A.V.C. COLLEGE (AUTONOMOUS), MAYILADUTHURAI, MANNAMPANDAL
DEPARTMENT OF ZOOLOGY

CBCS - FOR UG ZOOLOGY STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2018 - ONWARDS

Sem	Courses	Title of the papers	Hours	Credit	Total Credits
I	Language Course – I	LC I	6	3	20
	E. Language Course – I	ELC I	6	3	
	Core Course- I (Theory)	CC I – Invertebrata	5	5	
	Core Course- II (Practical)	CC II - Practical I – (Covering CC I)	2	2	
	Allied Course – I (Theory)	AC I - Allied Zoology – I (For I Bot. & I Chem.)	7	4	
	Allied Course – II (Practical)	AC II – Allied Practical I (I Bot. & I Chem.)	2	1	
	Value Based Course - I	VBC I – Human Value & Ethics	2	2	
II	Language Course – II	LC II	6	3	20
	E. Language Course – II	ELC II	6	3	
	Core Course – III (Theory)	CC III - Chordata	5	5	
	Core Course – IV (Practical)	CC IV - Practical - II (Covering CC III)	2	2	
	Allied Course – III (Theory)	AC III – Allied Zoology – II (For I Bot. & I Chem.)	7	4	
	Allied Course – IV (Practical)	AC IV - Allied Practical -II (I Bot.& I Chem.)	2	1	
	ES	ES – Environmental studies	2	2	
III	Language Course – III	LC III	6	3	20
	E. Language Course – III	E[illegible]	6	3	
	Core Course –V (Theory)	CC V- Cell and Molecular Biology	5	5	
	Core Course –VI (Practical)	CC VI - Practical – III (Covering CC V)	2	2	
	Allied Course – V (Theory)	AC V- Allied Course	7	4	
	Allied Course – VI (Practical)	AC VI- Allied Practical	2	1	
	Skill Based Course - I	SBC I - Vermiculture (For B.Sc. Zoo.)	2	2	
IV	Language Course – IV	LC IV	6	3	20
	E. Language Course – IV	ELC IV	6	3	
	Core Course – VII (Theory)	CC VII – Genetics	6	6	
	Core Course VIII (Practical)	CC VIII - Practical - IV (Covering CC VII)	2	2	
	Allied Course – VII (Theory)	AC VII – Allied Course	7	4	
	Allied Course – VIII (Practical)	AC VIII – Allied Practical	2	1	

		Gender Studies	1	1	
V	Core Course IX	CC IX Ecology and Evolution	5	5	30
	Core Course X	CC X Developmental Biology	5	5	
	Core Course XI	CC XI Animal Physiology & Biochemistry	4	4	
	Core Course XII	CC XII – Practical – V	5	5	
	Elective Course - I	EC I – Public Health & Hygiene/ Poultry Science/ Animal behaviour	5	5	
	Non-Major Elective I	NMEC I – Applied Zoology	2	2	
	Skill Based Course - II	SBC II - Apiculture (For B.Sc. Zoo.)	2	2	
	SSD	SSD – Soft Skills Development	2	2	
VI	Core Course XIII	CC XIII Microbiology and Immunology	4	4	30
	Core Course XIV	CC XIV Biotechnology and Bioinformatics	4	4	
	Core Course XV	CC XV – Biophysics, Biostatistics and Research Methodology	4	4	
	Core Course XVI	CC XVI Practical – VI	6	5	
	Elective Course - II	EC II Vector biology/ Aquaculture	4	4	
	Elective Course - III	EC III Wildlife Conservation & Management/ Dairy Science	4	4	
	Non - Major Elective - II	NMEC II - Biodiversity and Conservation	2	2	
	Skill Based Course - III	SBC III – MLT (For B.Sc. Zoo.)	2	2	
		EA II	-	1	
		Total	**180**	**140**	**140**

LC=8; CC – 16; AC-8; SBC-03; Electives -03; NMEC -02; EA - 02; ES - 01; VBC - 01 (TOTAL =44)

A.V.C. COLLEGE (AUTONOMOUS), MAYILADUTHURAI, MANNAMPANDAL
B.Sc., ZOOLOGY

SEMESTER I – C.C.I: INVERTEBRATA

Code: 18ZO101

Objectives: To understand the classification, biology and economic values of invertebrates.

UNIT - I

Principles of Taxonomy: Binomial nomenclature – rules of nomenclature – classification of animal kingdom (Whittaker's classification).

Protozoa: Characteristic features and classification upto classes with two examples for each class

Detailed study: Paramecium

General Topics: Protozoan diseases (Malaria, Amoebiasis, Trypanosomiasis & Leishmaniasis);

UNIT - II

Porifera and Coelenterata: Characteristic features and classification upto classes with two examples for each class

Detailed study: Sycon and Aurelia

General Topics: Polymorphism in Coelenterates; Formation and Importance of Coral reef

UNIT - III

Helminthes and Annelida: Characteristic features and classification upto classes with two examples for each class

Detailed study: Tape worm and Earthworm

General Topics: Adaptations of Helminth parasites; Adaptive radiations in Annelida

UNIT – IV

Arthropoda and Mollusca: Characteristic features and classification upto classes with two examples for each class

Detailed study: *Penaeus* sp. and Freshwater Mussel

General Topics: Crustacean larvae and their biological significance; Economic importance of Mollusca

UNIT - V

Echinodermata: Characteristic features and classification upto classes with two examples for each class

Detailed study: Starfish

General Topics: Echinoderm larvae and their significance

Minor Phyla: General characters – Classification based on coelom- Characteristics with two examples of Mesozoa, Rotifera and Chaetognatha

Text books:

1. Jordon, E.L. and Verma, P.S. 1995. Invertebrate Zoology, 12th edition. S. Chand & Co., New Delhi.
2. Kotpal, R.L. 2000. Minor phyla, Rastogi Publications, Meerut.
3. Majpuria, T.C. 1980. Invertebrate Zoology. Pradeep Publications, Jalandhar.
4. Nair, C. and N. Arumugam. 2006. A Text book of Invertebrates. Saras Publications, Nagercoil.

Reference books:

1. Ekambaranatha Iyer, M.E. 1986. A Manual of Zoology. Vol.1. Invertebrates. Viswanathan & Co., Chennai.
2. Barrington, E. J.W. 1979. Invertebrates structure and function, 2nd edition, ELBS and Nelson.

A.V.C. COLLEGE (AUTONOMOUS), MAYILADUTHURAI, MANNAMPANDAL
B.Sc., ZOOLOGY
SEMESTER I – CC.II - MAJOR PRACTICAL – I (INVERTEBRATA)

Code:18ZOP102

I. DISSECTIONS:

Earthworm:	Digestive system and Nervous system
Cockroach:	Digestive system and Nervous system
Prawn:	Nervous system

Dissection of any one Invertebrate animal's digestive and Nervous system by using Pro-dissector software.

II. MOUNTINGS:

Earthworm:	Body setae and Penial setae
Prawn:	Appendages
Mouth Parts:	Honey Bee, Mosquito / House Fly

III. SPOTTERS:

(1. Draw labeled diagrams: 2. Classify giving reasons: 3. Comment on biological significance: 4.Write descriptive notes on & 5.Relate structure and function)

Classify giving reasons

Entamoeba histolytica, Polystomella, Hyalonema , Spongilla, Gorgonia, Pleurobrachia, Tubipora, Schistosoma, Balanus, Squilla, Spirostreptus, Scolopendra, Hippa, Dentalium, Nautilus, Ophiothrix, Sea cucumber.

Write Descriptive notes on

Paramecium, Sycon sponge, Aurelia, Sea anemone, Physalia, Tapeworm, Cercaria, Redia, Neries, Chaetopterus, Penaeus, Chiton, Aplysia, Mytilus, Octopus, Asterias, Zoea larva, Mysis, Bipinnaria, Ophiopluteus, Auricularia, Echinus.

Comment on Biological Significance

Paramecium-binary fission, Paramecium conjugation, Obelia colony, Planaria, Ascaris, *Wuchereria bancrofti*, Dracunculus, Peripatus, Limulus, Spider, Tick, Nauplius, Daphnia, Cyclops, Sacculina, Palaemon, Pediculus, Pinctada.

Relate structure and functions of

Plasmodium – Oocyst stage, Spicules of sponges, Obelia medusa, Tapeworm – Scolex, Tapeworm – Proglottid, Neries - Parapodium, Heteroneries, Sepia, Pila, Antedon, Carcinus, Pedicellaria.

IV. ON THE SPOT STUDY (Mandatory)

V. RECORD SUBMISSION

A.V.C. COLLEGE (AUTONOMOUS), MAYILADUTHURAI, MANNAMPANDAL

B.Sc., ZOOLOGY

SEMESTER II – CC. III : CHORDATA

Code :18ZO203

OBJECTIVES:

To enable the students to acquire knowledge of organization, adaptive features and importance of Chordates.

