



MANONMANIAM SUNDARANAR UNIVERISTY,  
TIRUNELVELI-12

## SYLLABUS

### UG - COURSES – AFFILIATED COLLEGES

Course Structure for B. Sc. Zoology  
(Choice Based Credit System)

(with effect from the academic year 2023-2024 onwards )



Semester-III				
Part	Subject Status	Subject Title	Subject Code	Credit
I	LANGUAGE	TAMIL/MALAYALAM/HINDI	E1TL31/ E1MY31/ E1HD31	3
II	ENGLISH	ENGLISH	E2EN31	3
III	CORE V	CELL BIOLOGY	EMZO31	4
III	CORE VI	LAB ON CELL BIOLOGY	EMZOP3	2
III	ELECTIVE 3	CHEMISTRY FOR BIOLOGICAL SCIENCES-I	EECH12	3
		LAB COURSE: VOLUMETRIC ANALYSIS	EECH1P	2
IV	SEC 4	ECONOMIC ZOOLOGY	ESZO31	1
IV	EVS	ENVIRONMENTAL STUDIES	EEVS31	2
		NAAN MUTHALVAN (Poultry Science and Management*)		2



**Total Marks: 100 Internal Exam: 25 marks + External Exam: 75 marks**

**A. Scheme for internal Assessment:**

Maximum marks for written test: **20 marks**

**3 internal tests**, each of **1 hour** duration shall be conducted every semester.

To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

The break up for internal assessment shall be:

Written test- 20 marks; Assignment -5 marks Total - 25 marks

**B. Scheme of External Examination**

**3 hrs.** examination at the end of the semester

A – Part : 1 mark question two - from each unit

B – Part : 5 marks question one - from each unit

C – Part : 8 marks question one - from each unit

➤ **Conversion of Marks into Grade Points and Letter Grades**

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	O	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	A	8	Very Good
4	60-69	B+	7	Good
5	50-59	B	6	Above Average
6	40-49	C	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

➤ **Cumulative Grade Point Average (CGPA)**

$$CGPA = \frac{\Sigma (GP \times C)}{\Sigma C}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

➤ **Classification**

- First Class with Distinction : CGPA  $\geq$  7.5\*
- First Class : CGPA  $\geq$  6.0
- Second Class : CGPA  $\geq$  5.0 and  $<$  6.0
- Third Class : CGPA  $<$  5.0



## Part I TAMIL

### தமிழக வரலாறும் பண்பாடும்

#### அலகு 1

**தொழில் பழங்கால வரலாறும் சங்ககால வரலாறும்**

1. தொழில் தமிழர்
2. பழைய கற்காலம்
3. புதிய கற்காலம்
4. உலோகக் காலம்
5. அகழ்வாராய்ச்சியில் தமிழும் தமிழரும் (கீழடி வரை)
6. திணை வாழ்வியல் (களவு வாழ்க்கை, கற்பு வாழ்க்கை, உணவு, அணிகலன்கள், வாணிகம், விளையாட்டுகள்)
7. கல்வியும் கலைகளும்
8. தமிழ் வளர்த்த சங்கம்
9. சங்க கால ஆட்சி முறை
10. அயல்நாட்டுத் தொடர்புகள்

#### அலகு 2

**ஆட்சியர் வரலாறு**

1. மூவேந்தர் வரலாறு
2. பல்லவர் வரலாறு
3. நாயக்கர் ஆட்சி
4. முகம்மதியர் ஆட்சி
5. மராட்டியர் ஆட்சி

#### அலகு 3

**ஐரோப்பியர் கால வரலாறு**

1. போர்த்துகீசியர்
2. டச்சுக்காரர்கள்
3. டேனிஸ்காரர்கள்
4. பிரெஞ்சுக்காரர்கள்
5. ஆங்கிலேயர்கள்
6. பாளையக்காரர்கள்
7. இந்தியா விடுதலை போராட்டத்தில் தமிழ்நாடு

#### அலகு 4

**விடுதலைக்கிபின் தமிழ்நாட்டு வரலாறு**

1. மொழிபோராட்டம்



2. சமூக மறுமலர்ச்சி
3. தொழில்நுட்ப வளர்ச்சி

#### அலகு 5

#### மொழிப்பயிற்சி

1. நிறுத்தக் குறிகள்
2. கலைச்சொற்கள்
3. மொழிபெயர்ப்பு

#### Text Books

- தமிழக வரலாறும் பண்பாடும் - கே. கே. பிள்ளை, உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை
- தமிழர் நாகரீகம் பண்பாடும் - அ. தட்சிணாமூர்த்தி, யாழ் வெளியீடு, சென்னை
- தமிழக வரலாறும் பண்பாடும்-வே.தி.செல்லம், மணிவாசகர் பதிப்பகம், சென்னை

