

**E.M.G. YADAVA WOMEN'S COLLEGE , MADURAI – 625 014.**

*(An Autonomous Institution – Affiliated to Madurai Kamaraj University)*

Re-accredited (**3<sup>rd</sup> Cycle**) with Grade **A+** & **CGPA 3.51** by NAAC

## **DEPARTMENT OF ZOOLOGY**



### **CBCS SYLLABUS**

### **BACHELOR OF SCIENCE**

**PROGRAMME CODE - Z**

### **COURSE STRUCTURE**

(w.e.f. 2021 – 2022 Batch onwards)



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## **CRITERION - I**

*1.1.3 Details of courses offered by the institution that focus on employability / entrepreneurship / skill development during the year.*

Syllabus copies with highlights of contents focusing on  
Employability / Entrepreneurship / Skill Development



To be Noted:

HIGHLIGHTED COLORS	COURSES
	Employability
	Skill Development
	Entrepreneurship
	Skilled & Employability

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(w.e.f. 2021 – 2022 onwards)

**COURSE STRUCTURE – SEMESTER WISE**

Sem	Part	Sub Code	Title of the paper	Teaching hrs (per week)	Exam Duration (hrs)	Marks Allotted			Credits
						CIA	SE	Total	
I	I	211T1	Part – I Tamil	6	3	25	75	100	3
	II	212E1	Part – II English	6	3	25	75	100	3
	III	21Z11	<b>Core : Invertebrata</b>	4	3	25	75	100	4
	III		<b>Core : Lab in Invertebrata &amp; Chordata</b>	2	-	-	-	-	-
	IV	21SEZ11	<b>SBE :Computer Application</b>	2	3	25	75	100	2
	IV	21SEZ12	<b>SBE :Aquaculture</b>	2	3	25	75	100	2
	IV	21NMZ1	<b>NME :Medical microbiology</b>	2	3	25	75	100	2
	III	21AK1	<b>Allied I : General Chemistry -I</b>	4	3	25	75	100	4
	III		<b>Allied I : Practical-1 Inorganic qualitative analysis</b>	2	-	-	-	-	-
II	I	211T2	Part – I Tamil	6	3	25	75	100	3
	II	212E2	Part – II English	6	3	25	75	100	3
	III	21Z21	<b>Core : Chordata</b>	4	3	25	75	100	4
	III	21Z2P	<b>Core : Lab in Invertebrata &amp; Chordata</b>	2	3	40	60	100	2
	IV	21SEZ21	<b>SBE : Vermi Technology</b>	2	3	25	75	100	2
	IV	21SEZ22	<b>SBE : Clinical Microbiology</b>	2	3	25	75	100	2
	IV	21NMZ2	<b>NME: Ornamental Fish Culture</b>	2	3	25	75	100	2

	III	21AK2	Allied I : General Chemistry-II	4	3	25	75	100	4
	III	21AK2P	Allied I : Practical-1 Inorganic qualitative analysis	2	3	40	60	100	1
III	I	211T3	Part – I Tamil	6	3	25	75	100	3
	II	212E3	Part – II English	6	3	25	75	100	3
	III	21Z31	Core : Cell and Molecular Biology	4	3	25	75	100	4
	III		Core Lab : Cell and Molecular Biology and Developmental Biology	2	-	-	-	-	-
	III	21AK3	Allied I : General Chemistry -III	4	3	25	75	100	4
	III		Allied I : Practical-II Volumetric Analysis	2	-	-	-	-	-
	III	21AG3	Allied II : Botany Plant diversity – Algae, fungi, Bryophytes, Pteridophytes and Gymnosperms	4	3	25	75	100	4
	III		Plant diversity - Algae, fungi, and Bryophytes, Pteridophytes Gymnosperms,	2	-	-	-	-	-
IV	I	211T4	Part – I Tamil	6	3	25	75	100	3
	II	212E4	Part – II English	6	3	25	75	100	3
	III	21Z41	Core : Developmental Biology	4	3	25	75	100	4
	III	21Z4P	Core : Lab in Cell and Molecular Biology and Developmental Biology	2	3	40	60	100	2
	III	21AK4	Allied I : General Chemistry -IV	4	3	25	75	100	4
	III	21AK4P	Allied I : Practical-II Volumetric Analysis	2	3	40	60	100	1
	III	21AG4	Allied II : Cell Biology ,Plant Anatomy,Genetics , Plant Breeding & Horticulture	4	3	25	75	100	4

