# B.Sc. ZOOLOGY
# (SPECIALIZATION IN BIOTECHNOLOGY)
# (For students admitted from 2015 onwards)
# COURSE PATTERN AND SYLLABUS - CBCS

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**DEPARTMENT OF ZOOLOGY**
**CHOICE BASED CREDIT SYSTEM**
**UG COURSE PATTERN B.Sc. ZOOLOGY (SPECIALIZATION IN BIOTECHNOLOGY)**
**(FOR STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2015 onwards)**

| Semester | Part | Course | Title of the Paper | Code | Hrs/ Week | Credit | Marks |
|---|---|---|---|---|---|---|---|
| I | I | Language | Tamil paper I/ Hindi paper I / French paper 1 | U15TL1TAM01<br>U15HN1HIN01<br>U16FR1FRE01 | 6 | 3 | 100 |
| | II | English | English Paper 1 | U15EL1GEN01 | 6 | 3 | 100 |
| | III | Major Core 1 | Animal Diversity1:Invertebrata | U15ZO1MCT01 | 7 | 5 | 100 |
| | III | Allied-1(Optional) | Basics in Biotechnology | U15ZO1AOT01 | 4 | 4 | 100 |
| | III | Allied-2 (Optional) | Environmental Management | U15ZO1AOT02 | 4 | 3 | 100 |
| | IV | Environmenta l studies | Environmental studies | U15RE1EST01 | 1 | 1 | 100 |
| | IV | Value Education | Bible/Catechism/Ethics | U15VE2LVE01<br>U15VE2LVB01<br>U15VE2LVC01 | 1 | - | - |
| | VI | Extension Activities Outside the class hours from Semester I-IV | | Any 1 activity based on the student's choice (11 Activities) | 1 | - | - |
| | | | **Total** | | **30** | **19** | **600** |

| Semester | Part | Course | Title of the Paper | Code | Hrs/ Week | Credit | Marks |
|---|---|---|---|---|---|---|---|
| II | I | Language | Tamil paper II/ Hindi papeonr II / French paper II | U15TL2TAM02<br>U15HN2HIN02<br>U16FR2FRE02 | 5 | 3 | 100 |
| | II | English | English Paper II | U15EL2GEN02 | 6 | 3 | 100 |
| | III | Major Core 2 | Animal Diversity-2: Chordata | U15ZO2MCT02 | 5 | 5 | 100 |
| | III | Major Core 3 | Practical-I (Animal Diversity I & II) | U15ZO2MCP03 | 5 | 4 | 100 |
| | III | Allied-3 (Optional) | Basics in Bioinformatics | U15ZO2AOT03 | 4 | 3 | 100 |
| | IV | Skill Based Elective-1 | Soft Skill Development | U15RE2SBT01 | 2 | 2 | 100 |
| | IV | Skill Based Elective-2 | Rural Enrichment and Sustainable Development | U15RE2SBT02 | 2 | 2 | 100 |
| | IV | Value Education | Bible/Catechism/Ethics | U15VE2LVE01<br>U15VE2LVB01<br>U15VE2LVC01 | 1 | 1 | 100 |
| | VI | Extension Activities Outside the class hours from Semester I-IV | | Any 1 activity based on the student's choice (11 Activities) | | - | |
| | | | **Total** | | **30** | **23** | **800** |

| Semester | Part | Course | Title of the Paper | Code | Hrs/ Week | Credit | Marks |
|---|---|---|---|---|---|---|---|
| III | I | Language | Tamil paper III/ Hindi paper III/ French paper III | U15TL3TAM03<br>U15HN3HIN03<br>U16FR3FRE03 | 6 | 3 | 100 |
| | II | English | English Paper III | U15EL3GEN03 | 6 | 3 | 100 |
| | III | Major Core 4 | Cell & Molecular Biology | U15ZO3MCT04 | 5 | 5 | 100 |
| | III | Major Core 5 | Genetics | U15ZO3MCT05 | 5 | 5 | 100 |
| | III | Allied-4 (Compulsory) for Botany students | Biology of Invertebrates and Chordates | U15ZO3ACT04 | 4 | 3 | 100 |
| | IV | Skill Based Elective-3* | Animal Science Skills for Physics Students-(Theory cum Lab) / Animal Science Skills for Physics students-Advanced (Theory cum Lab) | U17ZO3SBP03/<br>U17ZO3SBT03 | 2 | 2 | 100 |
| | IV | Gender Studies | Gender Studies | U15WS3GST01 | 1 | 1 | 100 |
| | IV | Value Education | Bible/Catechism/ Ethics | U15VE4LVE02<br>U15VE4LVB02<br>U15VE4LVC02 | 1 | | |
| | VI | Extension Activities Outside the class hours from Semester I-IV | | Any 1 activity based on the student's choice (11 Activities) | | - | |
| | | | | **Total** | **30** | **22** | **700** |

***Zoology students will take up SBE - 3 from Physics Department**

| Semester | Part | Course | Title of the Paper | Code | Hrs/ Week | Credit | Marks |
|---|---|---|---|---|---|---|---|
| IV | I | Language | Tamil paper IV/ Hindi paper IV/ French paper IV | U15TL4TAM04<br>U15HN4HIN04<br>U16FR4FRE04 | 5 | 3 | 100 |
| | II | English | English Paper IV | U15EL4GEN04 | 6 | 3 | 100 |
| | III | Major Core-6 | Practical-II (Cell biology, Genetics &Biochemistry) | U15ZO4MCP06 | 5 | 5 | 100 |
| | III | Major Elective- 1 | Biochemistry & Biostatistics / Aquaculture | U15ZO4MET01/<br>U15ZO4MET02 | 5 | 5 | 100 |
| | III | Allied-5 (Compulsory for Botany students) | Zoology and Human Welfare | U15ZO4ACT05 | 4 | 4 | 100 |
| | III | Allied-6 (Compulsory for Botany students) | Allied Zoology-Practical | U15ZO4ACP06 | 4 | 3 | 100 |
| | IV | Value Education | Bible/Catechism/Ethics | U15VE4LVE02<br>U15VE4LVB02<br>U15VE4LVC02 | 1 | 1 | 100 |
| | VI | Extension Activities Outside the class hours from Semester I-IV | | Any 1 activity based on the student's choice (11 Activities) | | 1 | |
| | | | | **Total** | **30** | **25** | **700** |

| Semester | Part | Course | Title of the Paper | Code | Hrs/ Week | Credit | Marks |
|---|---|---|---|---|---|---|---|
| V | III | Major Core-7 | Developmental Biology & Evolution | U15ZO5MCT07 | 5 | 5 | 100 |
| | III | Major Core-8 | Fundamentals of Biotechnology | U15ZO5MCT08 | 5 | 4 | 100 |
| | III | Major Core-9 | Biological techniques | U15ZO5MCT09 | 5 | 4 | 100 |
| | III | Major Core 10 | Practical-III Developmental Biology, Evolution, Microbiology, Biotechnology& Bioinformatics | U15ZO5MCP10 | 5 | 4 | 100 |
| | III | Major Elective-2 | Microbiology & Bioinformatics/ Applied Entomology | U15ZO5MET03/ U15ZO5MET04 | 5 | 4 | 100 |
| | III | Non-Major Elective -1 | Ornamental Fish Culture | U15ZO5NMT01 | 2 | 2 | 100 |
| | IV | Skill BasedElective -4* | Animal Science Skills for Chemistry students- (Theory cum Lab) / Animal science Skills for Chemistry students-Advanced (Theory cum Lab) | U17ZO5SBP04/ U17ZO5SBT04 | 2 | 2 | 100 |
| | IV | Value Education | Bible/Catechism/Ethics | U15VE6LVE03 U15VE6LVB03 U15VE6LVC03 | 1 | - | |
| | | | | Total | 30 | 25 | 700 |

***Zoology students will take up SBE - 4 from Chemistry Department**

| Semester | Part | Course | Title of the Paper | Code | Hrs/ Week | Credit | Marks |
|---|---|---|---|---|---|---|---|
| VI | III | Major Core-11 | Animal Physiology | U15ZO6MCT11 | 6 | 5 | 100 |
| | III | Major Core-12 | Applied Biotechnology | U15ZO6MCT12 | 6 | 5 | 100 |
| | III | Major Core-13 | Practical-IV Animal Physiology, Environmental Biology & Immunology | U15ZO6MCP13 | 6 | 5 | 100 |
| | III | Major Elective-3 | Immunology / Environmental Science | U15ZO6MET05/ U15ZO6MET06 | 5 | 5 | 100 |
| | III | Non Major Elective-2 | First Aid and Home Nursing | U15ZO6NMT02 | 2 | 2 | 100 |
| | IV | Skill Based Elective-5 | Animal Cell Culture Techniques (Theory cum Lab) | U15ZO6SBT05 | 2 | 2 | 100 |
| | IV | Skill Based Elective-6 | Research Methodology (Theory Cum Project) | U15DS6SBT06 | 2 | 2 | 100 |
| | IV | Value Education | Bible/Catechism/Ethics | U15VE6LVE03 U15VE6LVB03 U15VE6LVC03 | 1 | - | - |
| | V | Extension Activities | RESCAPES-Impact study | U15RE6ETF01 | - | 1 | 100 |
| | | | | **Total** | **30** | **27** | **800** |
| | | | | **Grand Total** | **180** | **141** | **4300** |

**புனித சிலுவை தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி – 620 002.**

**தமிழாய்வுத்துறை**

**இளங்கலை / இளமறிவியல் / இளம்வணிகவியல் / பட்டவகுப்பு**

**முதலாமாண்டு – முதற்பருவம் - நவம்பர் 2017**

**தாள் - I**

**Total Hours : 90** **Code : U15TL1TAM01**

**Hrs : 6Hrs /Wk** **Marks : 100**

**Credit : 3**

**நோக்கங்கள்:**

1. தாய்மொழியை வலுவோடும், பொலிவோடும் கையாளும் வழி முறைகளைக் கண்டறியச் செய்தல்.
2. தமிழ் இலக்கியப் பரப்பையும், பாரம்பரியத்தையும் அறிமுகப்படுத்துதல்.
3. படைப்பாற்றலை வளர்த்துக் கொள்ள ஊக்கம் அளித்தல்.
4. உயர்ந்த பண்பாடுகளின் அடிப்படையில் வாழ்க்கையை அமைத்துக் கொள்ளும் உள்ளார்ந்த விருப்பத்தைத் தோற்றுவித்தல்.
5. மனித உரிமைகளை வலியுறுத்தி மனித நேயத்தை வளர்த்தல்.
6. நாம் வாழும் நாட்டையும், உலகையும் பற்றிய விழிப்புணர்வை ஊட்டி சமய நல்லிணக்கத்தையும், சமூக நல்லுறவையும் பேணிக்காக்கத் துணைப்புரிதல்.
7. ஆரோக்கியமான சிந்தனைகள் வளர ஆக்கம் அளித்தல்.

**பயன்கள்:**

1. தற்காலத் தமிழ் இலக்கிய வரலாற்றை வளர்க்க வழிகாட்டல்.
2. மாணவர்களின் தன்னம்பிக்கையை வளர்த்தல்
3. வாழ்வியல் நெறிகளை உணர்த்தல்.
4. பிழையின்றி எழுத பேச பயிற்சி அளித்தல்.

