/B.Sc/B.Com/ B.B.A. /B. S. W./ B.C.A. /B.V.A Degree Programmes**

SYLLABUS

(Effective from the academic year 2019-2020)

PET CARE

CODE:19ZL/GE/PC22

CREDITS :2

L T P:2 0 0

TOTAL TEACHING HOURS:26

OBJECTIVES OF THE COURSE

- To enable students to understand the general principles of pet care.
- To familiarise students with the feeding, containment and grooming of pets
- To enable students to identify and manage some common diseases of pets
- To help inculcate in students, a humane and caring attitude towards animals and their welfare.

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Discuss concepts in animal welfare
- Recognize abnormal behavior in pet animals
- Describe needs of pets and how they can be met
- Identify a few different breeds of fish, birds, cats and dogs
- Apply pet selection criteria while selecting pets
- List a few common health/hygiene problems of pets and their remedies

Unit 1 (8 Hours)

- 1.1 Science, Ethics, Law and Welfare Assessment of Animals – Mental, Physical and Natural Assessment of Welfare – Five Freedoms – Factors that Contribute to Animal Behaviour and Welfare
- 1.2 Recognition of Normal Behaviour – Abnormal Behaviour in Pet Animals
- 1.3 Laws and Licenses – Animal Charities and Societies: RSPCA, WSPA, Blue Cross – Pet Trade – Trafficking in pets
- 1.4 Pet Care Needs: Feeding, Watering, Shelter, Containment, Fencing, Caging, Protection

Unit 2 (9 Hours)

- 2.1 Care of fish – Fish Selection – Types of Fish (Tropical, Marine, Cold Water)
- 2.2 Maintaining aquaria: Tanks, Size, Cost, Pumps, Lighting, Water Quality Management – Feed (pelleted, microencapsulation, diet and live feed e.g., *Daphnia sp.* and *Artemia sp.*)
- 2.3 Diseases in Fish (fungal, bacterial, parasites, environmental) and treatment
- 2.4 Breeds of Birds (e.g., Parrots, Pigeons, Love Birds) – Bird Selection

- 2.5 Containment (Aviaries – selection, design, size, management) – Feed – Watering – Grooming (Wing trim, Beak Trim, Nail Trim) – Hygiene – Catching and Restraining
- 2.6 Caring for a sick bird: Signs of illness, temperature, supportive therapy – Common Ailments – Abscesses, Alopecia, Apoplexy, Aspergillosis, Breathlessness, Constipation, Parasites - Treatment

Unit 3 (9 Hours)

- 3.1 Breeds of Cats (Long- Haired, Semi Long- Haired, Short-Haired, Oriental, Bombay Cross) – Selection of Cats
- 3.2 Cat care: Containment, Nutrition and Grooming - New born kittens - Breeding
- 3.3 Common infections and Treatment in Cats and their treatment
- 3.4 Breeds of Dogs (Pure and Mixed)
- 3.5 Selection of Dogs - Varying size and Temperament – Dog Care: Containment, Nutrition and Grooming – Breeding
- 3.6 Common infections in dogs and their treatment : tapeworm, Ticks and Viral infection (Rabies)
- 3.7 Zoonotic diseases: causes and prevention

BOOKS FOR REFERENCE

- Alderton, David. (2016). *The Illustrated Practical Guide to Small Pets & Pet Care: Hamsters, Gerbils, Guinea Pigs, Rabbits, Birds, Reptiles, Fish*. Ohio: Lorenz Books.
- Andrews, Chris, (2011). Exell Adrian and Carrington, Neville. *Manual of Fish Health*. U.K: Interpet publishing
- Brown, Andi. (2006). *The Whole Pet Diet. Eight Weeks to Great Health for Dogs and Cats*. California: Celestial Arts.
- Gerstenfeld, Sheldon, L. (1989). *The Bird Care Book*. Massachusetts: Lifelong Books.
- Hines, Shannon.(2007). *Holistic Pet Care: For the Responsible Pet Owner*.Colorado: Outskirts Press.
- Puotinen , C.J. (2000). *The Encyclopedia of Natural Pet Care*. New York : Mc Graw Hill.
- Shojai, Amy.(2017). *Complete Kitten Care*. London:Furry Muse Publishing.
- Silverstein, Deborah C. and Hopper, Kate (ed.). (2015) *Small Animal Critical Care Medicine*. Amsterdam: Elsevier Inc.,
- Levin, Caroline D. *Dogs*,(2001). *Diet and Disease – An Owner’s Guide to Diabetes Mellitus, Pancreatitis, Cushings Disease and More*.Nigeria: Lantern Publications.