	III	<b>21AG4P</b>	Plant diversity - Algae, fungi, and Bryophytes, Pteridophytes Gymnosperms, Cell Biology ,Plant Anatomy,Genetics , Plant Breeding & Horticulture	2	3	40	60	100	1
V	III	<b>21Z51</b>	<b>Core : Genetics</b>	4	3	25	75	100	4
	III		<b>Elective - I</b>	4	3	25	75	100	4
	III		<b>Elective - II</b>	4	3	25	75	100	4
	III		<b>Core : Lab in Genetics, Ecology &amp; Evolution and Biochemistry.</b>	4	-	-	-	-	-
	III		<b>Core : Lab in Physiology Microbiology &amp; Immunology and Biotechnology</b>	4	-	-	-	-	-
	IV	<b>21SEZ51</b>	<b>SBE: Biostatistics</b>	2	-	25	75	100	2
	IV	<b>214EV5</b>	Environmental Studies	2	-	25	75	100	2
	III	<b>21AG5</b>	<b>Allied II : Morphology, Taxonomy of Angiosperms, Medicinal Botany &amp; Economic Botany</b>	4	3	25	75	100	4
	III		<b>Allied Lab II : Morphology, Taxonomy of Angiosperms, Medicinal Botany &amp; Economic Botany</b>	2	-	-	-	-	-
VI	III	<b>21Z61</b>	<b>Core : Physiology</b>	4	3	25	75	100	4
	III	<b>21Z62</b>	<b>Core : Microbiology &amp; Immunology</b>	4	3	25	75	100	4
	III		<b>Elective – III</b>	4	3	25	75	100	4
	III	<b>21Z61P</b>	<b>Core : Lab in Biochemistry, Genetics, Ecology &amp; Evolution</b>	4	3	40	60	100	7
	III	<b>21Z62P</b>	<b>Core : Lab in Physiology Microbiology &amp; Immunology and Biotechnology</b>	4	3	40	60	100	8
	IV	<b>21SEZ61</b>	<b>SBE: Economic Zoology</b>	2	3	25	75	100	2

	III	21AG6	<b>Allied II : Botany</b> Plant Physiology, Embryology, Tissue culture and Plant Pathology.	4	3	25	75	100	4
	III	21AG6P	Morphology, Taxonomy of Angiosperms , Medicinal Botany & Economic Botany, Plant Physiology, Embryology, Tissue culture and Plant Pathology	2	3	40	60	100	1
	IV	214VE6	Value Education	2	3	25	75	100	2
	V	215NS4/ 215PE4	Extension Activities NSS/Physical Education	-	3	25	75	100	1
			Total	180					140

**Electives :****Semester - V****Elective – I & II – (Choose any two)**

1. Ecology & Evolution - 21ZE5A
2. Biochemistry - 21ZE5B
3. Fisheries Biology - 21ZE5C

**Semester- VI****Elective - III – (Choose any one)**

1. Biotechnology - 21ZE6A
2. Poultry science - 21ZE6B

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(w.e.f. 2021 – 2022 onwards)

**Title of the Paper : Invertebrata****Semester : I****Contact hours: 4****Sub Code : 21Z11****Credits : 4****Objectives:**

- 1.To enable the students to understand the level of organization in invertebrate classifications.
- 2.To help the students gain practical applications in the biomedical and agronomy fields of research.
- 3.To make the learners aware of the human misconceptions, bioethics and phobias associated with invertebrate interactions.