#### Reference Books

1. தமிழக சமுதாயா பண்பாட்டு கலை வரலாறு - கு சேதுராமன், என்,சி,பி.எச், சென்னை
2. தமிழர் கலையும் பண்பாடும்-அ .கா.பெருமாள், என்,சி,பி.எச், சென்னை
3. ஒரு பண்பாட்டின் பயணம்: சிந்து முதல் வைகை வரை - ஆர். பாலகிருஷ்ணன், ரோஜா முத்தையா ஆராய்ச்சி நூலகம், சென்னை.



# MALAYALAM - POETRY

## UNIT I

This unit focus on significance of Malayalam Poetry and trends.

To familiarize the early stages of Malayalam poetry- Folklore heritage-Pattu-Bhakthi movement-Cherussery-Ezhutachan- Kunjan Nambiar-

Detailed study:

Jaritha Vilapam (Mahabharatam kilippattu) Ezhutachan

## UNIT II

Romanticism –Asan- Ulloor – Vallathol

Detailed study :

1. Veena Poovu (First 7 slokas only)- Asan
2. Aa poomala- Changampuzha

## UNIT III

Modernity in Malayalam poetry- First phase

Post Independent India and Modernization of Nation in Malayalam poetry

Detailed study

1. Yuga Parivarthanam- Vailoppilli Sreedhara Menon
2. Gandhiyum Godseyum- N .V.Krishna Warriar

## UNIT IV

Modernity in Malayalam poetry- second phase

Detailed Study

1. Gajendra moksham \_ Sugathakumari
2. Kozhi – Kadammanitta
3. Megharoopan – Aattoor Ravi Varma
4. Budhanum Attin kuttium – A. Ayyappan

## UNIT V

This unit introduces the nature of samakalika kavitha It also evaluates s a m a k a l i k a kavitha,- the contemporary poetry originated after modern poetry- women, Dalit, environment and cyber issues.

Detailed study

- 1.Pattanbipuzhamanalil – P P Ramachandran
- 2.Malayalakavithakku oru Kathu- S. Joseph
- 3.Thoramazha – Rafeek Ahammad
- 4.Muttamadikkumbol – Anitha Thampi
- 5.Survey of India-B.M.Manoj

## Recommended Text

Puthukavitha Ed by Dr.O.K.Santhosh.Madras University Publication (5 poems only )

- (a) pattambipuzhamanalil,
- (b) Malayala kavithakku oru kathu,
- (c) Muttamadikkumbol,
- (d) Thoramazha,
- (e) Survey of India

## Reading List (Print and Online)

1. Aadhunika Malayala Sahitya Charithram prasthanangaliloode – Dr. K.M.George (Ed.)
2. Kairaliyute Kadha – N.Krishnapillai
3. Kavitha Sahitya Charithram – M.Leelavathi
4. Adrushyathayute Akhyanangal- Rajesh Chirapadu
5. Adhunikananthara Malayala Kavitha –C.R.Prasad
6. Pen kavitha malayalathil-Sheeba Divakaran,kerala bhasha institute.Thiruvananthapuram
7. Samakalika Malayala kavitha-M.B.Manoj,Samayam Classics. Kannoor
8. Varnnaraji Dr.M.Leelavathi



## **HINDI - Patra Lekhan aur Paribhashik Shabdavali**

### **Unit I**

#### **Niji Patra Lekhan**

- Niji Patra – Arth aur Bhed
- Pitaji/Mataji ke naam patra
- Mitra, Bhai aadi ke naam patra
- Paribhashik Shabdavali – 20 words

### **Unit II**

#### **Samajik Patra Lekhan**

- Samajik Patra – Arth aur Bhed
- Aavedan Patra – Noukri, Chutti aadi
- Dak Adhikari ke naam patra
- Paribhashik shabdavali – 20 words

### **Unit III**

#### **Vyavasayik Patra Lekhan**

- Vyavasayik Patra – Arth aur Bhed
- Prakashak ke naam patra
- Shikayathi
- Paribhashik shabdavali – 20 words

### **Unit IV**

- Samanya Parichay
- Sarkari Patra
- Ardh-Sarkari Patra
- Gyapan, Paripatra
- Anusmarak
- Paribhashik Shabdavali – 20 words