JOURNALS

- Pet Boarding and Day Care Magazine
- Journal of Exotic Pet Medicine

WEB RESOURCES

- www.bluecrossofindia.org
- www.peta.org

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 25 Duration: 60 minutes

Section A – 5 x 2 = 10 Marks (All questions to be answered)

Section B – 1 x 5 = 5 Marks (1 out of 2 to be answered)

Section C – 1 x 10 = 10 Marks (1 out of 2 to be answered)

Other Components: Total Marks: 25

Quiz/Scrap Book/Assignment/Poster making/Case study presentation

No End-Semester Examination

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by Department of Zoology to Students of
B A. / B.Sc. / B.Com. / B.S.W. / B.B.A and B.V.A Degree Programmes**

SYLLABUS

(Effective from the academic year 2019-2020)

NUTRITION AND THERAPEUTIC DIET

CODE:19ZL/GE/ND22

CREDITS:2

L T P:2 0 0

TOTAL TEACHING HOURS:26

OBJECTIVES OF THE COURSE

- To familiarise students with nutrition, health, food safety and nutritional disorders
- To help students understand the principles and practices involved in Diet Therapy

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Discuss functions, sources, deficiencies and toxicities of macro and micronutrients
- Utilize concepts of balanced diet and diet therapy and relate them to fitness and health.
- Relate importance of Therapeutic diet
- Construct a meal planning menu for normal and specific diets

Unit 1 (10 Hours)

- 1.1 Sources and Functions of Macro nutrients and Micro nutrients, Antioxidants and Fiber
- 1.2 Balanced Diet-Food Groups and Food Guide -Nutrigenomics
- 1.3 Malnutrition: Protein Energy Malnutrition (PEM), Iodine Deficiency, Vitamin A Deficiency and Iron Deficiency
- 1.4 Eating Disorders

Unit 2 (9 Hours)

- 2.1 Diet Therapy: Purpose and Principles - Food Acceptance in Illness - Therapeutic Diets –Tube Feeding – Parenteral Feeding
- 2.2 Diet for-Diabetes Mellitus and Cardiovascular Diseases
- 2.3 Diet Therapy for Addictive Behaviors - Anorexia nervosa, Bulimia nervosa and Alcoholism

Unit 3 (7 Hours)

- 3.1 Meal Planning – Nutritious Food (Breakfast, Lunch and Dinner) – Calculation of Calories
- 3.2 Preparation of Low Cost Nutritious Food - Practicals
- 3.3 Nutritious Food for Anaemic Individuals, Adolescents, Pregnant Women and Elderly Persons

BOOKS FOR REFERENCE

Brown, Judith E. (2003).*Nutrition Now*. Canada: Wadsworth Thomson Learning
Caroll A. Lutz, (2015) *Nutrition and Diet therapy*, (6th ed), Philadelphia: F.A. Davis Company

Insel, Paul.R. Elaine Turner and Don Ross. (2007). *Discovering Nutrition*. Massachusetts: Jones and Bartlett
Krause, (2016) *Food and Nutrition Therapy*, (14th ed)., Amsterdam: Elsevier
Mudambi, S.R. and M.V. Rajagopal. (2018). *Nutrition and Diet therapy*. Chennai: New Age International
Rosalinda T. Lagua and Virginia S Claudio. (1996) *Nutrition and Diet therapy Reference Dictionary*, (4th ed) , London: Chapman & Hall
Sangeeta Karvita, (2010) *Nutrition and Diet therapy*, Biotech Publisher
Srilakshmi, B. (2006). *Dietetics*. Chennai: New Age International
Wardlaw, Gordon M. and Jeffrey S. Hampl (2007). *Perspectives in Nutrition*. New York: McGraw Hill

JOURNALS

Journal of Nutritional Disorders and Therapy
Journal of Food Science and Nutrition Therapy

WEB RESOURCES

<http://www.eatright.org/>
<http://www.who.int/nutrition/en/>

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 25 Duration : 60 minutes

Section A – 5x 2 = 10 Marks (All questions to be answered)

Section B – 1 x5 = 5 Marks (1 out of 2 to be answered)