**பாடத்திட்டம்**

**அலகு:1** செய்யுள்

1. பாரதியார் கவிதைகள் - தமிழ்
   கண்ணன் என் சேவகன்
2. பாரதிதாசன் கவிதைகள் - உலகம் உன்னுடையது
3. உமர்கய்யாம் - உமர்கய்யாம் பாடல்கள
4. பட்டுக்கோட்டையார் - செய்யும் தொழிலே தெய்வம்
5. ந. பிச்சமூர்த்தி – ஒளியின் அழைப்பு
6. வைரமுத்து – ஐந்து பெரிது ஆறு சிறிது
7. சிற்பி – ஒரு கிராமத்து நதி

**அலகு:2** செய்யுள்

8. கல்யாண்ஜி – பேசும்பார் என் கிளி
9. நிர்மலா சுரேஷ் - தைலச்சிமிழும் தச்சன் மகளும்
10. இரா. மீனாட்சி – ஒரு கோதை
11. விஜி – குரங்கு மனிதன்
12. பா. சத்திய மோகன் - எங்கெங்கு காணினும்
13. ஹைகூ கவிதைகள்

**அலகு:3**

தமிழ் இலக்கிய வரலாறு

20-ஆம் நூற்றாண்டு (தற்காலம்)

தமிழாய்வுத்துறை வெளியீடு

**அலகு:4**

படைப்பிலக்கியம் - சிறுகதைத் தொகுப்பு

**அலகு:5**

பொதுப்பகுதி - கலைச்சொற்கள்

தமிழாய்வுத்துறை வெளியீடு

**பாட நூல்கள்**

செய்யுள் - தமிழாய்வுத்துறை வெளியீடு

தமிழ் இலக்கிய வரலாறு - தமிழாய்வுத்துறை வெளியீடு

சிறுகதைத் தொகுப்பு - தமிழாய்வுத்துறை வெளியீடு

கலைச்சொற்கள் - தமிழாய்வுத்துறை வெளியீடு

(for the candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-620002**

**DEPARTMENT OF HINDI**

**PART – I LANGUAGE HINDI FOR B.A, B.Sc & B.Com**

**HINDI PAPER-I SHORT STORY, PROSE, GRAMMAR**

**SEMESTER – I**

**HRS/WEEK : 6** **CODE: U15HN1HIN01**

**CREDITS : 3** **MARKS : 100**

**UNIT – I :** Purasakar, Sukamaya Jeevan, Ganga Singh, Machuye Ki Beti, Maharaj Ka Ilaj

**UNIT- II :** Maatru vandana, Chandini, Thitalii, Divali, Seekho.

**UNIT- III :** Sadak Ke Niyam, Bhagavan mahaveer, Prithvi Ka swarga, Mahan ganithagya Ramanujam, Birbal Ki Chathuraye.

**UNIT- IV :** General Grammar
(Sanghya, Visheshan, ling, Vachan, Kriyavisheshan)

**UNIT- V :** Anuvad Abhyas – II

Books Prescribed :

- Galpa Sanchayan - D.B.H.P. Sabha Publishers, Chennai-17
- Naveen Hindi Patamala – I- D.B.H.P. Sabha Publishers, Chennai-17
- Naveen Hindi Patamala – II- D.B.H.P. Sabha Publishers, Chennai-17
- Sugam Hindi Vyakaran - D.B.H.P. Sabha Publishers, Chennai-17
- Anuvad Abhyas – II - D.B.H.P. Sabha Publishers, Chennai-17

# HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2

## DEPARTMENT OF FRENCH

### SEMESTER I

### PART I – LANGUAGE - FRENCH PAPER I [GRAMMAR & CIVILISATION (ÉCHO A1 2e édition)]

(For candidates admitted 2016 onwards)

**HRS/WEEK : 6**
**CREDIT : 3**
**CODE : U16FR1FRE01**
**MARKS : 100**

**Unit 1 Parcours d'initiation ; Vous comprenez**

La différence entre le prénom et le nom, les nationalités, les nombres, les professions

La présentation, le genre et le nombre d'un nom, l'interrogation et la négation – l'identité, les lieux de la ville, les mots du savoir-vivre – saluer, remercier – l'espace francophone.

**Unit 2 Au travail!**

La conjugaison des verbes du 1er groupe, des accords, les articles – l'état civil, des personnes et des objets caractéristiques d'un pays – exprimer ses gouts – première approche de la société française.

**Unit 3 On se détend!**

La conjugaison des verbes irréguliers, le future proche, les pronoms après une préposition – les loisirs – proposer, accepter, refuser, demander une explication – première approche de l'espace de France, repérages de quelques lieux de loisirs

**Unit 4 Racontez-moi ! ; Bon voyage !**

Le passé composé, la date et l'heure – les moments de la journée, de l'année, les événements liés au temps – dire ce qu'on a fait – les rythmes de vie en France, des personnalités du monde francophone.

La comparaison, les adjectifs démonstratifs et possessifs – les voyages et les transports – négocier une activité, faire les recommandations – les transports en France

**Unit 5 Bon appétit!**

L'emploi des articles, la forme possessive – la nourriture, les repas, la fête – les situations pratiques à l'hôtel et au restaurant – les habitudes alimentaires en France.

**TEXT BOOKS :**

ECHO A1 – METHODE DE FRANÇAIS & CAHIER PERSONNEL D'APPRENTISSAGE
Authors: J. Girardet and J. Pécheur
Publication: CLÉ INTERNATIONAL, 2013.

(for candidates admitted from June 2017 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2.**

**I YEAR UG – SEMESTER I**

**PART II – ENGLISH 1 - GENERAL ENGLISH I**

**HOURS : 6** **CODE : U15EL1GEN01**

**CREDIT : 3** **MARKS: 100**

**OBJECTIVES**

- Students learn to use LSRW skills and advanced communication skills in the context required in their daily life.
- The students learn to analyze and express their self and their concern and responsibilities to the world around.
- The students learn how English is used in literary writing so as to imbibe the spirit of using the standard language for communication.

**UNIT I - I, ME, MYSELF**

**Listening** for **s**pecific information in instructions and directions

**Speaking** about oneself, family and friends, likes, dislikes, strengths, weaknesses, profession, talents, emotions, feelings, incidents, reactions, opinions, views, aim, vision.

**Reading for c**omprehension of routine work.

**Writing -**Paragraph guided

**Grammar-** Articles, Prepositions, Punctuation

**Vocabulary-**Meanings, Synonyms, Antonyms

**Composition –**GuidedCreative writing

**TEXTS**

*This is the Photograph of me* by Margaret Atwood - Poem **(Internal Testing)**

1. *The Mayonnaise Jar*
2. *In Prison* by Jawaharlal Nehru (edited)
3. An extract from Shakespeare's *Othello* Act V Scene II

**UNIT II -MY FAMILY AND FRIENDS**

**Listening to** identify the persons/ places/ things from descriptions

**Speaking -**Describing incidents, favorite places, traits of a person, analyzing the nature of a person.

**Reading t**o get specific information and to analyze characters

**Writing -**Letters (personal ),paragraphs-family profile and history

**Grammar -adjectives and verbs**

**Vocabulary-synonyms and antonyms** in context

**Composition - Guided paragraph**

**TEXTS**

*Night of the Scorpion* by Nissim Ezekiel - Poem **(Internal Testing)**

1. *The Old Folks at Home* by Alphonse Daudet (edited)
2. *Will you, Daddy?* (Story from Reader's Digest)
3. An extract from Shakespeare's *King Lear Act I Scene I*

**UNIT III -THE WORLD AROUND ME**

**Listening** To identify specific information

**Speaking –**Discussing and expressing opinions

**Reading** To infer meaning

**Writing** Descriptive and Diary writing
**Grammar** Uses of 'be' Verbs – subject verb concord
**Vocabulary** Coining new words with Prefix and suffix- converting one part of speech to another
**Composition - Essay writing**

**TEXTS**
*Snake* by D.H. Lawrence – Poem **(Internal Testing)**
1. *Floating Fantasy* by Vinu Abraham (Prose)
2. *Discovery by Herman Ould* (Play)
3. *A Handful of Dates* by Tayeb Salih (Short story)

**UNIT IV - MY CONCERN AND RESPONSIBILITIES**
**Listening** to short speeches and getting main concern- Global comprehension
**Speaking** Expressing opinions, concerns and responsibilities
**Reading** To detect one's perspective
**Writing** Debate and Dialogue
**Grammar**Sentence patterns (5 basic types)
**Vocabulary**Appropriate words in the context ,coinage of new words , use of phrases
**Composition-Imaginative writing**

**TEXTS**
*I have a Dream* by Martin Luther King Jr - **(Internal Testing)**
1. *What I have lived for?* by Bernard Russell
2. *Three days to see* by Helen Keller(edited)
3. An extract from Shakespeare's *The Merchant of Venice Act IV Scene I*

**UNIT V - MY PROFESSIONAL WORLD**
**Listening to** short profile to get details –global comprehension
**Speaking** Discussion on secrets of success learnt from success stories
**Reading to i**nfer meaning – to trace the development and analyze the ratio of development
**Writing resume and** E-mail writing
**Grammar- Four** Types of sentences
**Vocabulary-**Idioms and phrases- meaning
**Composition –** Formal and imaginative writing

**TEXTS**
Profile of a successful personality **(Internal Testing)**
1. Extract from a profile and an Interview of Indra Krishnamoorthy Nooyi
2. *The Verger* by Somerset Maugham
3. Profile of Bill Gates

**PRESCRIBED BOOK:**
English for Communication –PoGo publication Trichy

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**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**B.Sc. ZOOLOGY (Specialization in Biotechnology)**
**(**For the candidates admitted from 2015 onwards)
**SEMESTER I**
**MAJOR CORE: 1- ANIMAL DIVERSITY 1: INVERTEBRATA**

**Total Hours: 105**
**Hours/Week: 7** **Code:U15ZO1MCT01**
**Credits: 5** **Marks:100**

**General Objectives**
The student will be able to acquire knowledge of the classification of invertebrates up to order, describe their organization with examples of biological importance and analyse the coral wealth of India.

**Course Objectives**
**The student will be able to**
1: understand the classification, characteristics and analyze the structural organization of protozoa, porifera and coelenterata
2: understand the classification, characteristics and analyze the structural organization of platyhelminthes, aschelminthes, nematode and annelid
3: understand the classification, characteristics and analyze the structural organization of Arthropods
4: understand the classification, characteristics and analyze the structural organization of mollusca and echinodermata
5: understand the classification, characteristics and analyze the structural organization of hemichordate, phylogeny and levels of organization in invertebrates

**UNIT I: ProtozoatoCoelenterata (21hrs)**
Concepts, Methods of grouping, Methods and Significance of Taxonomy
Phylum: Protozoa,Type study :Paramecium
Phylum: Porifera, Type study : Sponge
Phylum: Coelenterata, Type study : Obelia
Coral Wealth of India
**Extra Reading/Key words:** *Coral reefs, identification of sponges*

**UNIT II: PlatyhelminthestoAnnelida (21hrs)**
Phylum:Platyhelminthes, Type study: Tape worm
Phylum: Aschelminthes, Type study: *Ascaris*
Nematode Parasites of Man – *Enterobius, Ancylostoma, Wuchereria, Dracunculus*.
Phylum: Annelida, Type study: Leech
**Extra Reading/Key words:** *Common parasites in your locality*

**UNITIII:Arthropoda (21hrs)**
Phylum: Arthropoda- Classification of Phylum up to Classes
Class: Insecta – Classification up to Orders, Type study: Cockroach
**Extra Reading/Key words:** *Identify Arthropods in your locality*

**UNIT IV:Mollusca and Echinodermata (21hrs)**
Phylum: Mollusca, Type study :Pila
Phylum: Echinodermata, Type study : Starfish

**Extra Reading/Key words:** *Report on star fishes in Rameswaram*

**UNIT V Hemichordata and PhylogenyofInvertebrata (21hrs)**

Phylum: Hemichordata, Type study: Balanoglossus.
Phylogeny of Invertebrata, Levels of organization.

**Extra Reading/Key words:** *Evaluate the phylogeny of any Arthropod*

**Note:** General and Distinguishing characters of classes. An outline classification upto orders and study of the representative types. Applicable to all 5 units.

**Course Outcomes:**

1. Outline the Classification and characterize structuralorganization of protozoa, porifera andcoelenterate
2. Identify and classify the various organisms belonging to protozoa, porifera and coelenterate
3. Outline the Classification and characterize the structural organization of platyhelminthes, aschelminthes, nematode andannelid
4. Identify and classify the various organisms belonging to platyhelminthes, aschelminthes, nematode andannelid
5. Outline the Classification and characterizestructural organization ofArthropods
6. Identify and classify the various organisms belonging toArthropods
7. Outline the Classification and characterize structural organization of mollusca and Echinodermata
8. Identify and classify the various organisms belonging to mollusca andEchinodermata
9. Outline the Classification and characterize structural organization ofhemichordate
10. Identify and classify the various organisms belonging tohemichordate
11. Relate the phylogeny and levels of organization ininvertebrates

**Text Book**:

Ekambaranatha Ayyar.M and Ananthakrishnan.T.N. (1994). Manual of Zoology, Vol I, Part –I, S. Viswanathan Pvt. Ltd. Madras.

Shipley, A. E. (2013). *Zoology of the Invertebrata: A Text-Book; For Students*. London: Forgotten Books. (Original work published 1929)

**Books for Reference**:

Agarwal, V.K. (2000) Invertebrate Zoology. S. Chand & Co. New Delhi.