**UNIT- I** Principles of taxonomy and Binomial nomenclature - classification.

**PROTOZOA** -General characters and classification of Protozoa up to class level with one example. Type study: *Paramecium caudatum* - External morphology – Nutrition - Cyclosis -Contractile vacuole - Conjugation only. General topics: 1. Protozoan parasites: Life Cycle – Symptoms - Diagnosis - Prevention and Treatment of 1. *Plasmodium vivax*. 2. *Entamoeba histolytica*. **PORIFERA** - General characters and classification of Porifera upto class level with one example. Type study: Sycon Sponge – Structure - Histology - Spicules - Gemmules and Parenchymula larva. General topic: Canal system in sponges.

**UNIT- II** **COELENTERATA** - General characters and classification of Coelenterata upto class level with one example. Type study: *Obelia* -Structure and Metagenesis

only. General topics: 1. Polymorphism in Coelenterates 2. **Corals and Coral reefs** - Theories of reef formation.

**UNIT- III** **HELMINTHES** - General characters and classification of Helminthes upto class level with one example. Type study: *Fasciola hepatica* - External morphology - Excretory System - Reproductive system and Life history. General topics: 1. Structure - Pathology - Control measures of *Ascaris lumbricoides* and *Wuchereria bancrofti*. 2. Parasitic adaptations of Helminthes. **ANNELIDA** - General characters and classification of Annelida upto class level with one example. Type study: *Megascolex mauritii* - External morphology - Setae - Nephridia - Nervous system - Reproductive system only. General topics: 1. Metamerism in Annelida 2. Affinities of *Peripatus*.

**UNIT-IV** **ARTHROPODA** - General characters and classification of Arthropoda upto class level with one example. Type study: *Palaemon* - External morphology - Appendages - Excretory system - Reproductive system and development.

**General topics: Beneficial insects:- Honey bee, Lac insect and silkworm**

**UNIT-V** **MOLLUSCA** - General characters and classification of Mollusca upto class level with one example. Type study: *Pila globosa* - External morphology - Digestive system - Nervous system, Respiratory system and Osphradium only. General topic: Sepia is an advanced mollusc. **ECHINODERMATA** : General characters and classification of Echinodermata upto class level with one example. Type study: *Asterias rubens* - External morphology - Pedicellaria - Water Vascular System - Reproductive System. General topic: Larval forms of Echinoderms and their phylogenetic significance .

#### **Textbook:**

1. Nair N.C, Leelavathy.S , Soundara Pandian.N Murugan.T and Arumugam.N., “A text book of Invertebrata” , Saras publication 2010 .
2. M. Ekambaranatha Ayyar & T. N. Ananthakrishnan “A Manual of Zoology” S. Viswanathan Pvt. Limited, 2012



**Reference books:**

1. Hyman L.H. "*The Invertebrate*". Vol. I-VI. 1955, McGraw Hill Co New York.
2. Barrington, E. J. W. *Invertebrate Structure and functions*. ELBS and Nelson 1979.
3. Jordon E.L. and Verma P.S "*Invertebrate Zoology*" S. Chand & Company Ltd, 2014.
4. Kotpal. R..L., "*Invertebrate Zoology*" 9<sup>th</sup> Edition Rastogi publication, 2005.

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- 1.To enable the students to understand the basic operations of a computer system and computer application software.
- 2.To make students develop the skill of using computer applications software.
- 3.To help the students to gain basic computing skills.

**UNIT-I** Introduction to Computer - **Block diagram**- Characteristics of computer- Generations of computer - **Hardware components** of computer.

**UNIT-II** **Computer and communication**- types - needs - communication media- **Network topologies**.

**UNIT-III** **MS Word**- Word basic – Starting Word – Creating document - Key board operation – Mouse operation – Menu – File Menu – Editing Menu – Tool Bars and their icons – Drawing tool bar – Closing and opening the document.

**UNIT-IV** **MS Excel** – Selecting the cells – Entering the formulae – Entering data – Alignment – Format tool bar – Data menu – Inserting rows and columns.

**UNIT-V** **MS. Powerpoint** – View menu – Slide show – Tool menu – Create a new slide – Close presentation – Internet and its applications – E.mail and its advantages.

**Text Books:**

1. Arumugam. N., *Computer application, Bioinformatics and Biostatistics*, Saras Publications. 2012.
2. Lakshmanan. R. and R. Rajamani and Shanmuganantham. M ., *Basics of Computer Science*, R.L.Publication,Madurai. 2009.