Section C – 1 x 10 = 10 Marks (1 out of 2 to be answered)

Other Components: Total Marks : 25

Assignment /Preparation of low cost nutritious food /Preparation of specific diet- Meal Planning/Scrap book

No End-Semester Examination

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by Department of Zoology to students of
B A. / B.Sc. / B.Com. / B.B.A./B.S.W / B.V.A/ B.C.A. (except B.Sc. Plant Biology and
Biotechnology) Degree Programmes**

SYLLABUS

(Effective from the academic year 2019-2020)

GENES, DISEASES AND SOCIETY

CODE:19ZL/GE/GD22

CREDITS:2

L T P:2 0 0

TOTAL TEACHING HOURS:26

OBJECTIVES OF THE COURSE

- To enable students to understand the basic principles of Human Heredity
- To help students to have an understanding of the different patterns of genetic inheritance
- To familiarise students with the recent advances in the field of Genetics and their ethical and social implications

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Differentiate the various patterns of genetic inheritance
- Analyse the various causes for genetic disorders
- Relate the concepts in genetics / biotechnology to human welfare
- Discuss the impact of consanguineous marriage in society
- Identify the various ethical, legal, societal issues related to techniques in Genetics

Unit 1

(9 Hours)

- 1.1 Introduction - Human Gametes and their Role in Heredity – DNA the Genetic Material - Mendelian Inheritance: Monohybrid and Dihybrid Cross Experiments - Identification of Mendelian Traits in Humans - Pedigree Analysis and its Applications
- 1.2 Lethal Genes: Definition, Types and Inheritance
- 1.3 Multiple Allelic Inheritance: ABO and Rh Blood Types in Humans – ABO Blood Grouping and Rh Typing, Practical – Case Study/Problem Solving - Polygenic Inheritance (Skin Colour in Humans)

Unit 2

(10 Hours)

- 2.1 Autosomal Recessive Inheritance (Albinism) - Autosomal Dominant Inheritance (Familial Hypercholesterolemia)- X-Linked Dominant Inheritance (Hypophosphatemia) – X-Linked Recessive Inheritance (Haemophilia) – Y-Linked Inheritance (Hypertrichosis) – Mitochondrial Inheritance (Kearns Sayre Syndrome)
- 2.2 Disorders with Genetic Predisposition: Diabetes, Breast Cancer, and Alzheimer's Disease - Chromosomal Disorders: Down's Syndrome, Turner's Syndrome, Klinefelter's Syndrome - Observation of Karyotypes - Metabolic Disorders: Phenylketonuria, Huntington Disease and Lactose Intolerance

2.3 Consanguineous Marriage and its Impact in the Society- Genetic Counselling

Unit 3 (7 Hours)

3.1 Applications of Genetic Engineering: Genetically Modified Organisms, Gene Therapy and Gene Cloning

3.2 Predictive Genetic Testing: DNA Finger Printing (Case Study)

3.3 Ethical, Legal and Societal Issues (ELSI) Related to Techniques in Genetics

BOOKS FOR REFERENCE

Cummings, M. R. (2012). *Human Heredity – Principles and issues.*(10th ed.) Canada: Thomson Brooks/Cole

Gardener A & Daves T. (2012). *Human Genetics.* (2nd ed.). New Delhi: Viva Books.

Hartl, D. L. (2013). *Essential Genetics & Genomics.* (7th ed.). USA: Jones & Bartlett Learning.

Kelly, E. B. (2013). *Encyclopaedia of Human Genetics & Diseases. Volumes I & II.* Connecticut: Greenwood Publishing House.

Klug, W. S., Cummings, M. and Spencer, C. (2018). *Concepts of Genetics.*(12th ed.). New Jersey: Pearson Education

Pierce, B. A. (2016). *Genetics – A conceptual approach.*(6th ed.). New York: W. H. Freeman.

Russel, P. J. I. (2011). *Genetics – A molecular approach.* San Francisco: Benjamin Cummings.

Snustad, P. D. and Simmons, M. J. (2012). *Principles of Genetics.* (6th ed.) New York: John Wiley.

Yashion, R. & Cummins. M. *Human Genetics & Society.* (2nd ed.) 2012.