Agarwal, V.K. and Gupta U. (2004) Animal Taxonomy. S. Chand & Co. New Delhi

Jordan, E.L. and Verma, P.S. (2009), Invertebrate Zoology 14th Ed, S. Chand & Co., New Delhi

Kotpal,R.L.(2011).Modern Text Book of Zoology, Invertebrates Animal Diversity – I,10th

Ed. Rastogi Publications

Mukerji, D (1977) Textbook of Zoology Vol I & II The New book stall, Calcutta.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**DEPARTMENT OF ZOOLOGY**
(For candidates admitted from 2015 onwards)
**SEMESTER I**
**ALLIED: 1 (Optional) – BASICS IN BIOTECHNOLOGY**

**Total Hours: 60**
**Credits:4** **Code:U15ZO1AOT01**
**Hours/Week:4** **Marks:100**

**General Objective**

The student will be able to classify prokaryotes and eukaryotes, describe the structure of DNA, RNA and proteins and apply the techniques of genetic engineering in medicine, waste water treatment, plant and animal tissue culture.

**Course Objectives**
**The student will be able to**

1: understand and analyze the structure of prokaryotic and eukaryotic cell, and protein synthesis
2: understand the steps in recombinant DNA technology
3: analyse and apply knowledge of recombinant DNA technology in the production of insulin, vaccines, monoclonal antibodies and gene therapy
4: analyse and apply the knowledge of biotechnology in plant tissue culture, biopesticides and SCP production
5: apply and evaluate the knowledge of biotechnology in solving environmental issues and biopharming

**UNIT I - Basics and ScopeofBiotechnology (12 hrs)**

Scope of biotechnology - biotechnology as an interdisciplinary pursuit. Outline structure of prokaryotic and eukaryotic cells. Brief account of structure, synthesis and functions of DNA, RNA andproteins.

**Extra Reading/Key words:** *Biotechnological tree*

**UNIT II - Methodsin Biotechnology (12 hrs)**

Restrictionenzymes, vectors (plasmid and bacteriophage) - Recombinant DNA technology: Isolation of DNA, linking of DNA, gene transfer technique, selection and screening of recombinant clones - genomic and cDNAlibrary.

**Extra Reading/Key words:** *Microinjection in fishes*

**UNIT III - Medicalbiotechnology- (12hrs)**

Production of recombinant insulin and HBV vaccine. Monoclonal antibodies and their uses. Stem cell research. Gene therapy: protocol, ADA as an example.

**Extra Reading/Key words:** *Raising antisera in animals*

**UNIT IV-Plant Biotechnology (12hrs)**

Plant tissue culture and transgenic plants. Biopesticides and biofertilizers. Production of penicillin and single cell protein (SCP).

**Extra Reading/Key words:** *Bt brinjal*

**UNIT V - Environmental andAnimalBiotechnology (12hrs)**

Sewage treatment. Superbug and oil degradation. Biofuels, biosensors & biochip. Animal cloning, Transgenic fish and livestock, biopharming.
**Extra Reading/Key words:** *Graphine*

**Note: Texts given in the Extra Reading/Keywords must be tested only through Assignment and Seminars.**

**Course Outcomes:**

1. Evaluate and discuss the structure of Nucleic acid andproteins.
2. List and assess the enzymes and molecular tools involved in rDNATechnology.
3. Discuss the strategies for developing vaccine and explain the importance of monoclonalantibodies.
4. Elaborate and discuss the prospects for developing stem cell and gene therapy against infectiousdiseases.
5. Explain and examine the processes involved invitro tissue culturing & methods in plant biotechnologyindustry.
6. Examine and interpret the environmental issues and new technology in animal pharming.

**Text Book:**

R. C. Dubey and D. K. Maheswari (1994) Text book of Biotechnology, Chand and Co. NewDelhi.

**Books for Reference:**

Gupta, P.K. (2004) Elements of Biotechnology, Rastogi Publication, Meerut.
Irfan Ali Khan and Athiya Khanum (2004) Fundamentals of Molecular biology, Genetic engineering and Biotechnology, Ukaaz Publication, Hyderabad
Old R.W. and Primrose. S.B.(1989) Principles of Gene Manipulations,BlackwellScientific Publications.
Primrose. S.B. and R.M. Twyman (2006), Principles of Gene Manipulation and Genomics Blackwell Publishing, UK.
Satyanarayana (2006) Biotechnology, Books and Allied (P) Ltd., Kolkata.
Smith John.E. (1988) Biotechnology, Edward Arnold, London.
Walker, J.M. and Gingold, E.D. (Eds) (2012), Molecular Biology and Biotechnology, Panima Educational Book Agency. New Delhi
Watson, J.D., Michael G., Tam Witkowski and Mark Zollew (1999) Recombinant DNA, Scientific American Books, New Delhi

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**DEPARTMENT OF ZOOLOGY**
(For candidates admitted from 2015 onwards)
**SEMESTER I**
**ALLIED: 2 (Optional) - ENVIRONMENTAL MANAGEMENT**

**Total Hours: 60**
**Hours/Week: 4** **Code:U15ZO1AOT02**
**Credits:3** **Marks:100**

**General Objective:**

The student will learn about the global ecosystem, concept of community and population, pollution, biodiversity, and disaster management and environmental economics.

**Course Objectives:**
**The student will be able to**

**1:** understand the components of ecosystem and impact of man on the ecological balance
**2:** understand and analyses the concept of community and population
**3**: analyse the impact of pollution
**4**: understand and evaluates the importance of biodiversity and its conservation
**5**: evaluate the causes of disasters and the strategies of its management

**UNIT I: Scope ofenvironmentalmanagement (12 hrs)**

Global ecosystem and its components- Man‘s manipulation of environment and its impact on ecologicalbalance Measures for sustainable environmental management-Abiotic factors- water; oxygen; carbon dioxide; temperature; light- photoperiodism; soil – types andprofile.
**Extra Reading/Key words:** *changes in rainfall and summer temperatures*

**UNIT II: CommunityandPopulation (12 hrs)**

Ecological succession- concept, process, concept of climax community. Animal Population: Concept, attributes-density, natality, mortality, growth form, fluctuations, equilibrium, self regulation. World human population- industrialization, Urbanization and environmental degradation, Biomagnification, Pest outbreak-IPM.
**Extra Reading/Key words:** *population explosion*

**UNITIII:Pollution (12hrs)**

Radiation pollution episodes: Hiroshima-Nagasaki, Chernobyl. Water Pollution: Effects, Minamata episode, Gulf war 1990, Bombay high oil slick 1993. Anaerobic and aerobic treatment of sewage water- sewage as resource-WHO standard for drinking water. Air Pollution – acid rain, Stone leprosy and Taj Mahal, Bhopal Tragedy smog, global warming, ozone depletion and ecological disturbance-emission standards and control measures.
**Extra Reading/Key words:** *Fukushima, impact of photochemical smog on transport*

**UNIT IV: BiodiversityandConservation (12 hrs)**

Deforestation – causes, impact and management. Eco-tourism – India as a mega diversity nation – hot spots of biodiversity – threats to biodiversity – endangered species of India and conservationmeasures.
**Extra Reading/Key words:** *Sunderbans, silent valley*

**UNIT V: Disaster Management andEnvironmentalEconomics (12 hrs)**

Earth quakes, floods and cyclones- Causes, magnitude, predictionsandcontrol measures. International Environmental Organization and Conventions. Environmental Economics – Environmental Auditing. Environmental Acts ofIndia.

**Extra Reading/Key words:** *Tsunami, tectonic plates*

**Note: Texts given in the Extra Reading/Keywords must be tested only through Assignment and Seminars.**

**Course outcomes:**

1. Illustrate the components of ecosystem and relate the impact of man on the ecological balance
2. Analyze the concept of community andpopulation
3. Test for the impact ofpollution
4. Interpret the importance of biodiversity and its conservation
5. Justify the causes of disastersand
6. Recommend the strategies of itsmanagement

**Text Book:**

Odum, E.P.(1971). Fundamentals of Ecology. W.B. Saunders Company, Phil. London.

**Books forReference:**

Agarwal, K.C. (2001). Environmental Biology, Nidi Publication Ltd. Bikaner.

Chairas, D.D. (1985). Environmental Science. The Benjamin Cummings Publishing company.,Inc.

Clarke George, L. (1954). Elements of Ecology. Hohn Wiley and SONS, Inc.

Hodges, L. (1977). Environmental Pollution, II Edition. Holt, Rinehart and Winston, New York.

Krebs, C.J. (2001). Ecology.VI Edition.Benjamin Cummings.

Nebel, B.J. and Wright, R.T.(1996). Environmental Science, Prentice Hall, New Jersey

Odum, E.P. (2008) Fundamentals of Ecology.Indian Edition. Brooks / Cole.

Sharma, B.K. and Kaur (1997). Environmental Chemistry. Goel Publishing House, Meerut.

Sharma, B.K. and Kaur, (1997). An Introduction to Environmental Pollution. Goel Publishing House, Meerut.

Sinhe, A.K. Boojh, R. and Vishwanathan, P. N., (1989). Water Pollution Conservation and Management, Gyansdaya Prakashan,Nainital.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**B.A /B.Sc./B.Com/B.R.SC/B.C.A/B.B.A DEGREE EXAMINATION**
**SEMESTER I**

# ENVIRONMENTAL STUDIES

**Hrs – 2/Week** **CODE: U15RE1EST01**
**CREDITS:2**

**Unit I – Awareness and Natural Resources**

Awareness of Environmental issues and management strategies–need of the hour

Renewable and non-renewable resources-uses, present status and management of forest, water, land and energy resources.

**Unit II–Ecosystems and Biodiversity**

Ecosystem–concepts, structure and types–concept of food chains and food web–causes and effects of weakening food chains

Biodiversity–concept of genetic, species and ecological biodiversity–ecological and economic values–India, a mega diversity country, hotspots–threats to biodiversity and conservation measures.

**Unit III–Environmental Pollution**

Causes, effects and control of water, and air pollution – global warming–ozone depletion– Nuclear hazards.

**Unit IV–Human population and Environment** Population growth at national and global level.

World food production-Effects of modern agriculture on land and Eco systems-GMOs and related issues

Environmental pollutions and diseases-malaria- chikungunya

**Unit V–Environment and Social Issues Rich–**

**poor wide–at national and global levels**

Urbanization –slums

Changing value systems–AIDS Family welfare programs

**REFERENCES:**

Agarwal,K.C.(2001). Environmental Biology, Nidi Publication Ltd. Bikaner.
Chairas,D.D.(1985).Environmental Science. The Benjamin Cummings Publishing company.,Inc.
Clarke George,L. (1954). Elements of Ecology. Hohn Wiley and SONS, Inc.
Hodges,L. (1977). Environmental Pollution, II Edition. Holt, Rinehart and Winston, New York. Krebs,C.J

புனித சிலுவை தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி – 620 002.

தமிழாய்வுத்துறை

இளங்கலை / இளம் அறிவியல் / இளம் வணிகவியல் பட்ட வகுப்பு

முதலாமாண்டு – இரண்டாம் பருவம் - ஏப்ரல் 2017 - 2018

தாள் - II

**Total Hours : 75** **Code : U15TL2TAM02**
**Hrs : 5Hrs /Wk** **Marks : 100**
**Credit : 3**

**நோக்கங்கள்:**

1. இறைச் சிந்தனை வழி மாணவர்களை ஒருமுகப்படுத்துதல்.
2. தமிழ்ச் சான்றோர்களின் சிறப்புகளை அறிமுகப்படுத்துதல்.
3. மாணவர்களின் நல்லெண்ணங்களை மேம்படுத்துதல்.
4. நட்புணர்வை மாணவர்கள் மனதில் பதியவைத்தல்.

**பயன்கள்:**

1. இப்பாடம் மாணவர்களிடையே ஆன்மீக அறிவு அறிமுகமாகவும், வளரவும், ஆழப்படவும் துணைபுரிகின்றது. இது ஓர் இயற்கைப் பூங்கா.
2. தமிழை நேசித்து, தமிழ்ச் சான்றோர்களின் மீது மதிப்புக் கொள்ளவும், தானும் சான்றோர் ஆகவும் இது ஒரு பாலமாக பயன்படுகிறது.
3. ஊற்றுக்களாய் மாணவிகளிடையே மறைந்து கிடக்கும் நல்லெண்ணங்களை வெளிக்கொணரவும் நேர்மறைச் சிந்தனைகள் தோன்றவும் பயன்படுவதால் இது ஒரு நூலகமாகும்.
4. வாழ்க்கையில் நட்பின் தேவையை உணர வைக்கும் வழிகாட்டியாகத் திகழ்கிறது. இது வாழ்க்கைப் பெட்டகம்.