**Reference Books:**

1. Balaguruswamy. E., “*Fundamentals of Computers*”, Mc Graw –Hill Education - Europe Publication.,2009.
2. Mittal C , *Fundamentals of Information Technology* ,Pragathi Prakasam, Meerut. 2003.
3. Rajaraman. V., *Fundamentals of computes*, fourth edition, Prentice Hall India Pvt.Ltd., 2008.
4. Vasanthi Ramanathan., “*Computer application,*” 1<sup>st</sup> Edition, Meenakshi Pathippagam., 2007.

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1. To produce protein rich ,nutritive ,palatable and easily digestible human food.
2. To produce ornamental fish for aesthetic appeal.
3. To make learners aware of the means of livelihood through commercial and industrial aquaculture.

**UNIT – I** Introduction -Need and scope of aquaculture- Aquaculture potentials of India -**Inland Fishery resources- cultivable fishes.**

**UNIT – II** **Monoculture** – poly culture- pen culture – cage culture – Raft culture – its problems – Integrated fish farming- paddy cum fish culture and salt cum shrimp culture.

**UNIT - III** Predators – control measures – Aquatic weeds and their control measures – Types of fishing nets – **Marketing.**

**UNIT – IV** **Pearl oyster culture** – pearl formation. Mass culture of live feed Artemia, Algae, Spirulina and Daphnia.

**UNIT – V** **Prawn culture (fresh water)** – hatchery stocking density – fresh water fish farming – selection of pond, construction, water quality management – conditioning the pond.

**Text Books :**

1. Arumugam ., “*Aquaculture*” ., Saras Publication. 2012
2. Santhana Krishnan,G., “*Aquaculture*”., J.J Publications.1992.

**Reference Books:**

1. Bal.D.V and Rao K.V., “*Marine Fisheries*” .,Tata McGraw Hill Publishing Co- Ltd 1984.
2. Jhingran,V.G., “*Fish and Fisheries Of India*”., Hindustan.Publications 1982.
3. Marshall.N.B., “*The exploration in the Life history Of Fishes*”.,Harvard University Press., Cambridge,MA.1971.
4. Santhana Kumar.G and Selvaraj .A.M., “*Concept of Aquaculture*”., Meenam Publication .2005.

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1. To introduce basic principles and application relevance of clinical diseases.
2. To make students know the etiological agents responsible for global infections and diseases.
3. To make students acquire and demonstrate competency in laboratory safety and skills applicable to microbiological research

**UNIT- I    **Protozoan diseases:**** Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis **1. Malaria    2. Amoebiasis**

**UNIT-II **Fungal diseases:**** Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis **1.Candidiasis 2.Mycetoma ( Madurai Foot)**

**UNIT-III    **Bacterial    diseases:**** Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis**1.    Tuberculosis    (air-borne) 2. Syphilis (contagious)**

**UNIT-IV    **Viral diseases:**** Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis **1.Bird flu 2.Polio**

**UNIT-V    **Insect –borne diseases:**** Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis **1.Chikungunya 2. Dengue fever**

**Text Book:**

1. Dubey R.C. & Maheswari D.K., “*A text Book of Microbiology*”. S.Chand & Company Pvt, Ltd.2110.

**Reference Books :**

1. William Irving.et.al., “*Medical microbiology*”. Taylor and Francis Group 2005.
- 2.Patrick Murray ,Ken Rosenthal &Michael Pfaller.,” *Medical Microbiology*” 8th Edition, 2015.
3. Jawetz., Melnick & Adelbergs.,”*Medical Microbiology*”26<sup>th</sup> Edition,2010.

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(w.e.f. 2021 – 2022 onwards)

**Title of the Paper : Chordata****Semester : II****Sub Code : 21Z21****Contact hours : 4****Credits : 4****Objectives:**

1. To understand the origin and evolutionary relationship in different subphylum of chordates.
2. To understand the ecological role of different groups of chordates.
3. To make students learn and describe unique characters of urochordates, cephalochordates and fishes.