### **Unit V**

- Precis Writing And Applied Grammar (Ling, Vachan and Karak)

### **Reference Books**

1. Viyavaharik Hindi, Hindi Prachar press, T.Nagar, Madras-600 017
2. Alekhan aur Tippan – Prof. Viraj
3. Alekhan - Kichlu

### **Related Online Contents** (MOOCs, SWAYAM, NPTEL, YouTube, Websites, etc.)

1. <https://youtu.be/-kUPGG0B4tU>
2. <https://www.youtube.com/watch?v=xk14MNB1r7k>



# GENERAL ENGLISH

## Unit I ACTIVE LISTENING

### Short Story

- 1.1 In a Grove – Akutagawa Ryunosuke Translated from Japanese by Takashi Kojima
- 1.2 The Gift of the Magi – O’ Henry

### Prose

- 1.3 Listening – Robin Sharma
- 1.4 Nobel Prize Acceptance Speech – WangariMaathai

## Unit II INTERPERSONAL RELATIONSHIPS

### Prose

- 2.1 Telephone Conversation – Wole Soyinka
- 2.2 Of Friendship – Francis Bacon Song on (Motivational/ Narrative)
- 2.3 Ulysses – Alfred Lord Tennyson
- 2.4 And Still I Rise – Maya Angelou

## Unit III COPING WITH STRESS

### Poem

- 3.1 Leisure – W.H. Davies
- 3.2 Anxiety Monster – RhonaMcFerran

### Readers Theatre

- 3.3 The Forty Fortunes: A Tale of Iran
- 3.4 Where there is a Will – Mahesh Dattani

## Unit IV Grammar

- 4.1 Phrasal Verbs & Idioms
- 4.2 Modals and Auxiliaries
- 4.3 Verb Phrases – Gerund, Participle, Infinitive

## Unit V Composition/ Writing Skills

- 5.1 Official Correspondence – Leave Letter, Letter of Application, Permission Letter
- 5.2 Drafting Invitations
- 5.3 Brochures for Programmes and Events

### Text Books (Latest Editions)

1. Wangari Maathai – Nobel Lecture. Nobel Prize Outreach AB 2023. Jul 2023.
2. Mahesh Dattani, Where there is a Will. Penguin, 2013.
3. Martin Hewings, Advanced English Grammar, Cambridge University Press, 2000
4. Essential English Grammar by Raymond Murphy

### Web Resources

1. WangariMaathai – Nobel Lecture. Nobel Prize Outreach AB 2023. Mon. 17 Jul 2023.  
<https://www.nobelprize.org/prizes/peace/2004/maathai/lecture/>
2. Telephone Conversation - Wole Soyinka [https://www.k-state.edu/english/westmank/spring\\_00/SOYINKA.html](https://www.k-state.edu/english/westmank/spring_00/SOYINKA.html)
3. Anxiety Monster-RhonaMcFerran [www.poetrysoup.com](http://www.poetrysoup.com)



# CELL BIOLOGY

## Course Objectives

- To understand the various techniques used to study the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes and organelles.
- To understand how these cellular components are used to generate and utilize energy in cells.
- To understand the cellular components.
- To apply the knowledge of cell biology and its significance to cell function.
- To understand different types of cell division.

## UNIT I

History of Cell Biology and Cell theory, Tools and Techniques of Cell Biology, Cell Fractionation, Homogenization, Centrifugation, Staining - Vital Stains. – Cytoplasmic and Nuclear Stains.

Micro Technique Methods, Microscopes - Types - Light,

## UNIT II

The Cell - Ultra structure of Plant & Animal cell - Cytoplasm - Structure and Composition, Function - Cytoplasmic Inclusions. Viruses & Bacteria -Types and Structure

## UNIT III

Cell components - Plasma Membrane: Ultra Structure - Different Models – Functions, Ultrastructure and functions: Endoplasmic reticulum, Ribosomes, Golgi Complex, Lysosomes, Centrioles, Microtubules, and Mitochondria.

## UNIT IV

Nucleus - Ultrastructure, Composition and Functions, Nuclear Membrane - Nucleoplasm - Chromosomes - Heterochromatin and Euchromatin – Giant chromosomes, Nucleolus, DNA- structure and types, DNA replication and types of replication - RNAs - Protein Synthesis & regulation.