**பாடத்திட்டம்**

**அலகு:1 செய்யுள்**

1. தேவாரம் - சுந்தரர் (திருமழப்பாடி)
2. திருவாசகம் - மாணிக்கவாசகர் (குயில் பத்து)
3. திருமந்திரம் - திருமூலர்

4. திருப்பாவை - ஆண்டாள்

5. நாலாயிர திவ்வியபிரபந்தம் - குலசேகராழ்வார் (பெருமாள் திருமொழி)

**அலகு:2 செய்யுள்**

6. மீனாட்சியம்மை பிள்ளைத்தமிழ் - குமரகுருபரர்

7. இரட்சணிய யாத்திரிகம் - எச்.ஏ.கிருட்டிணப்பிள்ளை

8. வேதநாயகம் சாஸ்திரியார் பாடல்கள் - வேதநாயகம் பிள்ளை

9. நபிகள் நாயக மான்மிய மஞ்சரி - செய்கு தம்பிப் பாவலர்

**அலகு:3**

**தமிழ் இலக்கிய வரலாறு** - தமிழாய்வுத்துறை வெளியீடு

பல்லவர்காலம்

நாயக்கர்காலம்

**அலகு:4**

**படைப்பிலக்கியம் - புதினம்**

கல்கி - பார்த்திபன் கனவு

**அலகு:5**

**கடிதம் எழுதுதல்**

**பாட நூல்கள்**

செய்யுள் - தமிழாய்வுத்துறை வெளியீடு

தமிழ் இலக்கிய வரலாறு - தமிழாய்வுத்துறை வெளியீடு

கல்கி - பார்த்திபன் கனவு

கடித இலக்கியம் - பயிற்சி ஏடு.

(for the candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-620002**

**DEPARTMENT OF HINDI**

**PART – I LANGUAGE HINDI FOR B.A, B.Sc & B.Com**

**HINDI PAPER-II PROSE, DRAMA, GRAMMAR-II, COMPREHENSION**

**SEMESTER –II**

**HRS/WEEK : 5** **CODE: U15HN2HIN02**

**CREDITS : 3** **MARKS : 100**

**UNIT – I :** Bharat matha, Premchand, Taj mahal ki Aathma Kahani, Mahakavi Prasadh, Meri theertha yatra

**UNIT- II :** Sathyameva jayathe - Drama (chapter 1& 2)

**UNIT- III :** Sathyameva jayathe – Drama (chapter 3)

**UNIT- IV :** General Grammar (Sarvanaam, Kriya, Kaal, Karak, Ne Ka niyam)

**UNIT- V :** Comprehension – Prose passages

Books Prescribed :

- Naveen Gadhya Chayanika – D.B.H.P. Sabha Publishers, Chennai-17
- Sathyameva Jayathe – D.B.H.P. Sabha Publishers, Chennai-17
- General Grammar – D.B.H.P. Sabha Publishers, Chennai-17

# HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2

## DEPARTMENT OF FRENCH

### SEMESTER II

### PART I - LANGUAGE - FRENCH PAPER II [GRAMMAR, CIVILISATION & TRANSLATION (ÉCHO A1 2e édition)]

(For candidates admitted 2016 onwards)

**HRS/WEEK : 5** **CODE : U16FR2FRE02**
**CREDIT : 3** **MARKS : 100**

**Unit 1 Quelle journée !**
La conjugaison pronominale, l'impératif, l'expression de la quantité – les activités quotidiennes, les achats et l'argent – demander des nouvelles de quelqu'un – le comportement en matière d'achat et d'argent.

**Unit 2 Qu'on est bien ici !**

Les prépositions et les adverbes, les verbes exprimant un déplacement – le logement, la localisation, l'orientation, l'état physique, le temps qu'il fait – demander de l'aide, exprimer une interdiction – le climat en France, les cadres de vie (ville et campagne)

**Unit 3 Souvenez-vous ?**

Emplois du passé composé et de l'imparfait – les moments de la vie, la famille, les relations amicales, amoureuses, familiales – demander/donner des informations sur la biographie d'une personne – le couple et la famille.

**Unit 4 On s'appelle ?**

Les pronoms compléments directs et indirects – les moyens de la communication – aborder quelqu'un, exprimer une opinion sur la vérité d'un fait – les conseils de savoir-vivre en France.

**Unit 5 Un bon conseil ! ; Parlez-moi de vous !**

L'expression de déroulement de l'action, les phrases rapportées – le corps, la santé et la maladie – téléphoner, prendre rendez-vous, exposer un problème – les conseils pour faire face aux situations d'urgence.

La place de l'adjectif, la proposition relative, la formation des mots – la description physique et psychologique des personnes, les vêtements et les couleurs – demander/donner une explication – quelques styles comportementaux et vestimentaires en France.

**TEXT BOOKS :**

ECHO A1 – METHODE DE FRANÇAIS & CAHIER PERSONNEL D'APPRENTISSAGE
Authors: J. Girardet and J. Pécheur
Publication: CLÉ INTERNATIONAL, 2013.

(for candidates admitted from June 2017 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2.**

**I YEAR UG – SEMESTER II**

**PART II – ENGLISH 2 - GENERAL ENGLISH II**

**HOURS : 6** **CODE : U15EL2GEN02**

**CREDIT : 3** **MARKS: 100**

**OBJECTIVES**

- Students learn to use LSRW skills and advanced communication skills in the context required in their daily life.
- The students learn to analyze and express their self and their concern and responsibilities to the world around.
- The students learn how English is used in literary writing so as to imbibe the spirit of the standard language for communication.

**UNIT I – SELF**

**Listening-** Specific information from demonstration and instructions, transfer of information.
**Speaking -** Sharing expressions, dreams and expressing opinions.
**Reading -**Skimming and Scanning for specific information, reading for local comprehension.
**Writing -** Story Writing
**Grammar -** Articles and Sentence Pattern
**Vocabulary -** Meanings, Synonyms, Antonyms
**Composition -** Transfer of information: Paragraph to Bar graph/pie chart
General Essay - Courage is the key to success

**TEXTS**

1.*The Far and the Near* by Thomas Wolfe (Short Story)
2. *The Owl who was a God* by James Thurber (Short Story)
3.*Wings of Fire – Chapter I* by Dr. A.P.J. Abdul Kalam (Prose)

**UNIT II – STRENGTHS**

**Listening -** Listening to a process
**Speaking -** Telephone Etiquette
**Reading -** Loud reading with pause, intonation and expression in dialogue form
**Writing -** Writing about oneself (strengths& weaknesses, Have's & Have not's)
**Grammar-** Subject verb agreement, Prepositions
**Vocabulary-** One word substitute in the context
**Composition-** Letter Writing - informal letters
General essay – A bird in hand is worth two in bush.

**TEXTS**

1. *The Robe of Peace* by O' Henry (Short Story)
2. An extract from *Androcles and the Lion* by George Bernard Shaw (Play)

**UNIT III - POSITIVE SHORTCOMINGS**

**Listening -** Listening to facts and opinions and trying to differentiate it
**Speaking -** Pair Work – about have's & have not's, understanding the strengths and overcoming the weaknesses
**Reading -** Reading newspapers, articles, magazines, anecdotes for global and specific in analytical thinking
**Writing -** Filing Complaints, Travelogues
**Grammar -** Tenses, Direct and Indirect Speech

**Vocabulary -** Compound words
**Composition -** Dialogue Writing
General essay – Adversity is the seed of success.

**TEXTS**
1. *Six Thinking Hats* by Edward de Bono (Prose)
2. *A Cup of Tea* by Katherine Mansfield (Short Story)
3. An Extract from Shakespeare's *As You Like It (Act II Scene I lines 12 -17)*

**UNIT IV POTENTIALS**

**Listening -** Listening to the description of personalities, historical places and monuments
**Speaking -** Group Discussion – Totally controlled, partially controlled, Free
**Reading -** Parallel Reading, reading for pleasure
**Writing -** Letter writing – formal letters
**Grammar -** Adjectives, Degrees of Comparisons
**Vocabulary -** Idioms and Phrases
**Composition -** Debates and Discussions
General essay – My potentials

**TEXTS**
1. *Easy Ways to Avoid an Argument* by Sam Horn (Prose)
2. *Pygmalion* by George Bernard Shaw (Play)
3. My Heart Leaps up when I behold by William Wordsworth (Poem)
4. The Flower by Alfred Lord Tennyson (Poem)

**UNIT V ACHIEVEMENTS**
**Listening -** Listening to comparisons and arguments
**Speaking -** Performance
**Reading -** In-depth reading
**Writing -** Script writing of story to play
**Grammar -** Question Tags
**Vocabulary -** Homophones
**Composition -** Essay Writing
General essay - The reward of hard work

**TEXTS**
1. *On Saying Please* by A.G. Gardiner (Prose)
2. *A Time of Green* by Anna Stillaman (Play)

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**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**I B.Sc. ZOOLOGY (Specialization in Biotechnology)**
**SEMESTER II**
(For candidates admitted from 2015 onwards)
**MAJOR CORE: 2 - ANIMAL DIVERSITY- 2: CHORDATA**

**TotalHours:75** **Code :U15ZO2MCT02**
**Hours/Week: 5** **Marks:100**
**Credits : 5**

**General Objectives:**

To enable the student to acquire knowledge on outline classification of vertebrates upto order.

**Course Objectives :**

**The student will be able to**

1: understand Geological Time Scale,Structural organisation of amphioxus and analyse classification of prochordates .

2: understand the outline classification of Pisces with Shark as an example and analyse the few locally available fishes of aquaculture importance.

3: understand the outline classification of Amphibia and Reptiles with Frog and Calotes as an example, evaluate poisonous and non poisonous snakes.

4: understand the outline classification of Aves with Pigeon as an example and analyse significance of Archaepotryx.

5: understand the general characters and outline classification of prototheria,metatheria and Eutheria with Rabbit as an example.

**UNIT I: Origin of Chordates and classificationofProchordates (15hrs)**

Geological time scale, Origin of chordates, Vertebrate relationships and basic structure. Type study: Amphioxus Prochordates- Classification, characters andrelationship.

**Extra Reading/Key words:** *Study of 2 extinct species*

**UNITII:Pisces (15hrs)**

General characters and outline classification upto orders with suitable examplesof biological interest. Type study:Shark.

Identification and study of a few locally available fishes and fishes of aquaculture importance (Lab Cum theory).

**Extra Reading/Key words:** *Methods of culturing locally available fishes.*

**UNIT III: Amphibia and Reptilia (15hrs)**

General characters and outline classification up to orders with suitable examples of biological interest. Type study: Frog and Calotes.

Identification and study of a few Poisonous and non-poisonous snakes.

**Extra Reading/Key words:** *Poisonous and non-poisonous snakes in the locality.*

**UNITIV: Aves** **(15hrs)**

General characters and outline classification up to orders with suitable examples of biological interest.

Type study: Pigeon

Arachaeopteryx, Significance of Arachaeopteryx, Flightless birds.

**Extra Reading/Key words:** *Finding out endangered birds in the locality*

**UNITV:Mammalia** **(15hrs)**

General characters and outline classification up to orders with suitable examples of biological interest.

Prototheria, Metatheria and Eutheria

Type study: Rabbit

Differences between Prototheria, Metatheria and Eutheria

**Extra Reading/Key words:** *Parental care in mammals.*

**Note: Texts given in the Extra Reading / Key words must be tested only through Assignment and Seminars.**

**Course outcomes:**

1. Compare era, epoch andperiod.
2. List characters ofprochordate.
3. List the characters ofPisces.
4. Construct a table with the characters of locally available fish to help in its identification.
5. Explain how Frog belongs to the classAmphibia.
6. Defend the given snake is poisonous or non poisonous by analyzing itscharacters.
7. Critically analyze the characters of Archaeopteryx with reptiles andbirds.
8. Compare and contrast Prototheria, Metatheria andEutheria.

**Text Books:**

Kotpal , R.L. (2001)Modern Textbook of Zoology Chordates. Rastogi publications, Meerut.

Miller, A.S. and John P. Harvley, (1996). Zoology. Latest Edition. Wm.C.Brown Publishers.

EkambaranathaAyyar, M. and Anantha Krishnan, T. N. (1994). A Manual of Zoology Part I
(Chordata). S.ViswanathanPvt.Ltd.