**UNIT- I** General characters (Diagnostic characters and additional characters )classification upto class level with one example. **Prochordates** General characters and

classification of Prochordates upto class level with example. Type study: Prochordata –

*Amphioxus lanceolatum* - External morphology- Digestion - Respiration. **General****topics:** Retrogressive metamorphosis in Ascidians , Affinities of Hemichordata.**UNIT- II** **Agnatha:** *Petromyzon*- External morphology ; Ammocoetes larva. -**Pisces-** **Shark(*Scoliodon*)** External Morphology- Lateral Line Sense organ - UrinogenitalSystem **General topics:** Affinities of Petromyzon and Accessory respiratory organs in Fishes.**UNIT – III** **Amphibia:** External features and biological significance of the followingExamples: a. *Rana hexadactyla* , b. *Rana tigrina*, c. *Rana cyanophlyctis* - respiratory system (*Rana hexadactyla* only ) **General Topics:** Parental care in Amphibia.



**Reptilia :** External morphology of *Calotes versicolor* only. Identification of poisonous and non- poisonous snakes of south india –poison apparatus- Biting mechanism venom and Anti venom - First aid for snake bite.

**UNIT – IV Aves-** External morphology of Pigeon (*Columba livia*) - structure and function of eye – respiratory system. **General Topics:** Flight adaptation in Birds, Migration in Birds.

**UNIT – V Mammalia** - External morphology of Rabbit (*Oryctolagus cuniculus*)- structure & function of heart, respiratory system only.**General Topics:** Dentition in mammals , monotremes (egg laying mammals).

**Textbooks:**

1. Nair N.C.*et.al.*, “*A text book of Chordata*” Saras Publications. 2012.
2. Jordon, E.L & Verma, P.S. Chordate Zoology, S.Chand & Co., New Delhi. 2000.

**Reference books:**

1. Alexander R.M.C.N., “*The Chordata*” Cambridge University Press., New York, 1981
2. Kotpal. R.L., “*Modern Text Book of Zoology Vertebrates*” Rastogi Publications., 3<sup>rd</sup> Edition., 2009.
3. Romer A.S. & Parson, T.S “*A vertebrate body*”, W.B Saunders, Philadelphia 1986.
4. Young J.Z., “*Life of Vertebrates*”., ELBS,1988.

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1. To understand the basic principles and procedures of Vermicomposting and Vermiculture technology
2. To make students aware of ecofriendly agriculture by way of organic farming utilizing the byproducts of vermiculture.
3. To create knowledge and avenues for self employment.

**UNIT-I** Introduction-**Scope & Importance of Vermitechnology**- Classification of earthworms – External morphology of earthworm.

**UNIT-II** Selection of earthworm species for composting - commercially available earthworm-Collection and preservation of earthworms for Vermicomposting - **Vermiculture techniques**.

**UNIT-III** Raw materials for Vermicomposting -Maintenance of composting- Methods of Vermicomposting –**Collection of Vermicompost- vermiwash**.

**UNIT-IV** Role of Earthworms in organic farming -Use of Vermicompost for crop production, Land improvement and Reclamation –**Recycling of Wastes through Vermicomposting**.

**UNIT-V** Large scale manufacture of Vermicompost, Packaging of Vermicompost and its Marketing-Economic importance of vermicompost-vermicompost agencies (BERI – Bhawalkar Ecological Research Institute in pune & BAIF- Bhartiya Agro Industries Foundation).

**Text book:**

1. M. Seethalekshmy & R. Santhi, “*Vermitechnology*”, Saras Publications 2012

**Reference Books:**

1. Edwards, C.A., Bohlen, P.J., Lindon, D.R and Subler, S “*Earthworms in Agroecosystems*. In: *Earthworm Ecology and Biogeography in North America*” Lewis Publisher, Boca Raton., FL, PP:185-213. 1995.
2. Edwards, C.A & Bohlen, P.J., “*Biology and Ecology of Earthworms*” 3<sup>rd</sup> Edition., Springer Science & Business Media, 1996.
3. Mary Violet Christy, A., “*Vermitechnology*”, MJP Publishers. 2008.