## UNIT V

Cell Divisions and Cell Cycle - Amitosis, Mitosis and Meiosis and their Significance - Cancer Biology – Characteristics of cancer cells, types, theories on Carcinogenesis, Ageing of Cells – Apoptosis

## Text Books (Latest Editions)

1. Ambrose, E.J. and Dorothy, M. Easty, 1970. Cell Biology, Thomas Nelson & Sons Ltd.,
2. Kumar P. and Mina U. (2018) Life Sciences: Fundamentals and Practice, Part-





- I, 6th Edn., Pathfinder Publication.
3. VeerBala Rastogi, Introductory cytology. Kedar Nath Ram Nath. Meerut 250 001.
  4. Verma, P.S. and V. K. Agarwal, 1995. Cell and Molecular Biology, 8th Edition, S.Chand & co., New Delhi - 110 055.
  5. Verma P.S. and Agarwal V.K. (2016) Cell Biology (Cytology, Biomolecules, Molecular Biology), Paperback, S. Chand and Company Ltd.

**Reference Books** (Latest editions, and the style as given below must be strictly adhered to)

1. Albert B., Hopkin K., Johnson A.D., Morgan D., Raff M., Roberts K. and Walter P. (2018), Essential Cell Biology ,5th Edn.,(paperback) W.W. Norton & Company p.864.
2. Burke, Jack. D., 1970. Cell Biology, Scientific Book Agency, Calcutta.
3. Challoner J. (2015), The Cell: A visual tour of the building block of life, The University of Chicago Press and Ivy Press Ltd., p.193.
4. Cohn, N. S., (1979), Elements of Cytology, Freeman Book Co., New Delhi – 110007, 495 pp
5. Cooper G.M. (2019) The Cell – A Molecular Approach, 8th Edn., Sinauer Associates Inc., Oxford University Press p.813.
6. DeRobertis, E.D.P. and E.M.F. De Robertis, (1988), Cell and Molecular Biology, 8th Edition, International Edition, Info med, Hong Kong, 734pp.
7. Dowben, R., (1971), Cell Biology, Harper International Edition. Harper and Row Publisher, New York, 565 pp.
8. Giese, A.C., (1979), Cell Physiology, Saunders Co., Philadelphia, London, Toronto, 609 pp.
9. Hardin J. and Bertoni G. (2017), Becker’s World of the Cell. 9th Edn (Global Edition). Pearson Education Ltd., p. 923
10. Karp G., Iwasa J. and Masall W. (2015), Karp's Cell and Molecular Biology Concepts and Experiments. 8th Edn. John Wiley and Sons. p.832.
11. Loewy, A.G. and P.Sickevitz, (1969), Cell Structure and Function, Amerind Publishing Co., NewDeihi - 110 020, 516 pp.
12. Mason K.A., Losos J.B. and Singer S.R. (2011), Raven and Johnson’s Biology. 9th Edn. Mc Graw Hill publications. p.1406.
13. Powar, C.B., (1989), Essential of Cytology, Himalaya Publishing House, Bombay - 400 004, 368 pp.
14. Swansen, C.P. and P.L.Webster, (1989), The Cell, Prentice Hall of India Pvt. Ltd., New Delhi - 110 001, 373 pp.
15. Urry L.A. Cain M.L., Wasserman S.A., Minorsky P.V., Jackson R.B. and Reece J.B. (2014), Campbell Biology in Focus, Pearson Education. p.1080.

**Web Resources**

1. <http://www.microscopemaster.com/organelles.html>
2. <https://bit.ly/3tXwDSB>
3. <https://bit.ly/3tWNpRX>
4. <https://bit.ly/3AuYR9M>
5. <https://rsscience.com/cell-organelles-and-their-functions/>



## LAB ON CELL BIOLOGY

### Learning Objectives

- To encourage students to learn to focus the microscope and usage of ocular & stage micrometer, camera lucida.
- To impart the skills required to understand the nature and types of blood cells and to understand various histochemical and micro techniques and to prepare and observe the chromosome arrangement during cell division.
- To dissect and mount various body parts and to study the various functional details of chordates
- To identify the different groups of invertebrate animals by observing their external characteristics.
- To identify cell and organelles structure and to record.

### UNIT I

Micrometry- use of microscopes – microscopes - light microscope, camera lucida, stage and ocular micrometer.

### UNIT II

Preparation and Identification of Mitotic divisions with Onion Root Tip Cells.

Preparation and Identification of different stages of Meiosis in Grasshopper testis - Demonstration only. Staining and observation of polytene chromosome in salivary glands of Chironomous larva.