**Books for Reference:**

Arnold, G. Kluge, (1971) Chordate structure and function. Latest Edition. Macmillan.

Harvey, P.F., Christine, M.J., John,B.H(2006 )Vertebrate Life, Latest edition. Pearson EducationPvt.Ltd

Jordan,E.L.andVerma,P.S.(2008) Chordate Zoology S. Latest Edition Chand &Co.NewDelhi

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**

**I B.Sc. ZOOLOGY (Specialization in Biotechnology)**

(For candidates admitted from 2015 onwards)

**SEMESTER II**

**MAJOR CORE 3: PRACTICAL I -**
**ANIMAL DIVERSITY I & II**

**Total Hours: 75**

**Hours/Week: 5** **Code:U15ZO2MCP03**

**Credit: 4** **Marks:100**

**General Objectives:**

The student will learn the art of mounting the mouth parts of cockroach, body setae of earthworm and placoid scales of shark, dissects the digestive, nervous and reproductive system of Earthworm, Cockroach and Frog through virtual lab and classify selected animals of biologicalimportance.

**Course Objectives:**

**The student will be able to:**

1: understand the structural organization of mouth parts

2: correlate the mouth parts of insects to their feeding habit

3: mount the body setae, placoid scales, and mouth parts of insects

4: analyze the structural organization of the different systems in Earthworm, Cockroach and Frog

5: apply knowledge of classification in the identification of specimens of biological importance

1. Cockroach, House fly, Head Louse and Mosquito– Mount and labeling of Mouth parts.
   Cockroach – Flag labelling of Digestive system, Nervous system and Reproductive system.
2. Earthworm- Nervous system, Reproductive system using virtual class study and Mounting of Bodysetae.
3. Shark – Mounting of Placoidscales
4. Frog- Digestive system, Circulatory system (Arterial and Venous system), Urinogenital system using virtual class study. Nervous system – Flag labelling of Brain V, VII, IX and X cranial nerves and I spinal nervestudy.
5. Spotters: Animal Diversity I andII
   Identification of prepared slides and specimens of Biological importance.

**A Record of the work done is to be submitted at the time of examination**

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**DEPARTMENT OF ZOOLOGY**
**(**For the candidates admitted from 2015onwards)
**SEMESTER –II**
**ALLIED: 3 (Optional) – BASICS IN BIOINFORMATICS**

**Total Hours: 60**
**Hours/Week: 4** **Code:U15ZO2AOT03**
**Credits:3** **Marks:100**

**General Objective:**
The student will be able to understand the structure of biomolecules, types of databases, tools of proteomics and genomics, sequence alignment, phylogenetic analysis.

**Course Objectives:**
**The learner will be able to**
1: Remembers and understands the structure of biomolecules
2: Understands, analyses and evaluates the different structural databases
3: Understands and analyses the proteome databases
4: Understands and analyses the genome databases
5: Understands and analyses, apply software and tools in sequence alignment and phylogenetic analysis

**UNIT I: BasicsandScope (12hrs)**
Bioinformatics- Definition, Scope. Biomolecular Structure (Primary, secondary, tertiary and quarternary) – Proteins and Nucleic acids.
**Extra Reading/Key words:** A*pplication of bioinformatics*

**UNIT II:Databases (12hrs)**
Web Browsing – Structural Data bases- Introduction, primary data base, protein data bank (PDB) - Nucleic acid structural data base (NDB) - Secondary or derived data base- Molecular modeling data base (MMDB).
**Extra Reading/Key words:** *Softwares in development of databases*

**UNITIII:Proteomics (12hrs)**
Protein information resources (PIR) - Martinsried Institute for protein sequences (MIPS) – Swiss- Prot - Translated EMBL (TrEMBL) - Composite pattern Database- Structural classification of proteins (SCOP), ORF Prediction.
**Extra Reading/Key words:** *Docking*

**UNITIV:Genomics (12hrs)**
Genome Information Resource – European Molecular Biology Laboratories (EMBL) - DNA Data Bank Japan (DDBJ) - Gen Bank.
**Extra Reading/Key words:** *Gene prediction*

**UNIT V: Sequence Alignment andPhylogeneticAnalysis (12 hrs)**
Sequence Alignment- Multiple sequence alignment – Software used in sequence alignment. Phylogeneticanalysis.
**Extra Reading/Key words:** *Algorithm for sequence alignment*

**Note: Texts given in the Extra Reading / Key words must be tested only through Assignment and Seminars.**

**Course outcomes:**

1. Illustrate the structure ofbiomolecules
2. Interpret the data retrieved from different structuraldatabases
3. Interpret the data retrieved proteomedatabases
4. Interpret the data retrieved genomedatabases
5. Utilize the software and tools in sequencealignment
6. Utilize the software and tools in phylogeneticanalysis

**Text Book**

Arthur, M.L. (2007). Introduction to Bioinformatics. Oxford Uni . Press, USA.

**Books for Reference**

Irfan Ali Khan and Atiya Khanum. (2003). Fundamentals of Bioinformatics. Ukaaz Publications Hyderabad, AP, India.

Jonathan , P.(2009). Bioinformatics and Functional genomics, 2nd edition. Sinauer Associates, Inc.

Lovric, J. (2011). Introducing Proteomics: From concepts to sample separation, mass spectrometry and data analysis . Wiley.

Murthy, C. S. V. (2003). Bioinformatics. Himalaya Publishing House. Mumbai, Delhi, Nagpur. Bangalore, Hyderabad,India.

Subramanian, C. (2004). A Textbook of Bioinformatics**.** Dominant Publishers and Distributors. New Delhi, India.

**(**For the candidates admitted from 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI**

**B.A/B.Sc./B.Com/B.R.SC/B.C.A/B.B.A DEGREE**

**EXAMINATION SEMESTER-II**

# SBE-1 SOFT SKILL DEVELOPMENT

**Hrs – 2/Week**

**CODE: U15RE2SBT01**

**CREDITS -2**

**General Objective:**

The student understands the need for the development of self esteem, team spirit and communicative skills to prepare themselves for self development.

**UNIT I:**

**Individual Capacity Building**

Self awareness – building self–esteem – importance of having a strong self–esteem – developing positive attitude - .Anchoring on principles: Universal principles and values– forming & inculcating values-Leadership skills.

**UNIT II :**

**Interpersonal skills**

Trust- worthiness-interpersonal communication–art of listening, reading and writing–art of writing–building relationship-empathy.

**UNIT III:**

**Corporate skills**

Vision, mission and goals: Concepts, vision setting, goal setting, Individual and Group goals, Concept of synergy, team building, group skills.

**UNIT IV:**

**Management skills**

Developing Body Language–Practicing etiquette and mannerism–Stress Management– Time Management Prioritization Importance and urgent activities-Time management to move towards life vision.

**UNIT V:**

**Self Development Plan**

Concept and Need for Self Development Plan–Preparing Self Development Plan. (Format is used to complete the self development Plan), Monitoring and Evaluation of self Development plan– Developing indicators for self development introduction to National Skill Development Mission.

**REFERENCES:**

Alex K.(2012)Soft Skills–Know Yourself & Know the World, S. Chand &Company Ltd., New Delhi Meena K.AyothiV. (2013). A Book on Development of Soft Skills (Soft Skills: A Road Map to Success), P.R. Publishers & Distributors, Trichy.

Francis Thamburaj S.J.(2009).Communications of skills for Professional Excellence,1st Ed., Grace Publishers,

Rathan Reddy B.(2005).Team Development and Leadership, Jaico Publishing House, Mumbai.

(For candidates admitted from 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI– 2**

**B.A./B.Sc.,/B.Com./BCA&BBA,DEGREEEXAMINATION**

**SEMESTER II**

**SBE- 2 RURAL ENRICHMENT AND SUSTAINABLE DEVELOPMENT**

**Hrs – 2/Week** **CODE: U15RE2SBT02**

**CREDITS -2**

**Course Objective:**

The students are able to understand practically the Environmental concerns of rural areas and develop an alternative thinking through various field based intervention.

**Unit–I**

Village–Public Administration- Survey of natural resources and resource mapping of villages, village level Participating Approach (VLPA) – Role of NGO'S and SHG'S, Department of Rural development(central and state):

**Unit–II**

Green Revolution and industrialization cost climatic changes and mismanagement of natural resources- Reduced economic returns from agriculture-resultant social issues- poverty and farmer suicide- introduction to WTO, GATT and LPG and its impact on green Revolution.

**Unit–III**

Sustainable Development-Concepts , Environmental , social and economic aspects of sustainable development, sustainable development as solution to address rural issue-successful case studies from India

**Unit-IV**

Elements in sustainable development-Comparison and Compliments of Traditional water shed and modern water shed management techniques-water shed management practices-rain water harvesting, managing existing rain water drainage canals, desilting, buns construction, check dams, micro irrigation, agro forestry and alternative agriculture models and agriculture implements – Afforestation- Honey Bee rearing-dairy farming.

**Unit-V**

Elements in sustainable development –addressing agriculture issues-traditional farming technology-organic farming-Zero budget farming-organic manures vermicompost-azolla cultivation panchakavya-amirtha karaisal, organic pesticides mulikaipuchiviratti-neem products-natural management in soil-precision farming soil fertility. Ecological sanitation-bio-diversity and natural resource-terrace farming-seed banking and kitchen garden.

**REFERENCES:**


- Packages of organic practices from Tamil Nadu Center for Indian Knowledge System(CIKS) 2.www.fao.org.in

**(For Candidates admitted from June 2015 onwards)**
**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**B.A/B. Sc/B.Com /B.C.A-DEGREE COURSES**
**LIFE ORIENTED EDUCATION**
**ETHICS – I: RELIGIONS AND VALUE SYSTEMS**

**HRS / Wk :1**
**CODE:U15VE2LVE01**
**CREDITS : 1**
**MARKS : 100**
**OBJECTIVES:**

- To understand and appreciate other Religions and Culture
- To learn from other Religions and Culture
- To interact with all Religions and Culture to enhance my faith in my religion.
- To help the students to become aware of the negative forces of religions.

**UNIT – I: RELIGION**

God – Faith, Religion, Definition, Nature, Characteristics and Basic values of different religions. Impact of Globalization on religion – Importance of worship in holy places – celebration, Communion (come-union) – Socialization

**UNIT – II: DIFFERENT RELIGIONS**

Basic characteristics and basic thoughts of different religions: Buddhism, Christianity, Hinduism, Islam, Jainism and Sikhism

**UNIT – III: UNITY OF RELIGION**

Unity of Vision and Purpose- Respect for Other Religions, Inter Religious Co-operation, Religious Pluralism as a fact and Religious Pluralism as a value

**UNIT – IV: FUNDAMENTALISM, COMMUNALISM AND SECULARISM**

Meaning and impact of Fundamentalism, Communalism, Violence and Terrorism – Tolerance – Secularism – Individualism

**UNIT – V: VALUE SYSTEMS**

Value and Value Systems - Moral Values -Individuals and the need to stand for values in the context of Globalization – Consumerism - Will power to live up to your values - Healthy body for empowerment – Physical health and Mental hygiene, food and exercises

**REFERENCES:**


1. Social Analysis (a course for all first year UG students), 2001. Department of Foundation Courses, Loyola College, Chennai-34.
2. Special topics on Hindu Religion, 2001.Department of Foundation Courses, Loyola College, Chennai-34.
3. Religion: the living faiths of the world, 2001. Department of Foundation Courses, Loyola College, Chennai-34.
4. Sydney Am Meritt, 1997. Guided meditations for youth.
5. Marie Migon Mascarenhas,1986. Family life education- Value Education, A text book for College students.

**(For Candidates admitted from June 2015 onwards)**
**HOLY CROSS COLLEGE (AUTONOMOUS) TRICHIRAPALLI-2.**
**B.A/B.Sc./B.Com /B.C.A-DEGREE COURSES**
**LIFE ORIENTED EDUCATION**
**BIBLE STUDIES – I: NEW TESTAMENT**

**HRS / WK : 1** **CODE: U15VE2LVBO1**
**CREDIT : 1**
**MARKS : 100**

**OBJECTIVE:**

- To enable the students to develop the passion for the Word of God – Jesus and inculcate the thirst of Missionaries being a disciple of Christ.