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(w.e.f. 2021 – 2022 onwards)

**SKILL BASED ELECTIVE****Title of the Paper : Clinical Microbiology****Semester : II****Contact hours : 2****Sub Code : 21SEZ22****Credits : 2****Objectives:**

1. To impart knowledge of the basic principles of bacteriology , virology , mycology and parasitology.
2. To make students understand the nature of pathogenic microorganisms , pathogenesis, laboratory diagnosis ,transmission ,prevention and control of diseases common in the country.
3. To identify and discover cures for human diseases.

**UNIT- I Protozoan diseases:** Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis **1. Amoebiasis 2.**

**Balantidiasis 3. Vaginitis**

**UNIT-II Fungal diseases:** Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis **1. Phycomycoses 2. Candidiasis 3. Actinomycosis**

**( Actinomyctis bovis)**

**UNIT-III Bacterial diseases:** Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis **1. Tuberculosis (air-borne) 2. Syphilis (contagious)**

**3. Cholera (water-borne).**

**UNIT-IV Viral diseases:** Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis **1. Influenza (Bird flu ) 2. Polio. 3. Chicken pox**

**UNIT-V Insect – borne diseases:** Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis **1. Chikungunya 2. Dengue fever**

**3. Sleeping sickness.**

**Text Book:**

1. Dubey R.C. & Maheswari D.K., “*A text Book of Microbiology*”.,  
S.Chand & Company Pvt, Ltd.2110.

**Reference Books :**

1. William Irving.et.al., “*Medical microbiology*”., Taylor and Francis Group  
2005.
2. Patrick Murray ,Ken Rosenthal &Michael Pfaller.,” *Medical Microbiology*”  
8th Edition, 2015.
3. Jawetz., Melnick & Adelbergs.,”*Medical Microbiology*”26<sup>th</sup> Edition,2010.

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1. To analyse the impact of the aquarium fish trade on social and natural environments.
2. To collect baseline data on the ecosystems, socio –economy and diversity of fishes.
3. To develop best handling practices for the care of fishes .

**UNIT-I Scope and importance of Ornamental fishes. Identification and salient features-**

Siamese fighting fish, Gold fish, Rosy barb, tiger barb, Angel fish, Black molly, Guppy and Swordtail.

**UNIT – II Construction of aquarium** : Size and Shape of fish tank, bottom settings , stocking of fish ,Accessories of fish tank – aerators, types of filters , nets, lights and hood.

**UNIT - III Transport of fishes:** Oxygen packing , Food and feeding: **Culture of live food organisms** – Chironomous larva tubifex ,Artificial feed – Pellet feed.

**UNIT – IV Breeding methods:** Siamese fighting fish, Gold fish , Black molly , Guppy and sword tail.

**UNIT – V Common diseases and treatment of ornamental fishes** : Protozoan diseases (White spot disease), Fungal disease ( Ichthyosporidium ), Bacterial diseases (Dropsy disease and ectoparasites).

**Text books :**

1. Arumugam et.al., “*Ornamental Fishes*”, Saras Publications. 2012
2. Jameson J. D and R. Santhanam , “*Manual of ornamental fishes and farming Technologies*”, Fisheries college & Research Institute , Tamilnadu. 1996,

**Reference Books :**

1. Ramanathan . N and Francis,T., “*Manual of Breeding& Larval rearing of cultivable fishes*”, Tamilnadu Veterinary & Animal Sciences University, Chennai 1996.
2. Santhanam R., Sukumaran .N and Natarajan “*Manual of fresh water Aquaculture*”, P. Oxford and IBH Publishing.Co Pvt . Ltd, New Delhi.1990.
3. Sundaraj.S, and Thilakar .S., “*Manual of tropical fish diseases and diagnosis*, Tamilnadu Veterinary & Animal sciences University – Chennai, 1999.