UNIT – I

Origin of Chordates

General Characters and classification of Prochordates upto orders with two examples.

General Characters and classification of Pisces upto sub-classes with two examples.

Detailed study – Balanoglossus, Shark

General Topics: Retrogressive metamorphosis in Ascidia; Migration in Fishes.

UNIT – II

General Characters and classification of Amphibia upto orders with two examples.

Detailed study- Frog (*Rana* sp.)

General Topics: Parental care in Amphibia; Gymnophiona – adaptations and modes of life.

UNIT – III

General Characters and classification of Reptiles upto orders with two examples.

Detailed study- Calotes

General topics: Identification of poisonous and non-poisonous snakes; Golden age of reptiles.

UNIT – IV

General Characters and classification of Aves upto orders with two examples.

Detailed Study- Pigeon

General topics: Salient features and distribution of Ratitae (Flightless birds); Migration in birds.

UNIT – V

General Characters and classification of Mammals upto orders with two examples.

Detailed study: Rabbit

General topics: Distinctive features and adaptations of Prototheria and Metatheria; Adaptations of aquatic Mammals.

Text books:

1. Agarwal, V. 2003. Chordate Zoology, S. Chand & Co., New Delhi.

Reference books:

1. Ekambaranatha Ayyar,M. and T.N.Ananthakrishnan.1995. A Manual of Zoology Vol.II (chordate). S.Viswanathan (Printers and Publishers)Pvt.Ltd.,Chennai.
2. Jordan E.L. and P.S Verma.2015..Chordata Zoology (11th Edition).S.Chand and Company Ltd., New Delhi-110 055.
3. Saxena. O. P 1973. Mammalia. S.Chand Co.(Pvt.) LTD. Ram Nagar, New Delhi-55

4. Newman, H.H. 1981. The Phylum Chordata. Biology of Vertebrates and their Kin. The Macmillan Company, New York.
5. Bhamrah, H.S., Juneja, K., Shrivastava, S. and Joshi, S.C. 1993. A Text book of Chordates. Anmol Publications, New Delhi.
6. Dhami, P.S. and Dhami, J.K. 1972. Chordate Zoology. R. Chand & Co., Delhi.
7. Renganathan, T.K. 1996. Chordate Zoology. Jayalakshmi Printers, Tuticorin.
8. Alexander, R.M. 1977. The Chordates. Cambridge University Press, Cambridge.

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305
B.Sc., ZOOLOGY

SEMESTER II – CC IV - MAJOR PRACTICAL - I1 (CHORDATA)

Code:18ZOP 204

I. **DISSECTIONS:** Digestive system and Reproductive system of Fish

II. **DEMONSTRATION:** Frog – Prodissector - Software

III. **MOUNTINGS:** Fish scales (Cycloid, Ctenoid and Placoid scales), Brain of Fish.

IV. **SPOTTERS:**

1. Draw labeled diagrams:

Frog: Skull, lower jaw, pectoral girdle, pelvic girdle, 8th vertebra, urostyle, forelimb and hind limb.

2. Classify giving reasons:

Balanoglossus, Ascidia, Petromyzon, Shark, Syngnathus, *Rana hexadactyla*, Calotes, Varanus, Cobra, Pigeon, Crow and Rat.

3. Comment on biological significance:

Amphioxus, Ascidian tadpole, Tornaria larva, Anabas, Arius, Saccobranchus, Hippocampus, Uraeotyphlus, Axolotle larva, Alytes and Dryophis.

4. Explain adaptations:

Eel, Electric ray, Chamaeleon, Beak and feet of Parrot, Kite, Kingfisher, Loris, Bat and Hemidactylus.

5. Write descriptive notes on:

Cycloid scale and Ctenoid scale, feather types (Quill, Down and Filoplume); Dentition of Rabbit, Man and Cat.

6. Relate Structure and Function:

Exocoetus, Hippocampus, Ichthyophis, Draco, Carapace and Plastron (Turtle), Quill feather, Synsacrum, Baleen plate and Hedgehog.

IV **ON THE SPOT STUDY (Mandatory)**

V. **RECORD SUBMISSION:**

A.V.C College (Autonomous), Mannampandal – 609 305

Choice Based Credit System (CBCS)

(For the Students Admitted from 2018 – 2019 onwards)

GENERAL INTEREST COURSE

ENVIRONMENTAL STUDIES

SEMESTER II CREDIT: 2

COURSE CODE: 18ES 201 HOURS:2/WEEK

Unit: 1 The Multidisciplinary nature of environmental studies

Definition, scope and importance. (2 lectures)

Need for public awareness

Unit: 2 Natural Resources:

Renewable and non-renewable resources:

Natural resources and associated problems.

a) Forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

f) Land resources: Land as a resources, land degradation, man induced Landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles. (8 lectures)

Unit: 3 **Ecosystems**

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession.
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem:-

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems, (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lectures)

Unit: 4 Biodiversity and its conservation

- Introduction – Definition : Genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

(8 lectures)

Unit: 5 Environmental Pollution

Definition

Causes, effects and control measures of:

a. Air Pollution
b. Water Pollution
c. Soil Pollution
d. Marine Pollution
e. Noise Pollution
f. Thermal Pollution
g. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides.
- Ill-Effects of Fireworks: Firework and Celebrations, Health Hazards, Types of Fire, Firework and Safety.

(8 lectures)

Unit: 6 Social Issues and the Environment

- From Unsustainable to Sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns.

Case studies

- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of pollution) Act.

- Water (Prevention and Control of pollution) Act.
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness.

(7 lectures)

Unit: 7 Human Population and the Environment

- Population growth, variation among nations.
- Population explosion – Family Welfare Programmes
- Environment and human health
- Human Rights – Value Education
- HIV/ AIDS – Women and Child Welfare
- Role of Information Technology in Environment and human health
- Case studies.

Unit: 8 Field Work

- Visit to a local area to document environmental assets-river/ forest/ grassland/hill/ mountain

Verified 21.12.18

verified 12-12-2019

References:

1. Agarwal, K.C. 2001 environmental Biology, Nidi Public Ltd Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt ltd, Ahamedabad – 380013, Indi
   E-mail: mapin@icenet.net(R)
3. Brunner R.C. 1989, Hazardous Waste Incineratin, McGraw Hill Inc 480p
4. Clark R.S. Marine Pollution, Clanderson Press Oxford (TB)
5. Cunnigham, W.P.Cooper, T.H.Gorhani E & Hepworth, M.T.2001.
6. De A.K. Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R)
8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security, Stockholm Env.Institute Oxford University, Press 473p.
9. Hawkins, R.E. Encyclopedia of India Natural History, Bombay Natural History Society, Bombay (R)
10. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge University Press 1140p.
11. Jadhav, H & Bhoslae, V.M. 1995. Environmental Protection and Laws Himalaya Pub. House, Delhi 284p.
12. Mckinney, M.L. & Schoch R.M.1996.Environmental Science systems & Solutions, Web enhanced edition 639p.
13. Mhaskar A.K. Matter Hazardous, Techno-science Publications (TB)
14. Miller T.G. Jr.Environmental Science, Wadsworth Publishing Co.(TB)
15. Odum, E.P. 1971 Fundamentals of Ecology. W.B. Saunders Co. USA. 574p
16. Rao MN & Datta, A.K. 1987 Waste Water treatment, Oxford & IBH Publication Co.Pvt Ltd 345p.
17. Sharma B.K. 2001 Environmental chemistry Goel Publ House, Meerut.
18. Survey of the Environment, The Hindu (M)
19. Townsend C.Harper, J and Michael Begon, Essentials of Ecology, Blackwell science (TB)
20. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media (R).
21. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB)
22. Wagner K.D. 1998 Environmental Management. W.B. Saunders Co. Philadelphia USA 499p

(M) Magazine (R) Reference (TB) Textbook

Verified
03.12.19

A.V.C. COLLEGE (AUTONOMOUS), MAYILADUTHURAI, MANNAMPANDAL.

SEMESTER I

AC I: ALLIED ZOOLOGY - I

(For Botany and Chemistry Students)

CODE: 18AZO101

Objective: To understand the basic characteristics and biology of animals.

UNIT – I

Outline classification of Invertebrates upto Phylum.

General characters of Protozoa, Porifera and Coelenterata

Detailed study: Paramecium

General topics: Skeleton in sponges; Polymorphism in Coelenterata

UNIT - II

General characters of Platyhelminthes; Nematoda and Annelida

Detailed study: Earthworm

General topics: Parasitic adaptations of Helminths; Modes of life in polychaetes

UNIT - III

General characters of Arthropoda; Mollusca and Echinodermata.

Detailed study: Cockroach

General topics: Economic importance of Mollusca; Water vascular system in Starfish and its significance.

UNIT – IV

Outline classification of Chordata upto Classes.