JOURNAL

Journal of Human Genetics

Journal of Genetics and Genomics

WEB RESOURCES

www.ncbs.res.in

www.omim.org

PATTERN OF ASSESSMENT

Continuous Assessment Test: Total Marks: 25 Duration: 60 minutes

Section A – 5 x 2 = 10 Marks (All questions to be answered)

Section B – 1 x 5 = 5 Marks (1 out of 2 to be answered)

Section C – 1 x 10 = 10 Marks (1 out of 2 to be answered)

Other Components:

Quiz/Pedigree Chart Construction/Assignment /Poster Presentation/Problem Solving

No-End-Semester Examination

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by the Department of Zoology to
B.A/B.Sc/B.Com/ B.B.A. /B. S. W./ B.C.A. /B.V.A Degree Programmes**

SYLLABUS

(Effective from the academic year 2019-2020)

BIOLOGY OF HUMAN REPRODUCTION

CODE:19ZL/GE/HR22

CREDITS :2

L T P:2 0 0

TOTAL TEACHING HOURS:26

OBJECTIVES OF THE COURSE

- To enable students to understand the human reproductive system and its functions
- To help students to learn the biological aspects of sexuality and ethical issues associated with reproductive technology

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Describe the gross appearance and functions of male and female reproductive systems.
- Explain the role of hormones associated with the reproductive tracts and their control
- Explain the mechanism of sex determination.
- Discuss age-associated physiological changes in the reproductive tract
- Describe physiological changes during pregnancy and benefits of breast feeding.
- Identify causes for infertility, treatments available and ethical issues related to treatments.
- Discuss advantages and disadvantages of available contraceptives.
- List common forms of fetal malformations and their causes.

Unit 1 (8 Hours)

- 1.1 Reproductive System: Testis – Testicular Functions, Ovary – Uterine and Ovarian cycle
- 1.2 Hormonal Control of Reproduction: H-P-G Axis
- 1.3 Puberty - Menopause – Andropause

Unit 2 (9 Hours)

- 2.1 Procreation – Fertilization – Implantation – Placentation- Embryonic and Fetal Development- Sex Determination
- 2.2 Prenatal Diagnosis: Invasive and non-invasive methods
- 2.3 Pregnancy – Parturition - Lactation
- 2.4 Consanguinity – Fetal Loss - Birth Defects

Unit 3 (9 Hours)

- 3.1 Male and Female Infertility: Physiological Causes – other causes: smoking, obesity, stress, alcoholism, psychoactive drugs
- 3.2 Control of Fertility: Abstinence, Contraception – Medical Termination of Pregnancy
- 3.3 Sexually Transmitted Diseases: Gonorrhoea, Syphilis, Genital Herpes

- 3.4 Assisted Reproductive Technology: Artificial Insemination, Induced Ovulation, IVF and ET, Cryopreservation, Stem Cell Banking - associated ethical issues
3.5 Surrogate Motherhood - Adoption

BOOKS FOR REFERENCE

Cassan, A. (2005). *Human reproduction and Development (Inside the Human Body)*. New York: Chelsea Clubhouse.
Field, M. A. (1990). *Surrogate Motherhood*. Massachusetts: Harvard University.
Gardner, D. K.(2001). *Textbook of Assisted Reproductive Techniques: Laboratory and Clinical Perspectives*. London: Martin Dunitz.
Johnson, M. H. (2018). *Essential Reproduction*. New Jersey: Wiley-Blackwell.
Jones, R. E. (2013). *Human Reproductive Biology*. Amsterdam: Elsevier.
Pinon, R. (2003). *Biology of Human Reproduction*. California: University Science Books.
Tremellon K. and Pearce, K. (2015). *Nutrition, Fertility and Human Reproductive Function*. Florida: CRC Press.

JOURNALS

Journal of Human Reproductive Science
Human Reproduction

WEB RESOURCES

www.physiologyweb.com
<http://www.visembryo.com/baby/index.html>

PATTERN OF ASSESSMENT

Continuous Assessment Test:	Total Marks: 25	Duration: 60 minutes
Section A – 5 x 2 = 10 Marks (All questions to be answered)		
Section B – 1 x 5 = 5 Marks (1 out of 2 to be answered)		
Section C – 1 x 10 = 10 Marks (1 out of 2 to be answered)		

Other Components:

Quiz/Scrap Book/Assignment/Poster making

No End-Semester Examination

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by the Department of Zoology to
B.A / B.Sc / B.Com / B.B.A. /B.S.W. / B.C.A. /B.V.A. Degree Programme**

SYLLABUS

(Effective from the academic year 2019-2020)

THE FASCINATING WORLD OF INSECTS

CODE:19ZL/GE/FI22

CREDITS :2

L T P:2 0 0

TOTAL TEACHING HOURS:26

OBJECTIVES OF THE COURSE

- To enable students to understand basic insect biology, their natural history and evolution.
- To enable students to appreciate the economic importance of insects including their impact on human health, agriculture and the environment.