### UNIT III

Mounting of buccal epithelium and using vital stains. Preparation of human blood smear Preparation of frog blood smear

### UNIT IV

Spotters: Plant cell, Animal cell, T4 bacteriophage, E.coli, Ribosomes, Mitochondria, Golgi Apparatus, Endoplasmic Reticulum, Giant Chromosome, Nucleus, DNA, t-RNA,

### UNIT V

Record / Observation Note (SUBMISSION IS MANDATORY)

### Text Books (Latest Editions)

1. Ekambaranatha Iyyar and T. N. Ananthkrishnan, 1995 A manual of Zoology Vol.I (Part 1, 2) S. Viswanathan, Chennai
2. Ganguly, Sinha and Adhikari , 2011 . Biology of Animals: Volume I, New Central Book Agency; 3rd revised edition. 1008 pp.
3. Sinha, Chatterjee and Chattopadhyay, 2014. Advanced Practical Zoology, Books & Allied Ltd; 3rd Revised edition, 1 07 0 pp.
4. Lal ,S. S, 2016 . Practical Zoology Invertebrate, Rastogi Publications.
5. Verma, P. S. 2010. A Manual of Practical Zoology: Invertebrates, S Chand, New Delhi



**Reference Books** (Latest editions, and the style as given below must be strictly adhered to)

1. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science
2. Barnes, R.D. (1982). *Invertebrate Zoology*, V Edition. Holt Saunders International Edition.
3. Barrington, E.J.W. (1979). *Invertebrate Structure and Functions*. II Edition, E.L.B.S. and Nelson
4. Boradale, L.A. and Potts, E.A. (1961). *Invertebrates: A Manual for the use of Students*. Asia Publishing Home.5
5. Lal, S.S. 2005. *A text Book of Practical Zoology: Invertebrate*, Rastogi, Meerut

**Web Resources**

1. <https://nbb.gov.in/>
2. <https://www.agshoney.com/training.htm>
3. <https://icar.org.in/>
4. <https://nisa.icar.gov.in/>
5. <https://www.nationalgeographic.com/animals/invertebrates/>

## ECONOMIC ZOOLOGY

**Learning Objective**

- To understand different farm animals' culturing techniques and production methods.
- To know the life history of animals and disease control methods used in farming.
- To understand the concept of breeding, cross-breeding and the importance of high-yield varieties.
- To know about the marketing strategies.

**Unit I**

**Economic Entomology:** Apiculture: Species of honey bees – Social organisation of honey bee – selection of bees and location for apiary – Newton's bee hive – products of bee keeping – enemies and diseases of honey bees. Sericulture: Species of silkworm – life history of mulberry silkworm – Rearing of silkworm – pests and diseases of silkworm.

**Unit II**

**Vermiculture:** Introduction: Types of earthworms – ecological classifications of earthworms – Physical, chemical and biological changes caused by earthworms in the soil – Natural enemies of earthworms. Vermicomposting: vermicomposting methods – factors affecting vermicomposting – Vermiculture unit. Harvesting of vermicompost – vermicast – advantages of vermicompost – vermiwash and its applications.



**Unit III**

**Aquaculture:** Freshwater aquaculture: Carp culture – types of ponds – preparation – maintenance – harvesting and management. Integrated and composite culture. Prawn culture. Marine Aquaculture: Edible – pearl oyster culture.

**Unit IV**

**Poultry Farming:** Poultry industry in India – Poultry for sustainable food production and livelihood - Commercial poultry farming – Nutritive value of egg and meat- Broiler management (Definition; Housing and equipment; Brooding, feeding and health cover of broilers; Record keeping; Broiler integration) – Layer management (Brooder; Grower and layer management; Culling of layers).

**Unit V**

**Dairy Farming:** Dairy farming – advantages of dairying – classification of cattle breeds – Indigenous and exotic breeds – Selection of dairy cattle. Breeding – artificial insemination – Dairy cattle management – housing – water supply – Common contagious diseases. Milk - Composition of milk – milk spoilage – pasteurization – Role of milk and milk products in human nutrition.