General characters of the Prochordata, Pisces and Amphibia

Detailed study: Shark

General topics: Affinities of Balanoglossus; Parental care in Amphibia

UNIT - V

General Characters of Reptiles, Birds and Mammals

Detailed study: Rabbit

General topics: Identification of Poisonous and non poisonous snakes; Flight adaptations of birds and migration of birds

Text books:

1. Arumugam, N. 2005. Text book of Invertebrates and Chordates. Saras Publications. Nagercoil

Reference books:

1. P.S. Verma, and S.K. Agarwal. 2012. Text book of Invertebrata and Chordata. S. Chand & Co., New Delhi.
2. Jordon, E.L. and Verma, P.S. 2015. Invertebrate Zoology, 12th edition. S. Chand & Co., New Delhi.
3. Kotpal, R.L. 2000. Invertebrata, Rastogi Publications.

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A.V.C. COLLEGE (AUTONOMOUS), MAYILADUTHURAI, MANNAMPANDAL

SEMESTER I – ALLIED ZOOLOGY PRACTICAL - I

(For Botany and Chemistry Students)

CODE:18AZOP102

I. Dissections:

1. Earthworm: Digestive and Nervous system.
2. Cockroach: Digestive system.
3. Frog -Prodissector software.

II. Mountings:

1. Earthworm: Body setae
2. Cockroach: Mouth parts
3. Fish Scales - Placoid, Ctenoid and Cycloid.

III. Spotters:

1. Paramecium entire
2. Paramecium binary fission
3. Paramecium conjugation
4. Ascon sponge
5. Parenchymula larva
6. Obelia -entire
7. Medusa
8. Tapeworm entire
9. Proglottids
10. Tapeworm scolex
11. Cysticercus larva
12. Pedicellaria
13. Starfish oral and aboral views
14. Glochidium larva
15. Quill feather
16. Echeneis
17. Amphioxus
18. Balanoglossus
19. Ascidia
20. Petromyzon
21. Salamander
22. Ichthyophis
23. Hyla
24. Alytes
25. Varanus
26. Chamaeleon
27. Draco
28. Kingfisher
29. Loris
30. Bat
31. Owl

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A.V.C. COLLEGE (AUTONOMOUS), MAYILADUTHURAI, MANNAMPANDAL

SEMESTER II – AC III: ALLIED ZOOLOGY - II

(For Botany and Chemistry Students)

Code: 18 AZO203

Objectives: To give a comprehensive idea of Cell biology, Genetics, Developmental biology, Physiology and Environmental biology.

UNIT - I

Cell biology:

Ultra structure of an Animal Cell

Plasma membrane-Fluid mosaic model and Functions.

Mitochondria – structure and enlist the functions

Chromosomes - structure and Functions

DNA-Watson and Crick model,

RNA - Types and Functions.

Cell division – Mitosis and Meiosis.

UNIT - II

Genetics:

Mendel's Laws- Monohybrid and Dihybrid cross.

Linkage and Crossing over.

Sex determination in Man-XY type.

Sex-linked inheritance: Colour blindness in Man and Eye colour in Drosophila.

Inborn Errors of Metabolism– a) Phenylketonuria b) Alkaptonuria

UNIT - III

Developmental Biology:

Structure of Human sperm and ova.

Fertilization- Chemotaxis, fertilizin and anti-fertilizin interaction, acrosome reaction and cortical reaction

Cleavage, Blastulation and Gastrulation in frog.

Development of Eye in Frog.

UNIT - IV

Physiology:

Metabolism of protein- Ornithine cycle

Metabolism of carbohydrate – Glycolysis and Kreb's cycle.

Metabolism of fat – Beta oxidation.

Physiology of respiration in Man-Gaseous exchange in lungs.

Physiology of excretion in Man- Formation of urine.

UNIT - V

Ecology:

Ecosystem: Structure and types - Pond Ecosystem.

Animal Association: Mutualism, Commensalism and Parasitism.

Evolution:

Theories- Lamarckism, Darwinism and De Vries.

Fossils: Types and formation.

Text Books:

1. N. Arumugam (2007) Cell biology-Saras publications
2. N. Arumugam and R.P.Meyyan (2000) Genetics and Evolution- Saras publications

Reference Books:

1. S.Verma and V.K.Agrawal. 1985. Cytology S.Chand and company Ltd. New Delhi.
2. S.Verma and V.K.Agrawal.2000. Genetics S.Chand and company Ltd. New Delhi.

A.V.C. COLLEGE (AUTONOMOUS),
MAYILADUTHURAI,MANNAMPANDAL

SEMESTER II – AC – IV: ALLIED ZOOLOGY PRACTICAL-II

(For Botany and Chemistry Students)

Code:18AZOP204

I. Physiology and Ecology:

1. Qualitative test for carbohydrate, protein and fat.
2. Qualitative analysis of urine for sugar, albumin and urea.
3. Estimation of salinity.
4. Estimation of Dissolved oxygen.
5. Identification of ABO blood group in human.

II. Minor practical:

1. Determination of pH of water samples (pH paper method).
2. Squash preparation of onion root tip.
3. Squash preparation of Salivary gland Cells in Chironomous Larva

III. Spotters:

1. DNA Structure model.
2. DNA Replication model.
3. Stages of mitosis
4. Drosophila
5. Frog - egg
6. Cleavage (2-cell, 4-cell, 8-cell stages)
7. Frog - Blastula
8. Frog - Gastrula
9. Frog - Neural fold stage
10. Animal Association: Sea anemone on hermit crab, Echeneis (Sucker fish).
11. Parasitism – Ascaris.

IV. Record Submission:

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305

DEPARTMENT OF ZOOLOGY & WILDLIFE BIOLOGY

B.Sc., ZOOLOGY

SEMESTER III - PAPER –V. CELL AND MOLECULAR BIOLOGY

Code: 18ZO 305

Objective:

To make the students understand the structure, functions and composition of various cell organelles and their molecular concepts.

UNIT-I (12 hrs.)

Cell: General organization of Prokaryotic and Eukaryotic cells.

Methods of cell study: Microscopy, Micrometry, cell culture method; cell fractionation techniques-cytochemical staining methods- immunocytochemistry – autoradiography

Cell Membrane: Ultra Structure, modifications and functions of plasma membrane.

UNIT – II (12 hrs.)

Structure and functions: Mitochondria , Golgi complex, Endoplasmic reticulum, Lysosome, Ribosome, Nucleus and Nucleolus.

Biology of cancer cell: Causes and theories of carcinogenesis, cell growth and ageing.

UNIT – III (12 hrs.)

Chromosome: Ultra Structure and functions - Types.

Giant Chromosome: Polytene and lamp brush chromosomes.

Cell Division: Mitosis; Meiosis; Role of mitotic apparatus in cell division.

Cell cycle

UNIT – IV (12 hrs.)

Nucleic acids: DNA and RNA – Types, Structure and Chemical composition.

Replication of DNA: Semi conservative – Unidirectional and Bi-directional replication in eukaryotic chromosome.

Genetic Code: Properties and importance.

Protein **synthesis:** Transcription and Translation in eukaryotes.

UNIT – V (12 hrs.)

Mutations: Types of mutations – Chromosomal and Gene mutation – Mutagenesis.

DNA Repair mechanism: Excision Repair mechanism.

Radiation biology: Sources and types of radiations - Effect of radiation on cells

Text Book:

1. Gupta, P.K. 2010. Cell and Molecular Biology. Rastogi Publications. Meerut.
2. Rastogi, S.C. 2005. Cell & Molecular Biology. New Age International (P) limited. New Delhi.
3. Verma and Agarwal. 2002. Cell and Molecular Biology. S.Chand Publications. New Delhi.

References:

1. Deepak Kumar Kar and Soma Halder. 2009. Cell Biology, Genetics & Molecular Biology. New Central Book Agency (P) Ltd. Kolkata.
2. De Robertis, E.D.P. F.A., Saez, and E.M.R. De Robertis Jr. 1975. Cell Biology. W.B. Saunders Company, Philadelphia.
3. Du Praw, E.J. 1968. Cell and Molecular Biology. Academic Press New York.
4. George, M. 2008. Essentials of Molecular Biology, Narosa Publishing House.