**UNIT – I: BIBLE – THE WORD OF GOD**

- Books of the Bible – Division into Old Testament and New Testament – History of the Bible-
- Messianic Prophecies (Isaiah 9:6,40:3,53:1-12,61:1-3,Micah 5:2)
- The Birth and Ministry of John the Baptist (Luke 1:1-80,Mat 3:1-17,14:1-12)
- The Birth, Passion, Death and Resurrection of Jesus (Luke 1:26-80,2:1-52,John 1 :18-21)

**UNIT – II: MINISTRY OF JESUS**

- Miracles (Mark 2:1-12,Luke 4:38-41,6:6-11,7:1-17,8:26-56,John 2:1-12)
- Parables (Luke 6:46-49,8:4-15,10:25-37,15:1-32)
- Preaching
  - Sermon on the mount (Mat 5-7)
  - Lord's Prayer (Luke 11: 1-13)
  - Kingdom of God (Mat 13: 24-50)
- Prayer life of Jesus (Luke 5:12-16,John 11:41-45,17:1-26,Mark 14:32-42)
- Rich and Poor (Luke 16: 19-31,21:1-4)
- Women Liberation (John 4:1-30,8:1-4)
- Women in the New Testament
- Martha & Maria (Luke 10: 38- 42, John 11: 1-46)

**UNIT – III: CHURCH – BIRTH AND GROWTH**

- Early Church
- Birth (Acts 2:1-41)
- Unity and sharing (Acts 2:42-47,4:1-37,5:1-11)
- Witnessing life (Acts 3:1-26,5:12-42,8:26-40, 16:20-34)
- Comparison between early Church and present Church.

**UNIT – IV: DISCIPLES AND APOSTLES**

- Mother Mary (Mother of Jesus) (Luke 1: 27-35, John 2: 1-12, 19:35, Acts 1: 13-14)
- St. Peter (Luke 22:1-7,Acts 2:1-41,12:1-17)
- St. Andrew (Mat 4:18-20,John 1:35-42,6:1-14)
- St. Stephen (Acts 6,7)
- St. Paul (Acts 8,9,14,17,26 and 28)
- St. Thomas (John 20:24-31)

**UNIT – V: ST. PAUL'S LETTERS AND THE MESSAGE**

- I & II Corinthians
- Galatians
- Ephesians
- Philippians
- I & II Timothy
- Titus

**REFERENCES:**


1. Holy Bible
2. John Stott, 1994, **"Men with a Message"**, Angus Hudson Ltd. London.

**(For Candidates admitted from June 2015 onwards)**
**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI -2**
**B.A/B. Sc /B.Com/ B.C.A-DEGREE COURSES**
**LIFE ORIENTED EDUCATION**
**CATECHISM – I: GOD OF LIFE**

**HRS / Wk : 1** **CODE: U15VE2LVC01**
**CREDIT : 1** **MARKS : 100**

**OBJECTIVES:**

- To enable the students to know God and his Salvific acts through Holy Bible
- To enable the students to know about the Paschal Mystery

**UNIT – I: CREATION AND COVENANT**

Study from petty catechism - Genesis - God revealed himself in creation -God who preserves creation through covenants

(Pentateuch) -Our response to God's covenant -Reason for its success and failure -The relationship of God with Israel -Image of God in Old Testament-God and me

**UNIT – II: GOD OF THE PROPHETS**

God's care for the humanity through Prophets-Major (Isaiah, Jeremiah) Minor (Amos) and Women (Deborah) Prophets-Their life and mission - Theology of Prophets -Concept of sin and collective sins expressed by prophets and God's saving love.

**UNIT – III: GOD OF WISDOM**

God experience through wisdom Literature, its origin and growth

**UNIT – IV: SYNOPTIC GOSPELS**

Synoptic Gospels and John's Gospel – Author –historical background –Chief message of each Gospel and for whom it was written - A few passages for the study of parallelism in the Synoptic Gospels.

**UNIT – V: LUKE'S GOSPEL**

Study of Luke's Gospel in detail – speciality of the Gospel – main emphasis of the message – meaning and blessing of suffering and paschal joy in one's life - Passion – Paschal Mystery

**REFERENCES:**


1. Catechism of the Catholic Church published by Theological Publications in India for the Catholic Hierarchy of India, 1994
2. The Holy Bible Revised Standard Version with Old and New Testaments Catholic Edition for India.
3. Vaazhvin Vazhiyil – St. John's Gospel- Fr. Eronimus
4. God's Word nourishes A catholic approach to the Scriptures Dr. Silvano Renu Rita, O.C.V. STD and Dr. Mascarenhas Fio S.J. D.mim. Catholic Bible I
5. Documents of Vatican II – St. Paul's Publications, Bombay 1966.

**புனித சிலுவை தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி – 620 002.**

**தமிழாய்வுத்துறை**

**இளம் வணிகவியல் / இளங்கலை / இளம் அறிவியல் பட்ட வகுப்பு**

**இரண்டாம் ஆண்டு - மூன்றாம் பருவம் - நவம்பர் - 2017**

**தாள் - III**

**Total Hours : 90** **Code : U15TL3TAM03**

**Hrs : 6Hrs /Wk** **Marks : 100**

**Credit : 3**

**நோக்கங்கள்:**

1. வாழ்வியல் நெறிகளாகிய அறம், பொருள், இன்பம், வீடுபேறு ஆகியவற்றின் மேன்மையை எடுத்துரைத்தல்
2. சமூக வாழ்க்கைப் பற்றிய விழிப்புணர்வினைத் தோற்றுவித்தல்
3. ஆன்மீக உணர்வுகளை வலுப்படுத்துதல்

**பயன்கள்:**

1. காப்பியங்களைப் பயில்வதன் மூலமாக மாணவர்கள் அறக்கருத்துக்களை உணர்ந்து கொள்ளுதல்.
2. சமூக மாற்றங்களைக் கண்டறிந்து மேம்பாடுகளை உருவாக்கச் செய்தல்
3. கலைநுட்பங்களையும் பண்பாட்டுச் சிறப்புக்களையும் உணர்ந்து கொள்ளச் செய்தல்

**அலகு:1** செய்யுள்

1. சிலப்பதிகாரம் - கடலாடு காதை
2. மணிமேகலை – உலகவறவி புக்க காதை
3. கம்பராமாயணம் - கங்கைப் படலம்

**அலகு:2** செய்யுள்

4. இரட்சணிய யாத்திரிகம் - மரணப் படலம்
5. சீறாப்புராணம் - ஒட்டகை பேசிய படலம்

**அலகு:3**

தமிழ் இலக்கிய வரலாறு

சோழர் காலம்

**அலகு:4**

நாடகம்

சத்திய வேள்வி – அய்க்கண்

**அலகு:5**

கோயிற்கலை - திட்டக்கட்டுரை, வினாடி வினா

**பாட நூல்கள்**

1. செய்யுள் - தமிழ்த்துறை வெளியீடு
2. தமிழ் இலக்கிய வரலாறு - தமிழ்த்துறை வெளியீடு
3. நாடகம்
   அய்க்கண் - சத்திய வேள்வி
4. கோயிற்கலை - தமிழ்த்துறை வெளியீடு

(for the candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-620002**

**DEPARTMENT OF HINDI**

**PART – I LANGUAGE HINDI FOR B.A, B.Sc & B.Com**

**HINDI PAPER-III POETRY, PREDICS, HISTORY OF HINDI LITERATURE**

**SEMESTER – III**

**HRS/WEEK : 6** **CODE: U15HN3HIN03**

**CREDITS : 3** **MARKS : 100**

**UNIT – I** **:** Shubhagaman, Man, Tere ghar ked war bahuth hym
Memory poem : - Kabir das Ke Dohe - 6
Thulasidas Ke Dohe - 6 Rahim Ke Dohe - 6

**UNIT- II** **:** History of Hindi Literature :
Essay Type Questions : Veeragatha Kaal

**UNIT- III :** Bakthi Kaal

**UNIT- IV :** Poetics

a. Ras : Shringar, karun, Hasya, Veer
b. Alankar : Anupras, Yamak, Upama, Roopak
c. Chand : Choupayee, Baravai
d. **UNIT- V :** Kavi Parichaya : Ayodiya singh upadyaya Harioudh, Maithili Sharan Gupth, Siyaram Sharan Gupth, Kabir, Thulasi das

Books Prescribed :

- Naveen Padhya Rathnakar– D.B.H.P. Sabha Publishers, Chennai-17
- Pracheen Padhya Sangrah– D.B.H.P. Sabha Publishers, Chennai-17
- Hindi Sahitya Ka Sanshitpta Itihas – Rajnath Sharma, Agrwal Publication, Uttar Prakash
- Kavya Pradeep – Ram Bahori Shukla, Hindi Bhavan, Illahabad.

# HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2

## DEPARTMENT OF FRENCH

### SEMESTER III

### PART I - LANGUAGE - FRENCH PAPER III [LANGUAGE & CIVILISATION (ÉCHO A2 2e édition)]

(For candidates admitted 2015 onwards)

**HRS/WEEK : 6** **CODE : U16FR3FRE03**
**CREDIT : 3** **MARKS : 100**

**Unit 1 Vivement demain !**

Le futur, la comparaison des qualités, des quantités et des actions – la santé – le travail dans trente ans – la vie quotidienne - l'éducation et la formation (l'enseignement en France) – faire des projets.

**Unit 2 Tu as du boulot ?**

Le pronom « en » et « y » - exprimer une condition : si + présent, si + passé composé, exprimer des préférences – les emplois de demain - des idées pour créer une entreprise – l'économie en France - le travail en dix points

**Unit 3 Qu'en pensez-vous?**

L'emploi du subjonctif , l'expression de la quantité – revue de presse – entrée en politique – la naissance des départements – la région 'Poitou- Charentes' - la vie politique

**Unit 4 C'est tout un programme !**

Les propositions relatives, la formation des adverbes, la forme « en + participe présent » - parler de la télévision et de la radio - comment les Français s'informent (la télévision et la presse en France)

**Unit 5 On se retrouve**

L'emploi et la conjugaison de l'indicatif – parler de son apprentissage du français langue étrangère – les rencontres : modes et comportements – une vraie vie de quartier grâce à Internet – formules pour un premier contact par écrit.

**TEXT BOOKS :**

ECHO A2 – METHODE DE FRANÇAIS & CAHIER PERSONNEL D'APPRENTISSAGE
Authors: J. Girardet and J. Pécheur
Publication: CLÉ INTERNATIONAL, 2013.

(for candidates admitted from June 2016 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2**

**II YEAR UG – SEMESTER III**

**PART II – ENGLISH 3 - GENERAL ENGLISH III**

**HOURS : 6** **CODE : U15EL3GEN03**

**CREDIT : 3** **MARKS: 100**

## GROWING WITH VALUES

**Objectives:**

1. To acquaint students with fine pieces of literature thereby enhancing their communicative skills.
2. To develop both receptive (reading, listening) and productive (speaking, writing) skills through communicative classes
3. To create interest among students for self-learning
4. To create a general awareness among students regarding the importance of humanistic values in the modern world.
5. To acquire proficiency in oral and written language.