**E.M.G. YADAVA WOMENS COLLEGE, MADURAI -14.**

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(w.e.f. 2021 – 2022 onwards)

**Title of the Paper : Lab in Invertebrata & Chordata****Semester : II****Contact hours : 2****Sub Code : 21Z2P****Credits : 2****Anatomical observation and comments on the following systems ( Models / visual aids/ charts and transparency.**

- |              |  |
|--------------|--|
| 1. Cockroach | - Digestive System & Reproductive System |
| 2. Earthworm | - Nervous system                         |
| 3. Calotes   | - Arterial system                        |
| 4. Rabbit    | - Reproductive System                    |

**Mountings:**

- |              |                  |
|--------------|------------------|
| 1. Earthworm | - Body Setae     |
| 2. House Fly | - Mouth Parts    |
| 3. Shark     | - Placoid scales |

**Spotters:**

- |                 |   |
|-----------------|---|
| Protozoa        | : Paramecium conjugation, Entamoeba     |
| Porifera        | : Spicules and gemmules,                |
| Coelenterata    | : Physalia and Aurelia                  |
| Platyhelminthes | : Taenia solium, Liver fluke entire     |
| Annelida        | : Chaetopterus and Heteroneries.        |
| Arthropoda      | : Peripatus and Sacculina.              |
| Mollusca        | : Nautilus and Chiton.                  |
| Echinodermata   | : Star Fish& Sea- urchin                |
| Prochordata     | : Amphioxus, Balanoglossus and Ascidian |
| Agnatha         | : Petromyzon                            |
| Pisces          | : Echeneis and Hippocampus              |



Amphibia	:	Rhacophorus , Salamander and Bufo.
Reptilia	:	Naja naja, Draco and Chaemeleon
Aves	:	Duck and Kite ( beak and claw adaptations)
Mammalia	:	Bat and Echidna
Osteology	:	Fore and hind limbs of rabbit
	:	Synsacrum of Bird, Skull of Calotes.
		Field trip compulsory

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1. This Course is taken up by first year Zoology students
2. Period of study : I Semester

**COURSE STRUCTURE****Contact Hours: 30 hrs****Credit: 1**

<b>S.No.</b>	<b>Sem</b>	<b>Subject Code</b>	<b>Title of the Paper</b>
1.	<b>I</b>	<b>21ZAOC</b>	<b>Theory:</b> Entrepreneurial Bee Keeping
2.	<b>I</b>	<b>21ZAOC P</b>	<b>Practical:</b> Lab in Entrepreneurial Bee Keeping

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1. To inculcate importance of Bee keeping and honey processing in relation with entrepreneurship development.
2. To give students knowledge about various techniques of Bee keeping and honey processing and its marketing to make them self sustainable after graduation.
3. To teach techniques of construction of Bee Hives and its maintenance.
4. To teach students about Honey production and health related problems with Honey bees.

**Unit I : Introduction to Bee Keeping**

Importance of Honey bees – Benefits of Bee keeping – Honey Bee products – Nature of work.

**Unit – II :Indian Honey Bees**

Caste of Bees-Commercially important Bee species and their life Cycle.( *Apis dorsata*, *Apis cerana indica* )

**Unit III : Apiary site selection and Management**

Location of Apiary, starting a colony and establishment of a beehive-Seasonal management of Apiary.

**Unit IV : Diseases of Honey Bees and their management**

Viral diseases-Sac Brood and Thai sac Brood disease

Bacterial diseases – American Fowl Brood and Septicemia

Fungal diseases – Chalk Brood

Protozoan diseases – Amoeba disease

### **Unit V: Entrepreneurship Skills & Government Funds**

Preparing a Business plan for Bee keeping – Keeping Records-Hiring People – Economics of Bee Keeping(For 50 colonies).