Course Outcome:

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A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305
DEPARTMENT OF ZOOLOGY & WILDLIFE BIOLOGY

B.Sc., ZOOLOGY **Code: 18ZOP306**

SEMESTER III - CC –VI- MAJOR PRACTICAL –III (COVERING PAPERS- V)

Objectives:

1. Microscopy: Simple and compound microscope- principles, components and their applications.
2. Micrometry: Determination of nucleo- cytoplasmic ratio using stage and ocular micrometer.
3. Cell Division: Mitosis - Squash preparation of onion root tip to observe various stages of mitotic cell division; Meiosis - Preparation and identification of various stages of meiosis in testis of Grasshopper.
4. Giant Chromosomes: Mounting of Salivary gland cells of Chironomous larva/ Drosophila larva to observe Polytene chromosome
5. Identification of Drumstick chromosome from blood smear.
6. Identification of Barr body in human buccal epithelial cells.
7. Microtomy: Demonstration of permanent slides preparation.
8. Spotters: Prokaryotic cell – Bacteria, Eukaryotic cell – Animal cell, Cell organelles – Mitochondria, Endoplasmic reticulum, Golgi complex and Nucleus, Stages of mitosis and meiosis from permanent slides, Models of DNA, RNAs and Camera lucida.
9. Preparation of 2D models of cell organelles and processes related to cell and molecular biology.
10. On the spot study -

Learned Outcome:

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A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL - 609 305
DEPARTMENT OF ZOOLOGY & WILDLIFE BIOLOGY

B.Sc. ZOOLOGY

SEMESTER - IV - PAPER - VII- GENETICS

Objective: To enable the students understand the basic principles of inheritance.

Code: 18ZO 407

UNIT - I (15 Hours)

Gene Concept: DNA as the genetic material - Griffth's experiment

Mendelism: Law of dominance, segregation and independent assortment.

Interaction of genes: Non- allelic gene interactions - Epistatic genes- Dominant epistasis- Colouring pattern of plumage in domestic fowls, Complementary genes – Inheritance of flower colour in sweet pea and Supplementary genes-Inheritance of coat colour in rabbit.

Allelic gene interactions - Incomplete dominance- Inheritance of flower colour in 4 O' clock plant, Codominance - Coat colour in short horn cattle; Pleotrophism; Penetrance and expressivity.

UNIT - II (15 Hours)

Multiple Alleles: Blood groups in man-ABO, MN and Rh types.

Polygenic inheritance: Skin colour in man.

Linkage & Crossing over: Principle, types and mechanism with *Drosophila* as example.

Mapping of Chromosomes: Principles and methods - Construction of chromosome map in *Drosophila* – Three Point Test cross experiment.

UNIT - III (15 Hours)

Sex determination: Chromosomal, genic balance, environmental and hormonal basis.

Sex - Linked inheritance: Colour blindness and hemophilia in man.

Sex limited genes and Sex influenced genes: Definition with examples.

Cytoplasmic inheritance: Inheritance of kappa particles in *Paramecium* and Shell coiling pattern in snail.

UNIT - IV (15 Hours)

Microbial genetics: Recombination-Transformation, Conjugation, Sexduction and Transduction in bacteria.

Gene expression and regulation: Operon model- Lac operon.

Population genetics: Hardy-Weinberg Law, Factors affecting Hardy-Weinberg equilibrium. Inbreeding, Outbreeding and Heterosis.

UNIT - V (15 Hours)

Human genetics: Human chromosome, Karyotype, Idiogram, Pedigree analysis.

Chromosomal syndromes in man: Down's, Turner's and Klinefelter's syndromes.

Inborn errors of metabolism: Phenylketonuria, Alkaptonuria and Albinism.

Lethal genes: Sickle cell anemia.

Genetic Counselling: Eugenics- positive and negative, Euthenics and Euphenics.

Text book

1. Verma, P.S. & V. K. Agarwal. 2009. Genetics. S Chand & Co. New Delhi.
2. Gupta, P.K. 2007. Genetics – Classical to Modern. Rastogi Publications, Meerut.
3. Dipak Kumar Kar & Soma Halder. 2009. Cell Biology, Genetics & Molecular Biology. New Central Book Agency (P) Ltd. Kolkata.

References

1. Altenburg, E. 1970. Genetics. Oxford and IBH Publishing Company, New Delhi.
2. Gardener, E.J. & M.J. Simmons. 2009. Principles of Genetics. John Wiley & Sons. Inc. New York.
3. Lewin, B. 2005. Genes. Wiley Eastern Ltd. New Delhi.
4. Rothwell, N. V. 1978. Human Genetics. Printice Hall of India.
5. Sinnott, E.W. L.C. Dunn and T. Dobzhansky. 1959. Principles of Genetics. Tata Mc. Graw Hill, New Delhi.

Course outcome:

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A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305
DEPARTMENT OF ZOOLOGY & WILDLIFE BIOLOGY

B.Sc., ZOOLOGY **Code: 18ZOP 408**

SEMESTER IV - MAJOR PRACTICAL –IV (CORE PAPER- VII)

GENETICS

1. Culture of Drosophila and identification of sex and mutants.
2. Monohybrid cross, Test cross and Back cross.
3. Dihybrid cross, Test the hypothesis of law of independent assortment by Chi-square test
4. Gene interaction - Non-allelic gene interactions- Complementary genes (9:7); Dominant epistasis (12:3:1)

   Allelic gene interactions- Co-dominance and incomplete dominance.
4. Polygenic / Quantitative genetics.
5. Study of finger prints and their pattern of inheritance in man.
6. Calculation of gene frequency and genotype frequency for autosomal, Sex linked and sex influenced human traits.
7. Multiple alleles - Blood grouping in Man.
8. **SPOTTERS:**

i) Mendel's law of inheritance - Mendelian traits.

ii) Human karyotype -

   a) Male and female
   b) Turner's syndrome
   c) Klinefelter's syndrome
   d) Down's syndrome

iii) Preparation of human karyotype and idiogram

iv) Construction of Pedigrees charts /models on

   a) Y-linked inheritance - Hairy pinna in man.
   b) X - linked recessive - Colour blindness in man
   c) Autosomal recessive gene inheritance – Sickle cell anemia in man
   d) Autosomal dominant gene inheritance- Polydactyly in Man

iv) **Cytoplasmic inheritance**: Identification of shell coiling pattern in Snail.

9. On the spot study-

Reference

1. Jayasurya,et.al. 2013. Practical Zoology Vol.III. Saras publications Nagercoil.

1. Meyyan. R. P. 2005. Genetics. Saras publications Nagercoil.
2. Singh. H.G , Y.S. Chauhan, and R.P. Katiyar. 1988. A manual of Practical genetics. Kalyani Publishers. New Delhi, Ludhiana.
3. Verma, P.S. and Agarwal, V.K. 2013. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Company Ltd, New Delhi.

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Text books:

Dubey, R.C (2008) A text book of biotechnology. S. Chand and Company, New Delhi.
Sathyanarayana, U (2005) Biotechnology. Books and Allied P.Ltd. Kolkata.

Reference:

Bains,W. (1998). Biotechnolgy from A to Z. Oxford University Press, Oxford.
Dubey,R.C. (2006). Text book of Biotechnology, S.Chand & Company Ltd. Ram Nagar, New Delhi
Ranga, M.M. (1999). Animal Biotechnolgy. Agrobios (India) Jodhpur.
Trevan, M.D, Boffery, S. Goulding, K.H. &Stanbury, P. (1984). Biotechnology: The Biological Principles. Tata McGraw Hill Publishing company Limited, New Delhi.
Lewin, B. 1986. Genes. Wiley Eastern Ltd. New Delhi.

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A.V.C.COLLEGE (AUTONOMOUS), MANNAMPANDAL, MAYILADUTHURAI- 609 305

M.Sc., ZOOLOGY

SEMESTER IV – PRACTICAL IV- C.C.XV (Covering Core Courses - 13 & 14)

Code: 11PZOP415

Environmental Biology:

1. Estimation of primary productivity by light and dark bottle method.
2. Measurements of productivity by leaf punch method.
3. Estimation of the size of animal population by mark and recapture method.
4. LC_{50} test on a suitable fish.
5. Estimation of chloride, alkalinity, phosphate, nitrate, nitrite, iron, silicate, BOD and COD.
6. Spotters: Representatives of animals from sandy, muddy, and rocky shores and their adaptation.

Biotechnology:

1. Isolation of DNA and RNA from plant and animal tissues.
2. Estimation of DNA and RNA
3. Isolation of Plasmid DNA from bacteria.
4. Isolation of Genomic DNA from bacteria.
5. Blotting techniques: Southern (Demonstration only).
6. Demonstration of PCR and GEL documentation.

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A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305
M.Sc., ZOOLOGY
SEMESTER IV - AQUACULTURE

C. C. XIV **Code: 11PZOE403a**

Objectives: To update the recent knowledge and research techniques in aquaculture and for continuing higher studies related to aquaculture and biochemistry.

UNIT – I

History of aquaculture- Origin, Growth and present status in India
Prospects: Rural development-social benefits- employment opportunity-economy
Role of Organizations – ICAR, CMFRI, CIFRI, CICFRI, CIFA, CIBA, CIFT, MPEDA and NABARD -Legal and environmental factors.

UNIT – II

Design and Construction of aquaculture pond: Inland and coastal ponds, Selection of site, other requirements- pens, Cages, rafts - Construction of hatcheries - Management of farm and hatcheries
Selection of species- Biological characteristics
Harvesting methods: Crafts and Gears, Preservation, Transport and Marketing strategies

UNIT-III

Finfish Culture: Indian Major Corps - Milk fish and mullet – Ornamental fishes
Mono culture, Poly culture, integrated fish farming- Induced breeding in fishes.
Parasitic diseases: Bacterial, Viral, Fungal, Protozoan and Helminthic diseases of finfish.