### UNIT I – Love, Faith and Hope

**Listening** for comprehension and general significance
**Speaking** about one's fear and hope
**Reading** for specific and global comprehension.
**Writing** – creative writing
**Grammar –** reporting speeches
**Vocabulary –** shades of meaning, Idioms and phrases (10)
**Composition –** Writing Paragraphs

**TEXTS**

"Hope" by Emily Dickinson **(Internal Testing)**
**1.** An extract from the Nobel Lecture by Mother Teresa
2. Angels Never Say "Hello!" by Dottie Walters
3. The Treasure by Alice Grey (Taken from Plant the seed by Timothy Kendrick)

### UNIT II – Perseverance

**Listening-** for distinguishing / convert / summarize/(interview)
**Speaking-** a role play on the theme of perseverance (enactment of fables/ folk tales based on the theme)
**Reading –** read the passage (from encyclopedia) and draw a flowchart / tree diagram [main idea]
**Writing-** parallel writing
**Grammar –** descriptive discourse – degrees of comparison (describing person, city, places, things, weather climate)
**Vocabulary –** antonyms, idioms and phrases (10)
**Composition –** Creative writing

**TEXTS**

Mother to Son by Langston Hughes**(Internal Testing)**
1.**The Perseverance of a Spider.**
**2.** Two Gentlemen of Verona by A.J Cronin
3. Faith of determination and perseverance (about Walt Disney)

### UNIT III – Tolerance/Benevolence/Compassion

**Listening-** for developing / relating (speech)
**Speaking-** simulate any personality related to humanity
**Reading –** scan the passage (life of …) and write down key phrases to sum up [figurative languages]

**Writing-** case study / letter writing (personal)
**Grammar –**writing reports of events and processes (voices)
**Vocabulary –** Suffixes, idioms and phrases
**Composition –** imaginative writing

**TEXTS:**
Portrait of Gandhiji by Will Durant (1st Para)**(Internal Testing)**

1. Gitanjali (Poem No. 11) Leave this chanting– Rabindranath Tagore
2. The Selfish Giant – Oscar Wilde
3. The Price of a Miracle in *Rainbows follow rain* by Dan Clark

## UNIT IV – Essential Life Skills/ Resilience

**Listening-** for deducing/ illustrating / subdivide to make notes (newspaper article)
**Speaking-** interviewing (gap activity) / picture description
**Reading –** in-depth reading to classify/ categorize [point of view]
**Writing-** Situational writing
**Grammar –** analysis of sentences – simple, compound, complex
**Vocabulary –** compound words, idioms and phrases
**Composition –** essay writing (proverb as title)

**TEXTS:**
The story of Rosa Parks**(Internal Testing)**

1. Life of Nelson Mandela
2. It's cool to be kechi by Juliet Hindell
3. 'Home they brought Her warrior dead' by Alfred Lord Tennyson

## UNIT V – The Art of Living

**Listening-** for comparing and contrasting (personality/lives of two people)
**Speaking-** reporting from the magazine / newspaper
**Reading -** read the passage to draw inference / parallel reading [making connections]
**Writing-** creative writing
**Grammar –'**If' clause
**Vocabulary –** coinage, idioms and phrases
**Composition –** creative writing/imaginative writing

**TEXTS:**
"A Psalm of Life" by H.W. Longfellow**(Internal Testing)**

1. The Power of Limitless living - by Robin Sharma.
2. The Art of Understanding Other People by Clarence Hall
3. "Leisure" by William Henry Davies

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**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2**
**B.Sc. ZOOLOGY (Specialization in Biotechnology)**
(For Students Admitted from 2015 onwards)
**SEMESTER III**
**MAJOR CORE: 4- CELL AND MOLECULAR BIOLOGY**

**Total Hours: 75**
**Hours/Week: 5** **Code: U15ZO3MCT04**
**Credits: 5** **Marks: 100**

**General Objective:**

The student will learn the ultra structure and functions of cells and cellular organelles and the molecular mechanisms involved in various cellular processes.

**Course Objectives:**
**The student will be able to**
1: remember and understand the structural and functional aspects of plasma membrane, mitochondria and lysosome
2: remember and understand the role of cell organelles in various cellular functions
3: understand, apply and analyze the organization of nuclear components and cell cycle events
4: understand, apply and analyze the structure, replication and transcription of DNA
5: understand, apply and analyze the structure and functions of RNA and synthesis of proteins

**UNITI** **(15hrs)**

**Plasma Membrane:** Ultra structure -Unit membrane and Fluid mosaic models; Modifications; Permeability Functions- Passive, Facilitated, Active, Exo- and Endocytosis; Introduction to signal transduction.

**Mitochondria:** Ultra structure – chemistry and functions.

**Lysosome**: Polymorphic forms, Cytochemistry – Functions.

**Extra Reading/Key words:** *Extra cellular matrix, Endosymbiont theory*

**UNITII** **(15hrs)**

**Ribosomes:** Structure – Composition and Assembly - Functions.

**Endoplasmic Reticulum**: Ultra structure - Types – Protein trafficking- Other functions.

**Golgi Complex**: Ultra structure - Role in cell secretion

**Centrosome** : Ultra structure and Functions.

**Extra Reading/Key words:** *Cytoskeleton, Microfilaments, Transport vesicles*

**UNITIII** **(15hrs)**

**Chromosomes**: Organization - Chemistry- Functions

**Giant Chromosomes –** Polytene and Lampbrush – Organization and functions

**Nucleus:** Ultra structural Organization – Functions

**Cell division**: **Mitosis -** Stages- Spindle mechanics- mitotic inhibitors, **Meiosis** – Stages – Significance

**Extra Reading/Key words:** *Checkpoints, Recombination*

**UNITIV** **(15hrs)**

**DNA Structure and Replication:** DNA – double helix – Watson and Crick model, DNA replication and semi-conservative method. Central dogma of molecular biology

**Transcription:** Eukaryotic transcription, RNA polymerase-types, transcription factors, reverse transcription, transcription regulators

**Post-transcriptional modification:** Processing of mRNA-capping, poly adenylation, splicing –introns andexons

**Extra Reading/Key words:** *Junk DNA, DNA sequencing*

**UNITV** **(15hrs)**

**Structure and functions** - mRNA, tRNA and rRNA

**Translation:** Genetic code and its characteristics, Protein synthesis– initiation, elongation, termination in eukaryotes

**Post-translational modifications:** Polypeptide to functional proteins (Glycosylation and, Phosphorylation)

**Extra Reading/Key words:** *Unnatural amino acids, unusual tRNA bases*

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

**Course Outcomes:**

1. Recall the structure and explain the functions of plasma membrane, mitochondria and lysosomes.
2. Describe and relate the structure and functions of ribosome and endoplasmicreticulum.
3. Recall the structure of Golgi apparatus and explain its importance in cellsecretion
4. Reproduce the ultra structure of centrosome and recognize its role in different applications
5. Recall and explain the detailed structure and functions ofnucleus
6. Describe the stages of cell division and distinguish between mitosis andmeiosis
7. Explain the structure of DNA, its replication, RNA structures and Recall the Central Dogma
8. Restate and interpret the processes and significance of transcription, translation and post – transcriptional and – translationalmodifications.

**Books for Reference:**


Agarwal**,** V.K., (2000). Molecular Biology, S. Chand and Company Ltd., New Delhi

Verma P.S. & Agarwal V.K. (1998). Cell Biology, S.Chand and Company Ltd, New Delhi.

Alberts B., Bray D., Lewis J., Raff M., Roberts K. & Watson J. (1994). Molecular Biology of the

Cell , 3rd Ed, Garland Publishing Inc, New York & London.

Darnell, J., Lodish,H., and Baltimore, D. (1986 ) .Molecular Cell Biology. Scientific American Book Inc., USA.

De Robertis E.D.P. & De Robertis E.M.F. (1995).Cell and Molecular Biology, 8th Edition, Saunders College, PA.

Freifelder, D (1990) .Molecular Biology, Narosa Publishing House, New Delhi

Sheeler P. & Bianchi D.E. (1987) .Cell and Molecular Biology, III Edition, John Wiley & Sons.

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPALLI-2**

**B.Sc. ZOOLOGY (With Specialization in Biotechnology)**

**(**For the candidates admitted from 2015 onwards)

**SEMESTER III**

**MAJOR CORE: 5 - GENETICS**

**Total Hours: 75**

**Hours/Week: 5** **CODE: U15ZO3MCT05**

**Credits:5** **Marks:100**

**General Objective**

The student will learn the basic concepts of Genetics, mechanism of sex determination and inheritance of genes, metabolic disorder and its management, types of mutation, bacterial and cancer genetics.

**Course Objectives:**

**The student will be able to**

1: understand and analyze the Mendelian traits, inheritance of multiple alleles, concept of linkage, crossing over and gene map.

2: understand the mechanism of sex determination, concept of sex-linked inheritance and role of sex limited and influenced genes.

3: understand the various genetic disorders in man and analyze the need of prenatal diagnosis for its management.

4: remember and understand the types of mutation, mutagens and its biological effects and apply the Hardy-Weinberg law for calculation of gene frequency.

5: understand the concept of bacterial recombination, control of gene expression and cancer genetics.

**UNITI** (**15hrs)**

Mendelian traits in human - Pedigree charts.

Multiple alleles: Blood group inheritance-ABO, Rh-applications.

Linkage: Morgan‘s experiment.

Crossing over: Kinds, theories & cytological basis.

Gene map: Determination of map distance and gene order.

Polygenic inheritance – Skin colour in man.

**Extra Reading/Key words:** *MN Blood groups*

**UNITII** **(15hrs)**

Sex determination in animals.

Sex determination in man - sex determining genes - Lyon hypothesis.

Non-disjunction – types – gynandromorphism - origin.

Sex linked inheritance: X linked genes in man - colour blindness and haemophilia-

Y linked genes.

Sex limited genes and sex influenced genes.

Cytoplasmic inheritance: Kappa particles in *Paramecium* and shell coiling in*Limnaea*.

**Extra Reading/Key words:** *Sex linkage in Drosophila and Mitochondriainheritance.*

**UNITIII** **(15hrs)**

Introduction to gene function-Metabolic disorders associated with phenylalanine metabolism. Thalassemia and Sickle cellanemia.

Genetic counselling: Prenatal diagnosis: Ultrasound scanning-amniocentesis-chorionic villus sampling - AFP test- management of genetic disorders.

**Extra Reading/Key words:** *Twins study and Genetic disorders – Diabetes Mellitus and hypertension.*

**UNITIV** **(15hrs)**

Mutation: Types, major molecular mechanisms; mutagens-radiation and chemical.

Mutation detection-ClB method.

Variation in chromosomes: Structural-deletion, duplication, inversion and translocation.

Numerical-aneuploidy-types, syndromes in man - Down, Turner and Klinefelter-polyploidy-types.

Population genetics: Hardy-Weinberg law and equilibrium and calculation of gene frequency for recessive alleles.

**Extra Reading/Key words:** *Edward and Cridu-chat syndromes*

**UNITV** **(15hrs)**

Recombination in bacteria: Transfer of genetic material-conjugation-F+,F- and Hfr strains, transformation, transduction and sexduction.

Operon model for transcriptional regulation in prokaryotes-lac operon in E.coli - promoter, operator, regulator, repressor, inducible and repressible operon.

Cancer genetics - oncogenes -activation of proto-oncogenes -anti oncogenes.

**Extra Reading/Key words:** *Gene regulation in Eukaryotes.*

**Note: Texts given in the Extra reading /Key wordsmust be tested only through Assignment and Seminars.**

**Course Outcomes:**

1. Examine the inheritance of mendelian traits inman.
2. Explain the concept of crossing over, linkage and genemap.
3. Illustrate the mechanism of sexdetermination.
4. Explain the inheritance of sex linked genes and the role of sex limited and influenced genes inman.
5. Analyze the need of prenatal diagnosis for management of geneticdisorders.
6. List the types of mutation and explain its biologicaleffects
7. Apply Hardy – Weinberg law to calculate the gene frequency for recessivealleles.
8. Explain the regulation of transcription in prokaryotes by citing lac operon in E.coli.
9. Compare oncogenes and antioncogenes.

**Text Book:**

Verma,P.S. and Agarwal, V.K. (1988) Genetics. S.Chand & Company Ltd, New Delhi.

**Books for Reference:**


Alice Marcus (2009) Genetics, MJP Publishers, Chennai.

Bhatnagar, Kothari & Mehta (1986) Essentials of human Genetics, Orient Longman Ltd.

Griffiths,A.J.F.(1993) An introduction to genetic analysis. Freeman company, NewYork.

Ricki, L (1994) Human genetics. WLB Publishers.

Robert H. Tamarin (2002). Principle of Genetics.McGraw Hill Publishers

Ursula Goodenough (1985) Genetics, Holt Reinhart and Winstan, NewYork.

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2**
**DEPARTMENT OF ZOOLOGY**
(for candidates admitted from 2017 onwards)
**SEMESTER III**
**SBE – 3 ANIMAL SCIENCE SKILLS FOR PHYSICS STUDENTS**
**(Theory cum Lab)**

**Total Hours: 30**
**Hours/Week:2** **Code: U17ZO3SBP03**
**Credits:2** **Marks:100**

**General Objective**:

To enable the students to learn the skills of performing experiments, analyzing the results and discussing the observations interlinking the information of biology to physics.