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Categorize a few insects based on ecological, behavioural, morphological and developmental attributes
- Identify the potential impact of a few common insect species on human health, agriculture and society in general
- Discuss unique adaptations and behaviour of insects
- Describe how insects can act as eco-indicators

Unit 1 (8 Hours)

- 1.1 Introduction: Taxonomic position of insects in the animal world - Evolution of insects – Scope of Entomology
- 1.2 Diverse habitats and general structure of an insect - Winged and Wingless insects- Insects on the Stella Maris College Campus
- 1.3 Types of Feeding

Unit 2 (9 Hours)

- 2.1 Reproduction and development in insects – Metamorphosis: complete and incomplete- Life cycle of butterfly and mosquito
- 2.2 Special adaptations in land-dwelling and aquatic insects – Nocturnal and Diurnal Insects – Defense Mechanisms: Camouflage, Mimicry, Toxin Production, Thanatosis – Bioluminescence
- 2.3 Insect Behaviours: Nest making, Courtship, mating - Intra- specific and inter-specific relationships - Other interesting behaviour: leaf mining, mud puddling, mushroom farming, dung rolling, processionary caterpillars, sound production, alarm signals, diapause, insect-plant interactions

Unit 3**(9 Hours)**

- 3.1 Social insects - Social life in honey bees and ants
- 3.2 Useful insects: insect pollinators - insect products – Harmful insects: insect pests, insects as vectors of diseases and venomous insects
- 3.3 What we can learn from Insects: Biomimicry - Insects as indicator organisms; Insects in Literature

BOOKS FOR REFERENCE

- Ambrose, D. P. (2010). *The Insects: Beneficial and Harmful Aspects*. Cuttack: Kalyani Publishers.
- Chapman, R.F., Simpson, S. J. & Douglas, A. E. (2013). *The Insects. Structure and Function*. Cambridge: Cambridge University Press.
- Goff, M. L. (2000). *A Fly for the Prosecution. How Insect Evidence helps Solve Crimes*. Massachusetts: Harvard University Press.
- Hoyt, E. & Schultz, T. (1999). *Insect Lives. Stories of Mystery and Romance from a Hidden World*. New Jersey: John Wiley and Sons Inc.
- Huis, A. & Tomberlin, J. K. (2017). *Insects as Food and Feed: From Production to Consumption*. Netherlands: Wageningen Academic Publishers.
- Iyer, G. (2016). *The Weavers. The Curious World of Insects*. Noida: Harper Collins.
- Shaw, S. R. (2015). *Planet of the Bugs. Evolution and Rise of Insects*. Chicago: The University of Chicago Press.
- Waldbauer, G.P. (2012). *How not to be Eaten. The Insects Fight Back*. California: University of California Press.
- Waldbauer, G. P. (2008). *A Walk around the Pond. Insects in and Over the Water*. Massachusetts: Harvard University Press.
- Waldbauer, G. P. (2004). *What Good are bugs? Insects in the Web of Life*. Massachusetts: Harvard University Press.
- Wilson, E.O. (1971). *The Insect Societies*. Cambridge: Belknap Press.

JOURNALS

- Journal of Insects
- Journal of Insect Science

WEB RESOURCES

- www.insects.orkin.com
- www.nationalgeographic.org/topics/insects

PATTERN OF ASSESSMENT

- Continuous Assessment Test: Total Marks: 25 Duration: 45 mins**
- Section A – 5 x 2 = 10 Marks (All questions to be answered)
- Section B – 1 x 5 = 5 Marks (1 out of 2 to be answered)
- Section C – 1 x 10 = 10 Marks (1 out of 2 to be answered)

Other Components:

Quiz/Scrap Book/ Assignment / Poster making

No End-Semester Examination

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019-2020)

INTRODUCTION TO WILDLIFE BIOLOGY

CODE:19ZL/UI/WB23

CREDITS:3

OBJECTIVES OF THE COURSE

- To enable students to acquire knowledge on various aspects of wildlife biology and habitat ecology
- To sensitize the students to the need for conservation of wildlife
- To enable students to understand the impacts of land use and environmental management decisions on ecosystems and society
- To familiarize students with a variety of laws and regulations that influence how natural resources are used and protected