UNIT- IV

Shellfish culture: Prawn, shrimp, crabs, lobster, oyster and mussels .
Parasitic diseases: Bacterial, Viral, Fungal, Protozoan and Helminthic diseases of shellfish.

UNIT – V

Biotechnology in aquaculture: Genetic engineering methods-Genomic manipulation- Hybridization, Androgenesis, Gynandrogenesis and Polyploidy.
Economics of Aquaculture: Methodological Approach- selection of fish farmers, Analytical frame work, Evaluation and appointment of coasts.- Maximum Sustainable Yield (MSY) - Maximum Economic Yield (MEY) - Optimum Sustainable Yield (OSY) - Fisheries Extension Programmes - Fish Farmer's Development Agencies (FFDAs).

Text Books:

Arumugam, N. (2007) Aquaculture, Saras Publications.

Références:

1. Chadar, S.L. 1980. Hypophysation of Indian major carps. Satish Book Enterprise, Agra.
2. Govindan, T.K. 1985. Fishes Processing Technology Exporters manual and Documentation. 1999. Jain Book Agency. New Delhi
3. Pillay, T.V.R. 1990. Aquaculture principles and practices, Fishing new books – A Division of Blackwell science limited, Oxford.
4. Santhanam, R. Ramanathan, N. and Jegatheesan, G. 1990. Coastal aquaculture in India, CBS Publishers & Distribution, Delhi,
5. Khanna, S.S and Singh, H.R. Fish Biology and Fisheries.
6. Singh, R.K. Economics of Aquaculture.

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A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305

M.Sc., ZOOLOGY

SEMESTER IV – Elective – III TOXICOLOGY

Code: 11PZOE403b

Objective: To enable the students to acquire knowledge of Toxicology and their effects

Unit-I

Elements of toxicology: Definitions - scope-classification.

Toxic substances (Environmental Toxi-cants): Pesticides(Insecticide- organochlorine, organophosphate,carbamates)-Herbicides,Fungicides-Automobile emissions – Heavy metals – Radioactive substances- Fertilizers – Food additives – Animal, Plant and Mushroom toxins.

Effects of toxic substance: Elementary account on reversible and irreversible toxic effects

Unit – II

Toxic effects: Categories - **Mechanism of actions based on molecular targets**: Protein, enzymes, lipids and nucleic acids - **Factors influencing toxicity – Chemical interaction** : additive, synergistics and antagonistic . **Evaluation of toxicity**: acute and chronic toxicity **Determination of toxicity:** LC_{50}, LD_{50} and EC_{50}

Unit – III

Route of Entry of toxicants: Food, water, Air, Skin and Laboratory animals – **Membrane Bariers - Absorption of toxicants**: mechanism and kinetics of absorption- Distribution of toxicants; storage (storage depots, kinds of storage depots)and kinetics of distribution-**Excretion of toxicants:** important routes (Renal, biliary ,pulmonary) Less important routes(faecal , salivary, placental, milk and egg) – Kinetics of excretion.

Unit – IV

Bio-transformation: Bio-transformation – phase I reaction and phase II reactions.

Mode of action of toxicants: Classification –Methods- Mode of action of selective toxicants .

Antidote – Mechanism of Antidotal therapy.

Unit – V

Safety Evaluation of Toxicants: Risk management and monitoring - Environmental hazards and risk assessment – Criteria for safety evaluation– Upper and lower confidence limits – Cumulative toxicity – Evaluation of combined toxicity – Role of Lc50 or LD50 values in safety evaluation of toxicants – **Behavior of toxicants in the environment** - Bioindicators .

Text Book :

Subramaniyam, M.A. 2004. Toxicology Principles and Methodology . M.J.P. Publishers,Chennai.

Reference:

1.Lu.F.C.Basic toxicology.1985, Hemisphere Pub. Corporation, Washington. N.V. London.

2.Sharma, P.H., 1995. Environmental biology and Toxicology – Restogi and company Meerut India.

3.Mehman,M.A(ed.)1976. Advances in Modern Toxicology. Hemisphere publishing Co., USA.

4.Niesink,R.J.M., Johncle Veries and Hollinger, M.A(eds.) 1996. Toxicology principles and Applications. CPR press, New york.

5.Paget, G.E., 1970. Methods in Toxicology. Black well Scientific publishers, Oxford

A.V.C. COLLEGE (AUTONOMOUS), MAYILADUTHURAI, MANNAMPANDAL.
M.Sc., Wildlife Biology

SEMESTER – II – S.S. – II: CELL BIOLOGY & GENETICS

Credit : 4 Code: 18PWL3202

Objective: To make the students understand the basic biology of cells & to enable the students to understand the basic principles of Inheritance.

UNIT – I

Structure and functions of Plasma membrane-lysosome-Golgi bodies- Ribosomes and Mitochondria-Cytoskeleton- Structure and functions of Endoplasmic Reticulum.

UNIT - II

Nucleus- Chromosome-Type – Cell Division- Mitosis and Meiosis- DNA, RNA. Chromatin and Nucleosome. Protein synthesis -Part Transcriptional Modification of Protein-Intracellular protein transport.
Cancer Cells- Characteristics, types - Apoptosis - Oncogenes –Factors inducing cancer

UNIT - III

Mendelism: Laws of inheritance.
Interaction of Genes: Epistatic genes, Duplicate genes and complementary genes. Linkage and Crossing over: Definition and suitable examples (Drosophila) .
Mapping of Chromosome: Principles and Methods.

UNIT – IV

Sexdertermination: Chromosomal, genic balance, environmental and hormonal basis.
Sex linkage: Colour blindness and hemophilia in man and eye colour in Drosophilia.
Polygenicinheritance: kernel color in wheat and skin colour in man.

UNIT – V

Classification of microbes. Structure of *a bacterium.* Bacterial respiration and reproduction .
Classification of viruses- physical and chemical structures of viruses. DNA and RNA viruses.
Microbial genetics: Transformation, Conjugation, Sexduction and Transduction in bacteria.Chromosomal syndromes in man-Down's, Turner's and Klinefelter's.
Inborn errors of metabolism-Phenylketonuria, Alkeptonuria, Sickle Cell anaemia, Albinism.

Text books:

1. Powar, C.B. (1983), Cell Biology, Himalaya Publishing House, Bombay
2. David Freifelder (1998), Molecular Biology, Ii Ed., Narosa Publishing House, New Delhi.
3. De Robertis, E.D.P., and De Robertis, Jr. E.M.F. 2001. Cell and molecular biology. Williams & Wilkins, USA.
4. Kavita B. Ahluwalia. 1991. 'Genetics' Wiley Eastern Ltd., New Delhi. 2.

Verified 2/12/19

Reference books:

1. Alberts, B., Johnson, A., Lewis, J, Raff, M., Roberts, K and Walter, P. 2002. Molecular biology of the Cell. Garland science, New York.
2. Bolsover, S.R, Hyams, J.S, Shephard, E.A, White, H.A and Wiedemann, C.G. 2004. Cell Biology. John Wiley & sons, Inc. Publication, New Jersey.
3. Gardner, E. J. et.al. (1991). Principles of Genetics. John Wiley & Sons. New York.

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A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305.
M.Sc., Wildlife Biology

SEMESTER II – EL-II: ADVANCES IN BIOLOGICAL SCIENCES
Code: 18PWLE202

Objectives: To enable the students to understand the recent concepts in Wildlife Biology

UNIT - I

Conservation Genetics: Scope and Genetic approaches to wild life conservation- Hardy Weinberg principle- Genetic drift- Principle and application of Quantitative genetics in wildlife populations- Inbreeding and loss of fitness- Advantages of out-breeding and heterosis- Fragmentation and genetic viability. Biotechnological strategies in conservation - Invitro Fertilization (IVF) –Cryopreservation- Uses of tissue culture in conservation- Stem cells & their application in Wildlife Conservation.

Biodiversity: definition – types –Values & Uses-Measurement of Biodiversity-Causes of Biodiversity loss-Mega Diversity Centers of the World- Methods of Conservation of Biodiversity.

UNIT - II

Evolutionary Genetics: Evolutionary genetics of natural populations- Loss of genetic diversity in small populations – Resolving taxonomic uncertainties- Genetic management of threatened species.

Immunity of Wildlife: Primary and secondary lymphoid structures and organs – structure and functions of bone marrow – thymus, spleen, Bursa of Fabricius, GALT, MALT and lymph nodes- Humoral and cell mediated immune response. Hybridoma technology: Production and Application of monoclonal and polyclonal antibodies.

Cells of immune system: origin and differentiation of T&B cells. Vaccines and toxoids- Principle and Applications, Antigen, antibodies- structure, classes and functions.

Transgenic animals-Animal cell culture- stem cell, Bioethics in animal genetic engineering.