**Text Books**

1. Sastry, N.S.R., C.K.Thomas and R.A.Singh, (2015), Livestock Production Management, 4thEd.Kalyani Publishers, New Delhi.
2. ICAR, (2013), Handbook of Animal Husbandry, 4th Ed., ICAR Publication, Pusa, New Delhi.
3. Awasthi, V.B., (2012), Introduction to General and Applied Entomology, third edition, Scientific publishers, India.
4. Vasanthraj David, B and Ramamurthy, VV., (2012), Elements of Economic Entomology, Seventh edition, Namrutha publications, Chennai.
5. Shukla & Upadhyay, (2014), Economic Zoology, 5th edn. Rastogi Publication, Meerut New Delhi.
6. Mary Violet Christy, A. (2014). Vermitechnology, MJP Publishers, Chennai.
7. Gupta, S.M., (2010), Text book of fishery, Ann Backer, Mumbai.
8. Shailendra Ghosh, (2009), Fisheries and aquaculture management, Adhyayan, New Delhi.
9. David, B and Ananthakrishnan, T. N., (2006), General and Applied Entomology, Second edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, India.
10. Jagadish Prasad, (2002), Principles and practices of Dairy Farm Management, 3rd Ed. Kalyani Publishers, Ludhiana.
11. Sukumar, D.E., (2002), Outline of Dairy Technology, Oxford University, New Delhi.
12. Rath, R.K., (2000), Freshwater Aquaculture. Scientific Publishers (India), Jodhpur.
13. Ismail, S.A., (1997), Vermitechnology, The biology of earthworms, Orient Longman, India.



14. Prabakaran, R. (1998), Commercial Chicken Production. Published by P. Saranya, Chennai.
15. Hafez, E. S. E., (1962), Reproduction in Farm Animals, Lea & Fabiger Publisher.

### Suggested Readings

1. Glenn Munroe, (2017), Manual of on-Farm Vermicomposting and Vermiculture, Holdanca Farms Ltd, Wallace, Nova Scotia.
2. Hanifa, M.A., (2011), Aquatic resources and aquaculture, Dominent, New Delhi.
3. Gupta, P.K., (2008), Vermicomposting for sustainable agriculture, 2nd Edition, Agrobios, India.
4. Talashikar, S.C., (2008), Earthworms in Agriculture, Agrobios, India.
5. Abishek Shukla, D ., (2009), A Hand Book of Economic Entomology, Vedamse Books, New Delhi .
6. Banerjee, G.C., (2006), Text book of Animal Husbandry, 8thEd.Oxford and IBH Publishing Company Ltd., New Delhi.
7. Walstra, P. Wouters, J.T.M. and Geurts, T.J. (2006), Dairy Science and Technology. CRC Press, New York.
8. Dunham, R.A., (2004), Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI publications, U.K.
9. Donald.D Bell and William. D. Weaver, (2002), Commercial chicken meat and egg production, Springer, New York.
10. Eckles C.H. and Anthony, E.L., (2001), Dairy Cattle and milk production, Biotech. Tata McGraw Hill Publishing Co.Pvt.Ltd., New Delhi.
11. Edwards, C.A., and Bother, B., (1996). Biology of earthworms, Chapman Hall Publication company.
12. ICAR, (1997), Handbook of Animal Husbandry– The Indian Council of Agricultural Research, New Delhi.
13. Banerjee G.C., (1992), Poultry, Oxford and IBH, New Delhi.
14. Jhingran, AVG, (1991), Fish and Fisheries of India. Hindustan Publishing Co. New Delhi.
15. James. N. Marnar, (1975), Principles of Dairy Processing, Wiley eastern limited, New Delhi.
16. Baradach, JE. Ryther. JH. and, MC larney WO., (1972), Aquaculture. The farming and Husbandry of Freshwater and Marine Organisms. Wiley InterScience, NewYork.

### Web Resources

1. <https://bit.ly/3tXHjk8>
2. <https://bit.ly/3tUTHBu>
3. <https://bit.ly/3hVv96q>
4. <https://bit.ly/39nztH1>
5. <https://bit.ly/3CzasVO>
6. [https://agritech.tnau.ac.in/org\\_farm/orgfarm\\_vermicompost.html](https://agritech.tnau.ac.in/org_farm/orgfarm_vermicompost.html)
7. <https://bit.ly/3nYvgSF>
8. <http://caa.gov.in/farms.html>
9. <http://www.csrtimys.res.in/>
10. <http://www.agshoney.com/training.htm>



# CHEMISTRY FOR BIOLOGICAL SCIENCES I

(FOR BOTANY AND ZOOLOGY)

## Objectives of the course

This course aims at providing knowledge on

- basics of atomic orbitals, chemical bonds,
- hybridization and fundamentals of organic chemistry
- nuclear chemistry and industrial chemistry
- importance of speciality drugs and
- separation and purification techniques

## UNIT- I

### Chemical Bonding and Nuclear Chemistry

Chemical Bonding: Molecular Orbital Theory-bonding, antibonding and non-bonding orbitals. M. O diagrams for Hydrogen, Helium, Nitrogen; discussion of bond order and magnetic properties.