COURSE LEARNING OUTCOME

On successful completion of the course, students will be able to

- Identify factors affecting population densities
- Describe various population estimation methods
- Explain proximate and ultimate threats to biodiversity and consequences of biodiversity loss.
- Differentiate *in situ* and *ex situ* conservation strategies
- Discuss the laws and regulations pertaining to protection of natural resources and their management

Unit 1

- 1.1 Introduction to Ecology - Habitats and Niches – Resource Partitioning
- 1.2 Landscape Ecology– High Altitude Ecology - Wetland Ecology
- 1.3 Natural Resource Management

Unit 2

- 2.1 Population Dynamics: Concepts - Animal Dispersion and Animal Populations
- 2.2 Population Growth and Its Regulation –Growth without Regulation - Regulation of Population Densities - Demographic Data and its importance
- 2.3 Factors Affecting Population Density – Determinate and Stochastic Factors: Space, Food and Water, Territories, Herbivores and Predators, Weather and Climate, Parasites and Diseases, Natural Disasters, Self -Regulation, Stress.
- 2.4 Wildlife Population Estimation Methods: Direct, Indirect – Making Observations – Field Notes and Photographic Records; Use of Field Equipment: Binoculars, Telescope, Camera, Tally Counter, GPS, Radio Telemetry, Drones

Unit 3

- 3.1 Biogeography and Wildlife Habitat: Species Distribution, Patterns, Continental Drift, Factors Affecting Animal Distribution, Biodiversity Hotspots in India - Endemism
- 3.2 Wildlife: Definition, Values - Biology of Indian Wildlife - Salient Features of Important Wild Animals: Insects and Other Arthropods, Fishes, Amphibians, Reptiles, Birds and Mammals
- 3.3 Man – Wildlife Interactions and Conflicts– Ecological Impacts – Concepts, Principles and Human Dimensions in Wildlife Management

Unit 4

- 4.1 Wildlife Tourism – Viewing Animals in the Wild–Wildlife Damage Management - Wildlife Crimes and Forensics
- 4.2 Wildlife Trade - Wildlife Protection -Legislations and Acts: Wildlife Protection Act (1972) and its Amendments, Biodiversity Act (2000) - Role of NGOs – Role of Institutions and Organizations
- 4.3 Planning and Execution of Field Surveys: Sampling Methods - Capture and Handling of Wild Animals
- 4.4 Principles of Wildlife Health – Wildlife Diseases: Anthrax, Rabies, Ringworm, Taeniasis

Unit 5

- 5.1 Need for Conservation – Strategies – *In Situ – Ex Situ*
- 5.2 Planning and Implementing Conservation Programmes - Wildlife Projects, Conservation Genetics and Conservation Management — Nutrition of Captive and Free Ranging Wild Fauna
- 5.3 Zoo Designing - Management and Husbandry of Zoo Animals

BOOKS FOR REFERENCE

- Anderson, S.H. (2002). *Managing our wildlife resources*. New Jersey: Prentice Hall.
- Dasmann, R. F. (2011). *Wildlife Biology*. New Jersey: John Wiley and Sons.
- Fulbright, T. E. & Hewitt, D. G. (2007). *Wildlife Science: Linking Ecological Theory and Management Applications*. Florida: CRC Press
- Krausman, P.R. (2002). *Introduction to Wildlife Management - the Basics*. USA: Prentice Hall.
- Krausmann, P. R. (2002). *Wildlife Ecology and Management*. USA :Prentice Hall.
- Newsome, D., Dowling, R. & Moore, S. (2005). *Wildlife Tourism*. Ohio: Cromwell Publishers.
- Saha, G. K. & Mazumdar, S. (2017). *Wildlife Biology: An Indian Perspective*. Delhi: Prentice – Hall of India Pvt. Ltd.
- Silva, N.J. (2012). *The Wildlife Techniques Manual: Research & Management*. Baltimore: The Johns Hopkins University Press.
- Terio, K.A., McAloose, D. & St. Leger, J. (Ed.). (2018). *Pathology of Wildlife and Zoo Animals*. Massachusetts: Academic Press.
- Wobeser, G. A. (2007). *Disease in Wild Animals: Investigation and Management*. New York City: Springer Verlag.