UNIT - III

Molecular phylogenetics: Diagnostic molecular markers for traditional population monitoring- Identifying individuals, species and higher categories- Site occupancy and range- Hybridization- Monitoring population genetic parameters- Monitoring recruitment in wild populations- Molecular forensics and enforcement

UNIT - IV

Wildlife Crimes: Definition, Wildlife Crime Bureau (WCB) of India and its role - Crime prevention training.

Wildlife forensics: Methods of analysis - DNA fingerprinting-Isolation of DNA-Amplification - Sequencing-Matching – Applications in detecting Wildlife crimes

UNIT - V

Wildlife Toxicology: Types of contaminants– pesticides, heavymetal, PCBs and PAHs - Methods of toxicity evaluation – mode of action – bioconcentration- bioaccumulation and biomagnifications – impacts of pesticides and heavy metals on birds and mammals.

CAMP and PHVA – Analyses and Reports

Environmental Impact Assessment (EIA) methods

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305
DEPARTMENT OF ZOOLOGY
SEMESTER – II - EDC – I: WILDLIFE CONSERVATION

Code: 18EDZO 201

Objectives:

I. To enable the students to acquire the basic knowledge of Indian wildlife.
II. To facilitate the students to realize the significance of wildlife and their Conservation.

Unit: I: Definition of Wildlife: Causes of wildlife depletion – need for wildlife conservation – IUCN categories – endangered and critically endangered species of birds and mammals in India. Bird watching and its Significance.

Unit: II: Territorial forest, Sanctuaries, National Parks, Biosphere Reserves and Project Tiger Reserves: Definition and importance. Territorial forest: Pichavaram Mangroves. Bird Sanctuary: Vedanthangal. Wildlife Sanctuary: Point Calimere. National Park: Corbett National Park- Biosphere Reserves: Gulf of Mannar- Project Tiger Reserve: Mudumalai.

Unit: III: Zoos and their importance: Types of enclosures- Indoor and outdoor - Wet and dry moat, cages - Aviary, nocturnal house- aquarium – food and feeding of zoo animals – Do's and Don'ts in Zoos - zoo education - Aringnar Anna Zoological Park.

Unit: IV: Social organization and behavior of organism: Parental care in Fishes and Amphibians; Identification of poisonous and non-poisonous of snakes; Migration and navigation of Birds; Social organization of Elephants; Intelligence of Dolphins; Honey bee dance.

Unit: V: Ecotourism: Definition and significance - Human wildlife conflicts with reference to Elephants and Leopard; Economic Importance of wildlife; Misconception of animals; Role of NGO's and Community participation in wildlife conservation.

Text books:

1. Vijayan. Inland Wetland of India
2. **Rahmani A (Ed.).** 2012. .Status of threatened birds in India.
3. WII Manual
4. **Saharia, V.B.** 1982. Wildlife in India. Nataraj Publishers, Dehradun

Reference books:

1. **Abbasi, S.A.** 1997. Wetlands of India; Ecology and threats. (Vol I & II). Discovery Publishing Company, New Delhi.
2. **Dasman, R.F.** 1964. Wildlife Biology. John and wildly and sons New York. Pp 231.
3. **Giles, R.H. Jr** (Ed) 1984. Wildlife Management Techniques 3rd edition. The Wildlife Society, Washington, D.C. Natraj Publishers, Dehradun, India
4. **Seshadri, B.** 1986. India's Wildlife reserves, Sterling Pub'rs Pvt Ltd., New Delhi.

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305

Department of Zoology and Wildlife Biology

M.Sc., Wildlife Biology

SEMESTER III – C.C. XI: WILDLIFE MANAGEMENT TECHNIQUES **Code: 18PWL311**

Hours: 4/week Credit: 4

Objectives: To make the students equip with principles and applications of various wildlife management techniques

UNIT – I

Wildlife Management: Approach: Wildlife Manager – Practice of Management – Scientific Method – Defining Techniques – Evaluating Techniques. Concepts and Principles of Planning Wildlife Management, Investigation and Project: Programme Development – Problem Statement – State of Knowledge – Planning Process – Prospectus – Investigation Plan – Management or Development Plan.

Evaluation of Wildlife habitat: Reconnaissance Survey: Reconnaissance-Mapping instruments – Making Reconnaissance Maps. Vegetation Analyses Techniques: Quadrat/Plot - Belt-transect, Point-Centered Quadrat (PCQ) – Satellite Imagery Classification – NDVI (Normalized Difference Vegetation Index – EVI (Enhanced Vegetation Index). Habitat Analysis and Evaluation: Forest Range Evaluation: Grass /Browse Assessment - Evaluation of Wetland Habitat.

GIS and Remote Sensing: GPS - Satellite Images - NDVI – EVI – NDWI - Drone and their applications in Wildlife: Habitat mapping – Habitat Surveillance – Habitat Protection.

UNIT – II

Habitat manipulation: Food Production: Grass – Browse: forbs - foliage – fruit. Planting Techniques: Direct seeding - transplantation. Water Development: Water-hole Spring & Seeps – Reservoir – Cover Improvement in Terrestrial Habitats: Protective Covers – Nesting Cover. Wetland Habitat Improvements: Development of Water Areas - Habitat Manipulation Practices – Constructing Water Control Devices – Structural Improvements.

Food Habit Analysis: Sampling Methods and Equipment Used: Direct: Direct Observation on Feeding – Evidences on Feeding on Plants – Subtraction from Previous quantity. Indirect: Gut – Crop – Droppings: Dung – Pellet – Regurgitated Pellets. Preservation Analytical Procedures: Preparation – Segregation – Identification – Data Records

Capture & Handling Techniques: Live trapping of birds and mammals: Bait and Scents – Kill Trapping – Live Trapping – Chemical Immobilization. Handling Live Trapped Animals.

UNIT – III

Methods of marking Birds & Mammals: Marking Without Capture: Ringing – Tagging – Clipping. Marking Without Capture: Colouring – Bow-paint tipped arrow- Marking Dart using Cap-Chur Gun - Snare Marking.

Determination of age in Fishes: Otolith-Body length-width - Body scale.

Identification of age and sex in Birds: Gallinaceous birds and water birds: Molt and Plumage patterns - Feather wear and shape - size and distance of spur/fur – Bursa Fabriculus or cloacal protuberance and brood patch – song.

Mammals: Tooth eruption- shoulder height methods – horns/antler - fur colour - Pelvis.

Translocation of wildlife: Principles - methods - applications.

UNIT – IV

Population Size Estimation: Direct count: Total count: Strip transect - Block count. Sample count: Line Transect Direct Sighting Methods - Point counts (Distance Sampling Analysis) - Mark – recapture - Peterson or Lincoln Index. Indirect count: Line Transect Dung Count Methods - Call count – Pugmark - Camera trap and Aerial photography.

UNIT – V

Human-Wildlife Conflicts: Elephant - Nilgai - Wild Pig - Tiger – Leopard. Identification - Evaluation of various types of damages: Crop-damage-Property damage-human casualty. Causes of conflict: Habitat loss-fragmentation-degradation- increase in population - weed proliferation. Mitigative measures: Compensation, *Ex-gratia* – habitat consolidation: relocation - corridor - invasive species management- capture and translocation-crop protection measures - physical barriers - mechanical barriers.

Text book

1. Giles, R.H. Jr. (Ed) 1984. **Wildlife Management Techniques** 3rd edition. The wildlife Society, Washington. D.C. *Nataraj Publishers*, Dehradun. India.

Reference books

1. Dasmann, R.F. 1964. **Wildlife Biology**. John and Wiley and sons New York. pp.231.
2. Robinson, W. and Eric, G. Bolen, 1984. Wildlife Ecology and Management *Mac Millan* Publishing Co, Ny. pp. 478.
3. Rodgers, W.A 1991. **Techniques for Wildlife census in India** – A Field manual technical Manual – TM – 2 Wildlife Institute of India, Dehradun.
4. Sutherland, W.J. 2006. Ecological census techniques 2nd Edition, *Cambridge University Press*.

Learning outcomes:

- Students would understand the various techniques being used around the globe for Wildlife Management.
- The course would also enhance the understanding on utility of various techniques, their advantages and disadvantages in studying and conserving the wildlife populations.
- It would also result in contributing standard outputs for development of science.

Verified

01/07/2019.

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305
M.Sc., Wildlife Biology

SEMESTER - III - C.C. XII: MANAGEMENT OF ZOOS, SANCTUARIES, AND NATIONAL PARKS

Hours : 4/week credit : 4 Code: 18PWL312

Objectives:

1. To understand the management and monitoring of zoos and protected areas in India.
2. To introduce the concept of conservation biology.