Nuclear Chemistry: Fundamental particles Isotopes, Isobars, Isotones and Isomers- Differences between chemical reactions and reactions- group displacement law. Nuclear binding energy - mass defect calculations. Nuclear fission and nuclear fusion differences Stellar energy. Applications of radioisotopes - carbon dating, rock dating and medicinal applications.

## Unit –II

### Industrial Chemistry

Fuels: Fuel gases: Natural gas, water gas, semi water gas, carbureted water gas, producer gas, CNG, LPG and oil gas (manufacturing details not required).

Silicones: Synthesis, properties and uses of silicones.

Fertilizers: Urea, ammonium sulphate, potassium nitrate NPK fertilizer, superphosphate, triple superphosphate.

## UNIT –III

### Fundamental Concepts in Organic Chemistry

Hybridization: Orbital overlap hybridization and geometry of CH<sub>4</sub>, C<sub>2</sub>H<sub>4</sub>, C<sub>2</sub>H<sub>2</sub> and C<sub>6</sub>H<sub>6</sub>. Polar effects: Inductive effect and consequences on K<sub>a</sub> and K<sub>b</sub> of organic acids and bases, electromeric, mesomeric, hyper conjugation and steric- examples.

Reaction mechanisms: Types of reactions-aromaticity (Huckel's rule) aromatic electrophilic substitution; nitration, halogenation, Friedel- Craft's alkylation and acylation. Heterocyclic compounds: Preparation, properties of pyrrole and pyridine.

## UNIT- IV

### Drugs and Speciality Chemicals



Definition, structure and uses: Antibiotics viz., Penicillin, Chloramphenicol and Streptomycin; Anaesthetics viz., Chloroform and ether: Antipyretics viz., aspirin, paracetamol and ibuprofen; Artificial Sweeteners viz., saccharin, Aspartame and cyclamate; Organic Halogen compounds viz., Freon, Teflon

## UNIT –V

### Analytical Chemistry

Introduction qualitative and quantitative analysis. Principles of volumetric analysis. Separation and purification techniques: extraction, distillation and crystallization. Chromatography: principle and application of column, paper and thin layer chromatography.

### Recommended Text

1. V.Veeraiyan, Text book of Ancillary Chemistry, High mount publishing house, Chennai, first edition, 2009.
2. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur, 2006.
3. S.ArunBahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, NewDelhi, twenty third edition, 2012.
4. P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007.

### Reference Book

1. P.L.Soni, Mohan Katyal, Textbook of Inorganic chemistry; Sultan Chand and Company, New Delhi, twentieth edition, 2007.
2. B.R.Puri, L.R.Sharma, M.S.Pathania, Textbook Physical Chemistry: Vishal Publishing Co., New Delhi, forty seventh edition, 2018.
3. B.K. Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.

## INORGANIC VOLUMETRIC ANALYSIS (LAB)

### VOLUMETRIC ANALYSIS

1. Estimation of sodium hydroxide using standard sodium carbonate.
2. Estimation of hydrochloric acid using standard oxalic acid.
3. Estimation of ferrous sulphate using standard mohrs salt.
4. Estimation of oxalic acid using standard ferrous sulphate.
5. Estimation of potassium permanganate using standard sodium hydroxide.
6. Estimation of magnesium using EDTA.
7. Estimation of ferrous ion using diphenyl amine as indicator.

### Reference Book

1. V.Venkateswaran, R.Veerasingam, A.R.Kulandaivelu, Basic Principles of Practical Chemistry; Sultan Chand & sons, Second edition, 1997.



## NAN MUDTHALVAN

### POULTRY SCIENCE AND MANAGEMENT\*

#### COURSE OUTCOMES

Students will be able to

- Understand the domestication of fowls
- Know the techniques of rearing and management of various breed
- Acquire the knowledge on the diseases of poultry and the prophylactic measures

#### Unit – I

External features of fowls – skeletal system – digestive system – endocrine system – feathers – Respiratory system – reproductive system. Genetics of fowls: Breeds of fowls – inheritance of morphological characters (List of autosomal and sex linked character – breeding methods – systems of breeding – modern method of breeding.

#### Unit – II

Poultry industry in India– choosing commercial layers and broilers – Poultry housing – deep litter and cage system-merits and demerits.

#### Unit – III

Practical aspects of chick rearing –brooding management- grower and layers – management of broilers – lighting, summer winter management – debunking.

#### Unit – IV

Poultry Nutrition: Energy – protein and aminoacids – Vitamins – essential organic elements – Non – nutrition feed additives – feed stuffs for poultry – feed formation.