JOURNALS

- Conservation Biology
Wildlife Biology

WEB RESOURCES

<http://www.worldwildlife.org/>

<http://www.wfindia.org/>

PATTERN OF ASSESSMENT

End-Semester Examination: Total Marks: 100

Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS

(Effective from the academic year 2019–2020)

FUNDAMENTALS OF FOOD SCIENCE

CODE:19ZL/UI/FS23

CREDITS:3

OBJECTIVES OF THE COURSE

- To enable the understanding of the fundamentals of Food Science
- To encourage Entrepreneurship

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Recognize the right type of food choice which will provide the right nutrition and adequate number of calories
- Relate the type of food spoilage and practice personal hygiene to avoid food borne diseases
- Discuss the varied types of food packaging materials and their barrier properties
- Differentiate common food adulterants
- Explain the importance of food laws

Unit 1

Food Chemistry and Nutrition

- 1.1 Introduction to Food Chemistry
- 1.2 Food Guide and Usage - Basic Five Food Groups - Malnutrition - Fortification
- 1.3 Diet Therapy: Purpose and Principles - Diet in Diabetes mellitus and Cardiovascular Diseases
- 1.4 Dietary Management

Unit 2

Food Microbiology and Sanitation and Hygiene

- 2.1 Microbial Growth-Growth Curve of Bacteria
- 2.2 Food Contamination and Spoilage –Vegetables and Fruits
- 2.3 Fish and Other Sea Food
- 2.4 Importance of Personal Hygiene of Food Handler - Safety in Food Storage - Handling and Preparation
- 2.5 Methods of Sterilization - Use of Detergents - Heat and Chemicals

Unit 3

Post Harvest Technology and Food packaging

- 3.1 Cereals and Legumes - Oil Seeds - Fruits and Vegetables - Meat Fish and Poultry
- 3.2 Fermentation Technology
- 3.3 Fortification Technology - High Protein Technology - Extruded Foods
- 3.4 Packaging Functions and Packaging Materials
- 3.5 Types of Packaging - Shrink-Strip – CFB – Glass – Tetrapak - Rigid Containers – Plastic- Shelf-Life- Plastic numbers-Bio Polymer

3.6 Quality Testing of Packaging

Unit 4

Food Adulteration and Food Toxicology

- 4.1 Detection of Food Adulteration in Food Grains, Dhal, Oil, Spices and Ghee
- 4.2 Estimation of Benzoic Acid and BOAA Test
- 4.3 Food Toxicology - Naturally Occurring Food Toxicants
- 4.4 Hazards of Pesticides and Heavy Metals in Food
- 4.5 Food Labeling

Unit 5

Sensory Evaluation & Quality Control

- 5.1 Factors affecting Food Acceptance - Sensory, Psychological
- 5.2 Objective Methods of Sensory Evaluation
- 5.3 Quality Control and its Importance - Food Laws

BOOKS FOR REFERENCE

- Banwart, George J. (1987). *Basic Food Microbiology*. New Delhi: CBS
- Brown, Judith E. (1987). *Nutrition Now*. Belmont: Wadsworth Thomson Learning
- Frazier, (2017). *Food Microbiology*. New York: Mc Graw Hill
- Insel, Paul R. Elaine Turner and Don Ross. (2007). *Discovering Nutrition*. Massachusetts: Jones and Bartlett
- Jay, James M. (1996) . *Modern Food Microbiology*. New York: McGraw Hill
- Marriot, Norman G. (1989). *Principles of Food Sanitation*. New York: AVI Publishing
- Maynard A., Amerine, Rose Marie P. & Edward B. Rossler. (1965). *Principles of Sensory Evaluation of Food*. New York
- Swaminathan, Geetha and Mary George. (2002). *Laboratory Chemical Methods in Food Analysis*. Chennai: Margham

JOURNALS

- Food Science and Nutrition
Journal of Nutrition and Food Sciences
International Journal of Nutrition and Food Sciences

WEB RESOURCES

- <http://www.foodnavigator-asia.com/>
<http://www.foodandnutrition.org/>
<https://www.ift.org/>

PATTERN OF ASSESSMENT

End-Semester Examination: Total Marks: 100 Duration: 3 hours

QUESTION PAPER PATTERN

- Section A – 10 x 3 = 30 Marks (All questions to be answered)
Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)
Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)