UNIT - I

Traditional In-situ conservation
Definition, declaration and management of Wildlife Sanctuaries, National parks, Territorial forest divisions in India
Designing and evaluating the protected area. Evaluating the shape and size of selected protected areas in India
Territorial forest divisions: (Erode forest division and Sambalpur forest division)
Wildlife Sanctuaries: Vedanthangal, Wayanad, Kedarnath WLS.
National parks: Gir, Kazhiranga and Eravikulam.
Marine National Park: Gulf of Kutch, Gulf of Mannar.

UNIT - II

Modern In situ conservation
The concept of landscape scale conservation: Biosphere Reserves
Tiger Reserves - Definition, formation, management and administration – Mudumalai, Corbet and Kanha.
Eco - Development and Ecotourism programmes in tiger reserves.

UNIT - III

Ex situ conservation
Zoos and Zoological Parks: Definition- Aims of Zoos- Formation and Management of Zoos and Zoological Parks - Central Zoo Authority of India. Enclosures- Designing, Engineering and Enrichment. Zoo animal nutrition: Food and feeding. Zoo sanitation: Principles and management of zoo. Diseases of Zoo animals. Zoo veterinary services. Animal restraint: principles and methods, release of restrained animals. Transport of animals Pests and parasites – nutritional disorders Zoo education: Internship techniques and Zoo research.
Captive breeding: Aims, Principles, methods and case studies. Germplasm storage: Cryobank – Pollen bank, sperm Bank.

UNIT - IV

Habitat deterioration: Pollution-Land-Air-Water-Organic pollution-BOD and COD.
Habitat Restoration and Animal Conservation: Identifying the key species, Assessment of Carrying capacity, Concept of Corridor management:
Exotic and Invasive Species: Principles and Problems-
Case Studies: Plant Species: *Lantana camera, Prosophis juliflora Parthiniam* spp.

and *Eichhornia crassipes*. **Animal species**: Sucker mouth armored cat fish, *Tilapia* spp. Role of Government, NGO's (BNHS, WTI , WCS, USFSW, WWF,) and Educational Institutes (ATREE) involved in Wildlife Conservation.

UNIT - V

Wildlife administration and legislation: Administrative set up - Advisory bodies- National Board for Wildlife –Wildlife (Protection) Act, 1972 and its Amendments. Wildlife trade and regulations, National Green Tribunal Act 2010.

Text books:

1. Saharia, V.B. 1998. Wildlife in India, Nataraj Publishers, Dehra Dun. pp. 294.
2. Bawa, S.K., Primack, R.B. and M. A. Oommen. 2011. Conservation biology A primer for South Asia. University Press, Hyderabad. pp. 589. ISBN: 978-81-7371-7246
3. Pullin, A.S. 2002. Conservation biology, Cambridge University Press, Cambridge. pp. 340. ISBN: 978-0-521-64482-2
4. Rees, P.A. 2011. An Introduction to zoo biology and management, John Wiley and Sons Ltd., West Sussex, UK. pp. 416. ISBN: 978-1-4051-9350-4.

Reference books:

1. Hambler, C., 2004. Conservation, Cambridge University Press, Cambridge. pp. 368. ISBN: 978-0521-00038-3.
2. Primack, R.B. 1993. Essentials of conservation biology, Sinauer Associates Inc. Publishers, USA. pp. 564. ISBN: 0-87893-722-6.
3. Chhapgar, B.F. 2006. Marine life in India, Oxford University Press, New Delhi. pp. 368. ISBN: 978-0-19-568514-5.
4. Divyabhanusinha (ed). 2008. The lions of India, Permanent Black, Ranikhet. pp. 267. ISBN: 81-7824-213-3.
5. Gadgil, M., Report of the Western Ghats, Ecology Expert Panel" (PDF). *Madhav Gadgil Commission*. The Ministry of Environment and Forests, Government of India. Retrieved 1 November 2013.

Learning outcomes:

After completing the course, the students would be able to

- Understand the definition, declaration and management of Protected areas, structure of Protected Areas like Sanctuary, and National park.
- Gain knowledge about the Biosphere Reserves, Tiger reserves and Ramsar Sites in India and Zoological parks and its importance.
- Evaluate the Habitat deterioration, Habitat Restoration and role of NGOs in wildlife conservation.
- Understand Wildlife administration and legislation, role of national board of Wildlife and Wildlife trade.

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01/07/2019.

A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL – 609 305.
M.Sc., Wildlife Biology

SEMESTER: III – C.C. – XIII: ETHOLOGY OF WILDLIFE **Code:** 18PWL313

Hours: 4/week Credit = 4

Objectives: To enable the students to understand the basic behaviour of animals and their architectural abilities

UNIT - I

Introduction and Scope to the study of Animal behaviour: Historical outline of Animal behaviour, Milestones in Ethology, Scope, Purpose and Importance of the study of Animal behaviour. Branches and Basic concepts of Ethology

Analysis of behaviour: taxes, kinesis and reflexes.

UNIT - II

Instinct Behaviour: Classical theory of Instinct – Phases of instinct behaviour, fixed action pattern – Sign stimuli – Drive and motivation – models of instinct behaviour – Ritualization.

Learning Behaviour: Types of learning (Habituation, classical conditioning I & II, trial end error learning, latent learning, insight learning, imprinting) – evolution of learning – memory.

Aggressive behaviour.

Field (Altmann, 1974) and laboratory methods (Dog and Rat) of studying of animal behaviour - Ethogram

UNIT - III

Social behaviour: Social behaviour of Bees, Primates (Baboons and Chimpanzee), Elephant and Lion.

Foraging behaviour: Optimal Foraging Theory (OFT) – Group foraging special reference to birds and mammals. Optimal foraging and risk predation.

Factors influencing the feeding and social behaviours- physical, chemical and biological.

UNIT - IV

Play behaviour: Types of Play – Play in mammals – biological effects of play.

Reproductive behaviour: Sexual behaviour and selection, mating strategy and pattern, parental care in birds and mammals; weaning in mammals.

Factors influencing the reproductive behaviours- physical, chemical and biological.

UNIT - V

Animal communication: Visual, auditory, chemical and vocalization in birds & mammals.

Chronobiology: Circadian, lunar, tidal and annual rhythms.

Animal architectural ability: birds.

Animal navigation

Text books:

1. Wilson, E.O. 1978. Sociobiology. The Belknap press of Harvard University Press, Cambridge.
2. Shukla, J.P. 2010. Fundamentals of Animal Behaviour. Atlantic Publishers, New Delhi.
3. Reena Mathur. 2010. Animal Behaviour. Rastogi Publications, Meerut.

Reference books:

1. Leshner, A.I. 1978. An introduction to Behaviour Endocrinology, Oxford University

2. Ridley, M. 1968. Animal Behaviour. A concise introduction Blackwell Scientific publication, Oxford.
3. Slater, P.J.B. 1985. An introduction to Ethology, Cambridge University Press. Cambridge.
4. McFarland.D. (Ed) 1981. The Oxford companion to Animal Behaviour. Oxford University Press, New YorkWallace, R.A. 1979. The ecology and evolution of Animal Behaviour, Goodyear Publishing Company, Inc. Santa Monica, California.

Learning Outcomes:

On completion of this course, the students would be able to

1. Understand the Scope, Purpose and Importance of studying Ethology and its branches.
2. Differentiate between Instinctive and Learned behaviour.
3. Apply the various field and laboratory methods for studying behaviour.
4. Gain knowledge on various types of behaviour, animal communication and biological rhythms.

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M.Sc., Wildlife Biology

SEMESTER III – C.C. – XIV: RESEARCH METHODOLOGY & BIOTECHNIQUES

Hours : 4/week credit : 4 Code: 18PWL314

Objective: To enable the students to acquire basic knowledge of experimental methods both laboratory and field in the wildlife biology and to pursue their higher studies including designing of a problem, experimental approach and report writing.

UNIT - I

Selection of a research problem: Approach and experimental design – defining the hypothesis, Law, and Theory.

Library and information sources: Books, Journals, Reprints, CD Rom, Microfilm, Internet, Preparation of Index cards – literature survey through internet.

Research and Documentation: Components of a thesis and thesis writing - abstracts, research papers and communication – preparation and submission of research paper for symposia/ seminar/ conferences and peer reviewed journals – citation index – *h*-index - impact factors – Creation and usage of Google scholar account.

UNIT – II

Animal Ethics in Research in Laboratory animals- Rules and Regulations.

Making observation and records: Field diary, filing and filing systems.

Photography recording: Field Photography – Photomicrography – Micrometry.

Maps and Mapping techniques.

Software: Application of Arc GIS and ENVI program, Steps involved in the usage of Q-GIS and its application.

UNIT – III

Audial, visual and activity recording instruments: Binoculars- Telescopes- Photography Equipment- Video Camera - Camera Traps- Drones- Anemometer- Lux-meter- Field Campus, Thermo-hygrometer- Tally counter- Bioacoustics- Bat Detectors- Thermal Imaging Scope.

Weight, height and distance measuring instruments: Rangefinder- Altimeter- Pedometer, Weighing and Spring Balance.