### **Text Book :**

- ❖ Mc Chercain and Ramachandran., Bee Keeping in south India ,

### **Reference books:**

1. Sardar Singh.,Beekeeping in India Hardcover., Indian Council of Agricultural Research; First Edition first Printing ,1962
2. Dharm Singh and Devender Pratap Singh.,A Handbook of Beekeeping ., Agrobios (India) ,2006
3. Prospective in Indian Apiculture - R.C. Mishra
4. Rearing queen bees in India - M.C. Suryanarayana et. al.
5. Bee Keeping in India - G. K. Ghosh
6. Technology and value addition of Honey - Dr. D. M. Wakhle and K. D. Kamble.
7. A. I. Root Bee culture , Indian Bee Journal - All India Bee Keeping Association Asian Bee Journal

## **PRACTICALS**

**Title of the Paper:** Lab in Entrepreneurial Bee Keeping

**Subject Code :21ZAOCP**

### **List of Experiments:**

1. Identification of Honey Bees-Drone Bee,Queen Bee, Worker Bee.
2. Bee Keeping Equipments-Typical Bee Hive,Hive stand,Smoker,Queen Excluder,Bee Brush,Honey Extractor
3. Harvest,Processing and Marketing of Honey.
4. Field visit and interaction with Bee keepers and other supportive agencies

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1. This Course is taken up by third year zoology students
2. Period of study : V Semester

**COURSE STRUCTURE****Contact Hours: 30 hrs****Credit: 1**

<b>S.No.</b>	<b>Sem</b>	<b>Subject Code</b>	<b>Title of the Paper</b>
1.	<b>V</b>	<b>21ZVAC</b>	<b>Theory:</b> Fundamentals of Medical Coding (FOMeC)
2.	<b>V</b>	<b>21ZVACP</b>	<b>Practical:</b> Lab in Fundamentals of Medical Coding (FOMeC)

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**CBCS**

**DEPARTMENT OF ZOOLOGY – UG**

**VALUE ADDED COURSE**

(w.e.f. 2021 – 2022 onwards)

**Title of the Paper:** Fundamentals of Medical Coding (FOMeC)

**Semester** : V

**Contact Hours** : 30 Hrs

**Subject Code** : 21ZVAC

**Objectives:**

- Anatomy Structure of the human body to increase your understanding.
- Physiology how the human body functions.
- Medical definitions and terminology Includes pronunciation and use of medical prefixes.
- Coding medical procedures what to code and how to prepare the forms.
- Professional claim information How to set up medical claims for Medicare, Medicaid, private insurance companies, HMOs, PPOs, workers' compensation and personal injury cases.

**Unit I**

**Language of Medicine (LOM) - Paper I**

Basic word structure, combining forms & terms -Prefixes & suffixes -Pharma/  
radiology/ oncology

**Unit II**

Gastroenterology & urogenital -Cardiovascular & respiratory -Musculoskeletal &  
neurology

**Unit III**

Dermatology -Ophthalmology & ENT-Hematology, lymphatic, immunology &  
endocrinology

**Unit IV**

**Medical Coding Essentials (MCE) - Paper II**

Ground Rules – A Quick Look, Taxonomy of Code Sets, Intention of Each Division,  
physician's / hospital coding & work types - Clinical abbreviations & laboratory data -

The AAPC, responsibilities, ethics, and HIPAA - Evolution and Origin of Medical Language-Scopes and Earnings of the Industry & Ladder of Outsourcing - Individual Calisthenics .

## **Unit V**

Medical English basics & Americanism for coders -AR analysis / AR callers & submitting -Guidelines of CPT – Current Procedural Coding, Sections and Ranges of CPT- Introduction to ICD 10 CM, Guidelines of ICD 10 CM, Categories and Sections of ICD 10 CM, ICD 9CM Vs ICD 10 CM -Introduction to HCPCS - Healthcare Common Procedure Coding System, Guidelines of HCPCS.

## **PRACTICALS**

**Title of the Paper:** Lab in Fundamentals of Medical Coding (FOMeC)

**Subject Code:** 21ZVACP

- a) Pharmacological units and measurements with numbers, Figures & Special Symbols
- b) Usage of search engines, application software, & standard references
- c) Justification of Employability and Introspection, Interviewee and Interviewer View Points
- d) Processes and Attempts of Screening Procedures (Practical)
- e) Operational methods, billing services, coding, charges, & audit
- f) Method of CPT Coding with Workouts
- g) Method of ICD 10 CM Coding with Workouts
- h) Introduction to ICD 11 CM
- i) Method of HCPCS Coding with Workouts
- j) Pre-evaluation & evaluation