#### Unit – V

Diseases: Viral, bacterial, fungal and parasitic disease of poultry. Vaccines and vaccination programme.

#### Suggested Readings

1. Gopalakrishnan C.A and G.Murley Mohan Lal (1997), Livestock and Poultry enterprises for rural development, Vikash, New Delhi.
2. Gnanamani M.R., (1998), Modern aspects of commercial poultry keeping, Giri Publications, Madurai.
3. Banarjee G.C., (1992), Poultry, Oxford and IBH, New Delhi.
4. Chauhan H.V.S. and S.Roy, (2018), Poultry diseases, diagnosis and treatment, New Age International Pvt. Ltd.
5. John William S. (Ed) 2003. Poultry for Sustainable Food Production and Livelihood, Loyola Publication, Chennai.
6. Vegad J.L., (2018), Poultry diseases: A guide for farmers and Poultry Professionals, CBS

#### Web Resources

1. <https://libguides.auburn.edu/PoultryScience>
2. <https://www.sciencedirect.com> › journal › poultry-science
3. <http://www.wpsa.com>





# ENVIRONMENTAL STUDIES

## Course Objectives:

The main objectives of this course are:

- Enable the students to be aware of our natural resources, ecosystems and their linkages to society, livelihood, environment and conservation.

## Unit I

### Multidisciplinary Nature of Environmental Studies and Natural Resources:

Concept of Renewable and non-renewable resource, Natural resources and associated problems: Forest resources: Deforestation, Timber extraction, mining, dams and their effects. Water resources: Over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Land resources: Land degradation, man induced landslides, soil erosion and desertification.

## UNIT II

**Ecosystem:** Concept of an Ecosystem, Structure and Functions of Ecosystem, Energy flow in the Ecosystem; Ecological Succession, Food Chains, Food webs and Ecological Pyramids, Characteristic Features of the following Ecosystem: Forest Ecosystem, Grassland Ecosystem and Desert Ecosystem, Aquatic Ecosystem (Ponds, Streams, Lakes, Rivers and Ocean Estuaries)

## UNIT III

**Biodiversity and its Conservation:** Definition, levels and values of biodiversity; Threats to biodiversity- habitat loss, poaching of wildlife, man-wildlife conflicts, IUCN categories of threat; Terrestrial and marine hotspots of biodiversity in India; Conservation of Biodiversity - In-situ and Ex-situ conservation; Conservation schemes :Gir lion sanctuary project, Project tiger, Project elephant, Conservation of sea turtles in India. Ecotourism

## UNIT IV

**Environment Pollution:** Types, causes, effects, and control - Air, Water, Soil and Noise pollution. Nuclear hazards and human health risks. Solid waste management: Control measure of urban and industrial waste. Climate change global warming, ozone layer depletion, acid rain, and impacts on human communities and agriculture

## UNIT V

**Social Issues and the Environment:** Sustainable Development, Water Conservation, Resettlement and rehabilitation of people. Disaster Management: Floods, earthquake, cyclone and landslides. Consumerism and waste products; Environment Protection Act; Air and water (Prevention and control of Pollution) Act; Wild life protection Act; Forest conservation Act; Environmental movements (Chipko, Silent valley, Bishnois of Rajasthan). Environmental ethics. Environmental communication and public awareness.



### **Reading list**

1. Erach Bharucha, 2021, Textbook of Environmental Studies for Undergraduate Courses, Third Edition, Orient blackswan Pvt. Ltd., Hyderabad.
2. V.K. Ahluwalia, Environmental Studies (Second Edition), Ane books India, T-Nagar, Chennai.
3. Y.K. Singh, 2006, Environmental science, New Age International (P) Ltd., Publishers, New Delhi.
4. S. P. Misra, 2023, Essential Environmental Studies, 4th Edn, Ane Books Pvt. Ltd., New Delhi.
5. G.S. Vijayalakshmi, A.G.Murugesan and N.Sukumaran, 2006, Basics of Environmental Science, Manonmaniam Sundaranar University Publications, Tirunelveli.

### **Recommended texts**

1. N.Arumugam and V. Kumaresan, 2014, Environmental studies, 4th edition, Saras Publication, Nagercoil, TamilNadu.
2. M.Basu, and S. Xavier, 2016, Fundamentals of Environmental Studies, Cambridge University Press.
3. A.K. Mitra and R. Chakraborty, 2016, Introduction to Environmental Studies, Book Syndicate.
4. J.S. Singh, S.P.Singh, and S.R. Gupta, 2014, Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.