Remote Sensing Instruments: Radars- GPS-Radio telemetry and Satellite telemetry-Microchips in wildlife research.

Radio isotopes – Measurement of radio activity – Gieger Muller Counter (GMC).

UNIT – IV

Principles, types and application of Colorimetry: UV Spectrophotometer-Atomic Absorption Spectroscopy (AAS)- Calorimetry- pH meter.

Chromatography: Paper-Column–Gas. Electrophoresis: Agarose- PAGE-Immuno-Electrophoresis.

Centrifuge: Table Top- Ultra Centrifuge. Thermo-cycler (Polymerase Chain Reaction - PCR) and Gel documentation.

UNIT – V

Post-mortem techniques: Equipments –Autopsy of birds and mammals.
Museum techniques: Wet and dry preservation – Taxidermy procedure.
Microtechniques: Permanent mounting: Narcotization and killing – fixing – washing – processing – staining – mounting – labeling. Cytochemical staining methods-Histological preparation of tissues for SEM and TEM –Immunocyto chemistry – Autoradiography.
Cell culture methods – Cell fractionation techniques – Cytophotometry –micrometry.

Text books:

1. Gurumani, N. 2007. Research Methodology for Biological Sciences. MJP Pub. Chennai.
2. Jawahar, P. 2000. The Preservation of Zoological Specimens. Government Museum, Chennai.
3. Giles, R.H. Jr. (Ed.). 1984. Wildlife Management Techniques. 3rd edition. The Wildlife Society, Washington. D.C. (Indian Printers: Nataraj Publishers, Dehradun).

Reference books:

1. Anderson, J., Durston, B. and Poole, M. 1991. Thesis and Assignment Writing. New Age International Pvt. Ltd., New Delhi.
2. Conference of Biological Editors. 1972. Style Manual for Biological Journals. American Institute of Biological Science, Washington, D.C.
3. Kothari, C.R. 2006. Research Methodology and Research Techniques. New Age Int. Pub., New Delhi.
4. Palanivelu, P. 2004. Analytical Biochemistry and Separation Techniques. 3rd Edition, MKU Co-op, Press Ltd., Palkalai Nagar, Madurai.
5. Subramanian, M.A. 2005. Biophysics – Principles and Techniques. 1st Edition, MJP Publishers, A Unit of Tamil Nadu Book House, Chennai.

Learning Outcomes:

- After studying this course, the students should be able to understand the basic framework of research process, various research designs and techniques.
- Identify various sources of information for literature review and data collection.
- Develop an understanding of the ethical dimensions of conducting applied research and the components of scholarly writing and evaluate its quality.
- Understand the working principles and applications of field and lab equipments, postmortem examination, preservation techniques, micro techniques and tissue culture techniques.

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A.V.C. COLLEGE (AUTONOMOUS), MANNAMPANDAL - 609 305

DEPARTMENT OF ZOOLOGY

SEMESTER – II EDC – II HEALTH EDUCATION

Hours: 4/week Credit: 2 Code: 18EDZ0302

Objectives: To enable the students acquire the basic knowledge of the importance of nutrition and sanitation.

To understand the sociological problems and family welfare.

To understand the human diseases and their control.

UNIT I

Nutrition:

Classification of foods.

Growth and development- growth chart.

Balanced diet- malnutrition- nutritional deficiency - special need groups.

UNIT II

Environment and Health:

Water – importance, standards and purification.

Air- ventilation and discomfort.

Effect of water, air and noise pollution.

Methods of environmental sanitation.

Global warming and its effects.

UNIT III

Family Health:

Small family - women and child health MCH programmes in India

Methods of birth control.

Sociological problem and large families

Occupational hazards: physical, biological and physiological hazards of working groups.

UNIT IV

Diseases:

Communicable- TB, Polio, Encephalitis

Non-communicable - Obesity, STD, Hypertension, Diabetes

Genetic disorders- Down's, Turner's, Klinefelter's syndromes.

UNIT V

Health Education:

Individual and social health - Family and community health - Role of mass media in health education - Physical exercises and health recreation.

Text Book:

1. Park, K. (2007). Park's Text book of preventive and social medicine
2. Jayaram Paniker, C.K. (2002) Textbook of medical parasitology. Jaypee brothers Medical publishers Pvt. Ltd, New Delhi.

Reference:

1. Chandler, A.C. and Read, C.P. Introduction to Parasitology. Wiley Eastern Private Ltd., New Delhi.

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Learning Outcomes:

After completing the course, the students would be able to

- ✓ Understand the importance of nutrition and need for taking balanced diet.
- ✓ Gain knowledge on the causes and effects of air, water and noise pollution and its control measures.
- ✓ Analyze the sociological problems attached to large families and maternal and child health programmes.
- ✓ Know various communicable, non-communicable diseases and genetic disorders.

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M.Sc., Wildlife Biology

SEMESTER - III – E.C. – III: CLIMATE CHANGE AND WILDLIFE CONSERVATION

Hours: 4/week Credit: 4 Code: 18PWLE303

Objectives: Upon completion of this paper, students will gain the scientific knowledge on issues related to global warming and biodiversity conservation.

UNIT - I

Introduction and concepts of climate change; Global climate change – past and present scenario; Climate change on Tectonic- Orbital-Glacial- Millennial and Historical Timescale; Modern climate change since industrial revolution; Natural disasters- cloudburst –frequent hurricanes and droughts; El Niño and La Nino effects on climate change- tsunami-Himalayan glacier effects.

UNIT - II

Causes of climate change: Greenhouse Effects- Green house gases: water vapour, carbon dioxide, methane, nitrous oxide, chlorofluorocarbon, ozone and aerosols; Anthropogenic sources of green house gases.

Elements of climate change – temperature – precipitation – ice sheet melting – sea level rise - acid rain-ozone depletion; Impact of natural radiation and global climate change.

Different concerns of Climate changes in developed and developing countries.

Mitigation and adaptation of global warming.

UNIT - III

The Earth's Carbon Reservoirs - Biogeochemistry; Atmospheric Carbon Reservoir - Carbon Cycling- the physical carbon pump -the biological carbon pump -the marine carbon cycle -the terrestrial carbon cycle – ecological responses to climate change- carbon trading.

UNIT - IV

Wind Systems- significances and consequences; Role of marine water current and global climate change - Atmospheric drivers of marine climate change; Sea Surface Temperature (SST); Ocean acidification; Effects of climate change on marine life; The significance of monsoon -irregular monsoon- direct and indirect effects on wildlife.

UNIT - V

Climate change and forest fire and their impact on Indian wildlife and behaviour- diapauses in insects (pollinators); Climate change-policies and governance; Role of IPCC (Intergovernmental Panel on Climate Change) – WMO (World Meteorological Organization) on climate change; Effects of natural climate fluctuations- climate change and society.

References:

1. Laffoley, D. and J.M. Baxter (eds.) (2016). *Explaining ocean warming: Causes, scale, effects and consequences*. Full report. Gland, Switzerland: IUCN.
2. IUCN (2015). *Oceans and Climate Change brochure*.
3. Joseph Romm (2015). Climate change: What everyone Needs to Know. Oxford University Press, 05-Nov-2015 - Science - 336 pages.
4. Gattuso, J.P. et al. (2015). 'Contrasting futures for ocean and society from different anthropogenic CO_2 emissions scenarios'. *Science* 349:6243.
5. Herr, D., Isensee, K., Harrould-Kolieb, E. and Turley, C. (2014). *Ocean Acidification: International Policy and Governance Options*. Gland, Switzerland: IUCN.
6. Turley, C. et al. (2013). *Hot, Sour and Breathless – Ocean under stress.*
7. Singh (2010). Global Warming and Climate Change, APH Publications, pp.320.
8. Julie Kerr, Casper (2009). Changing Ecosystems Effects of Global Warming-Facts on File. Library of Congress Cataloging-in-Publication Data
9. Dieter Helm (2005). Climate change policies. OUP Oxford, 05-May-2005 - Business & Economics - 399 pages.
10. Weart Spencer. (2004). The Discovery of Global Warming. Harvard University Press. *Available on-line:* http://www.physicists.org/history/climate.
11. Velma Grover. 2004. Climate Change, Hamilton, Ontario, Canada. ISBN 978-1-57808-326-8; pp. 472.
12. IPCC-Reports from Working Groups I, II and III are available at https://www.ipcc.ch/reports/.
13. Websites: https://www.ipcc.ch/; https://public.wmo.int/en

Learning Outcomes:

- After studying this course, the students should be able to understand the physical basis of the natural and man- made greenhouse effects.
- Comprehend the current evidence for global warming and its relation to climate changes throughout the Earth's history.
- Understand the mechanisms by which ecosystems and biodiversity, ecosystem goods and services, and human well-being have been and are expected to be affected by climate change.
- Realize the growing scientific consensus established by the IPCC and WMO along with complexities and uncertainties in mitigation of global warming.

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