**Course Objectives:**

**The student will be able to**
1: understand, apply and evaluate the laws of Physics in the Biological Adaptations of selected examples in invertebrates andchordates.
2: remembers and understands the different types of cells involved in functioning of the biological systems
3: apply, analyze and evaluate the knowledge of Cell Biology through selected techniques.
4: evaluate the techniques relating to the Physiology of organs and organ systems, and how they work within the body to respond to challenges.
5: understand and apply the concepts of heredity and inheritance in Genetics

**Unit I: Biological adaptation in invertebrateand chordate (5hrs)**

Protozoa: Plasmodium vivax, Porifera – Gemmule, Coelenterata- obelia colony
Platyhelminthes: Taenia scolex, Larval types for dispersal of their population, Annelida : Leech (Triradiate bite), Arthropoda: Honey- bee and Hornet, Mollusca: Radula Echinodermata- Water vascular system
Pisces: Swimming adaptation , Amphibia-Parental care, Reptilia-Identification of poisonous and Non- Poisonous snakes in India, Aves : Flight adaptation, Mammals: Animal behaviour

**Extra Reading/Key words:** *Thermodynamics, Aerodynamics*

**Unit: IIBiologicalSystems (5hrs)**

Observation of different types of animal cells
Observation of different types of animal tissues
Differential count of Blood cells
Preparation of Buccal cells
Preparation of vaginal cells

**Extra Reading/Key words:** *Estrous cycle, Sex determination*

**Unit III:CellBiology (5hrs)**

Preparation of polytene chromosomes in salivary gland of Chironomous larva
Study of mitotic stage in onion root tip

Differentiation of Normal and abnormal cells
Observation of sperm suspension.
Study of abnormal sperm.
Isolation of DNA from Human buccal wash

**Extra Reading/Key words:** *Cell cycle, Forensic DNA typing*

**Unit IV: Physiology**

Measurement of their ownBloodPressure (**6hrs)**
Determination of Bleeding time & Clottingtime
Determination / Estimation of Heamoglobin in Blood.
Preparation of Haemin crystals from human blood.
Recording of Electrocardiogram & whole body Scan.
Determination of Human salivary amylase in optimum temperature.
Test for presence of sugar inurine/serum.

**Extra Reading/Key words:** *Stroke, Artificial blood cells, Homeostatic regulation*

**UnitV:Genetics (5hrs)**

Survey of Mendelians Traits
Pedigree analysis
Syndrome and their Karyotypes
Analyzing their Blood Groups
Operon model in *E.coli* using virtual class study

**Extra Reading/Key words:** *Chromosome banding and painting, Gene regulation*

**Course Outcomes:**

1. Describes the structural adaptation of the organism to continue their mode ofliving.
2. Relates and learns the skill of identifying the cells and its role.
3. Identifies the genetic role of thecell.
4. Learns the skill of finding the physiology ofcells.
5. Analyse the genetics and the inheritancepattern.

**Books for Reference:**

Ekambaranatha Iyer, M. & Ananthakrishnan, T.N. (1990) Outlines of Zoology (Viswanathan Publishers) Vol. I & II.

Verma P.S. & Agarwal V.K. (1998). Cell Biology, S.Chand and Company Ltd, New Delhi.

Mariakuttikan, A. and Arumugam, N. (2007). Animal Physiology, Saras Publication, Tamil Nadu.

Alice Marcus (2009) Genetics, MJP Publishers, Chennai.

Halliday Resnick W, 2001. Fundamentals of Physics, VI Edition, John Wiley and Sons Inc.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**DEPARTMENT OF ZOOLOGY**
**(For candidates admitted from 2015 onwards)**
**Second Year - Semester III**
**SBE 3 – BIOLOGICAL SKILLS FOR PHYSICAL SCIENCES - ADVANCED**
**(Theory cum Lab for Physics Students)**

**Total Hours: 30** **Code: U17ZO3SBT03**
**Hours/Week: 2**
**Marks: 100**

**General Objective:** The student understands the principles of biological system, molecular biology, and computational tools including computer aided drug design.

**Course Objectives:**

The student will be able to
1: Classify the different levels of protein structures and analyse the significance of protein and DNA isolation
2: Apply the knowledge of DNA structure in rDNA technology, vector construction and cloning
3: understand the principles of specific techniques in structure analysis
4: Understand and analyse the uses of bioinformatics tools for gene and protein studies 5: Extend the knowledge on structure prediction models, statistical models and algorithms

**UNIT I**

Molecular Biology: Biomolecules – Proteins: Primary, secondary, tertiary and quarternarystructure. DNA: Structure (Watson and Crick model)

**Lab exercise**: Estimation of protein, Isolation and separation of DNA.

**Unit II**

Recombinant-DNA technology – DNA as universal molecule- construction of r DNA- vector-cloning methods- examples for transgenic plants and animals.

**Unit III**

Structure elucidation of protein and Bioactive compounds: Crystal studies, IR, NMR, MASS, X- ray diffraction and X-Ray crystallography and 2-D Electrophoresis.

**UNIT IV**

Bioinformatics: Introduction to data bases and retrieval of information. Introduction to Genomics- sequence alignment, gene finding.
Introduction to Proteomics- protein prediction, and visualization using various tools. Applications of Bioinformatics

**UNIT V**

Molecular dynamic simulation of movement of atoms about rotatable bonds. Hidden Markov models -Neural Networks . Computational approaches involved in structure prediction : GOR, Chou-Fasman.

**Course Outcomes:**

**The Learner will be able to**

1. Identify DNA and proteins at different levels, and interpret proteinestimations
2. Outline the processes involved in rDNA, vector construction and cloning and appraise their significance in production of transgenic animals and plants
3. Apply the principles of techniques like IR, NMR, MASS, X-ray diffraction, X-Ray crystallography and 2-D Electrophoresis in structural studies ofmolecules
4. Identify and apply bioinformatics tools in gene sequencing & prediction and protein prediction &visualization
5. Explain the various statistical models, algorithnms and structure predictionmethods

Books forReference

Arthur M. Lesk. (2003) Introduction to Bioinformatics, Oxford University Press.

Attwood, T.K. and D.J. Parry-Smith, (2001). Introduction to Bioinformatics, Pearson Education (Singapore Pvt. Ltd., Delhi, India.)

De Robertis, E.D.P. and De Robertis, E.M.F.(1995) Cell and Molecular Biology. Saunders College,PA

Mani K. and Vijayaraj N.(2003) Bioinformatics for Beginners, Kalaikathir Achchagam, TamilNadu.

Murray, R. K., Granner, D. K., Mayes, P. A., Rodwell, V. W. (2000). Harper‘s Biochemistry, Prentice Hall International Inc.

Palanichamy, S. & Manoharan,M. (1991) Statistical methods for biologists. Palani, Paramount Publications, Palani, Tamil Nadu.

Power,C.B. Cell Biology.(1990). Himalaya Publishing House, Mumbai, India

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-2**
**DEPARTMENT OF ZOOLOGY**
(For the candidates admitted from 2015 onwards)
**SEMESTER III**
**ALLIED ZOOLOGY: 4 (Compulsory for Botany students)**
**BIOLOGY OF INVERTEBRATES AND CHORDATES**

**Total Hours: 60**
**Hours/Week: 4** **Code:U15ZO3ACT04**
**Credits:3** **Marks:100**

**General Objective**

The student will be able to analyze the levels of organization and general characters of various phyla of invertebrates and chordates with examples.

**Course Objective**

**The student will be able to**

1. Understand the different levels of organization and its distinguishing features with respect to the life history of specific examples relating toinvertebrates.
2. Apprehend the organ system of organization and its distinguishing features with respect to the life history of specific examples.
3. Scrutinize the salient feature and detailed study of Arthropoda, Mollusca and Echinodermata with one specificexample.
4. Deliberate the salient features and detailed study ofprochordates.
5. Discuss and exemplify the characeristic features of Aves andMammalia

## BIOLOGY OF INVERTEBRATES

**UNIT1** **(12hrs)**

General characters and levels of organization

1. Protozoa: Acellular organization- distinguishing features, detailed study of the structure and life history ofPlasmodium

2. Coelenterata: Tissue grade of organization-Organization and life history of*Aurelia*.

**Extra Reading/Key words:** *Diseases of Plasmodium*

**UNITII** **(12 hrs)**

Organ system level of organization.

Detailed study of the structure and life history of representative types of the following phyla.

1.Platyhelminthes: *Fasciola hepatica*

2 Annelida-Hirudinaria.

**Extra Reading/Key words:** *Medicinal value of leech*

**UNITIII** **(12hrs)**

Detailed study of salient features and all the systems of the following type

1.Arthropoda-*Penaeus*

*2.* Mollusca-*Pila*

*3.* Echinodermata-*Asterias*

**Extra Reading/Key words:** *Amphibian mode of respiration in Pila*

## BIOLOGY OF CHORDATES

**UNITIV** **(12hrs)**

Salient features of prochordates

Vertebrata : General features and type study of the following (excluding skeletal system)

Reptilia – Calotes

**Extra Reading/Key words:** *Extinct reptiles*

**UNITV** **(12hrs)**

General features and type study of thefollowing

1.Aves– Pigeon 2.Mammalia –Rabbit

**Extra Reading/Key words:** *Homing instinct*

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

**Course Outcomes**

1. Classify the different levels of organization with respect to its distinguishing characters and specificexamples.
2. Interpret the organ system of organization and its distinguishing features with specific examples.
3. Discuss the salient features of Arthropoda, Mollusca and Echinodermata with one specific example.
4. Describe the salient features of prochordates withexamples.
5. Ilustrate the characeristic features of Aves and Mammals with specificexamples.

**Text Book:**

Ekambaranatha Iyer, M. & Ananthakrishnan, T.N.(2003). Outlines of Zoology, Volume I & II, Vishwanathan Printers and Publishers Private Limited, Chennai.

**Books for Reference:**

Jordan,E.L. and Verma, P.S. (2001). Invertebrate Zoology, 25 th edition. S. Chand& Company.

Jordan,E.L. and Verma, P.S. (2013). Chordate Zoology. S. Chand & Company.

Kotpal, R.L.(2014). Modern Text Book of Zoology- Invertebrates, 11 th edition, Rastogi company, Meerut (U.P.),India.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**B.A./B.Sc./ B.Com./ B.C.A./B.B.A DEGREE COURSE**
**YEAR: SEMESTER - III (Students who are admitted from 2015 onwards)**

# GENDER STUDIES

**Hours: 1Hr/wk** **CODE: U15WS3GST01**
**CREDITS: 1**

**Objectives**

To make boys and girls aware of each other's strength and weakness

To develop sensitivity towards both genders in order to lead an ethically enriched life

To promote attitudinal change towards a gender balanced ambience and women empowerment

**Unit I**

**Concepts of Gender** : Sex-Gender-Biological Determination-Patriarchy-Feminism-Gender Discrimination-Gender Division of Labour -Gender stereotyping – Gender Sensitivity-Gender Equity – Equality – Gender Mainstreaming – Empowerment.

**Unit II Women's Studies Vs Gender Studies**: UGC's Guidelines – VII to XI Plans – Gender Studies :Beijing Conference and CEDAW-Exclusiveness and Inclusiveness.

**Unit –III Areas of Gender Discrimination** : Family – Sex Ratio – Literacy – Health – Governance – Religion Work Vs Employment – Market – Media – Politics – Law – Domestic Violence – Sexual Harassment – State Politics and Planning.

**Unit – IV Women Development and Gender Empowerment** : Initiatives – International Women's Decade – International Women's Year – National Policy for Empowerment of Women – Women Empowerment Year 2001 – Mainstreaming Global Policies.

**Unit – V**

**Women's Movements and Safeguarding Mechanism**: In India National / State Commission for Women (NCW) – All Women Police Station – Family Court – Domestic Violence Act – Prevention of Sexual Harassment at Work Place Supreme Court Guidelines – Maternity Benefit Act – PNDT Act – Hindu Succession Act 2005 – Eve Teasing Prevention Act – Self Help Groups – $73_{rd}$ Amendment for PRIs.

**BOOK FOR STUDY**

Manimekalai. N & Suba. S (2011), Gender Studies, Publication Division, Bharathidasan University, Tiruchirappalli

**புனித சிலுவை தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி – 620 002.**
**தமிழாய்வுத்துறை**
**இளம் வணிகவியல் / இளங்கலை / இளம் அறிவியல் பட்ட வகுப்பு**
**இரண்டாம் ஆண்டு – நான்காம் பருவம் - 2017 – 2018**
**தாள் - IV**

**Total Hours : 75** **Code : U15TL4TAM04**
**Hrs : 5Hrs /Wk** **Marks : 100**
**Credit : 3**

**நோக்கங்கள்:**

1. மாணவர்களுக்குத் தமிழர்தம் வாழ்வியல் விழுமியங்களை உணர்த்துதல்.
2. அறநெறிகள் வாழ்க்கைக்கு வழிகாட்டும் விதத்தினை எடுத்துரைத்தல்
3. சிகரம் தொட்ட சாதனையாளரின் வாழ்வியலைப் புலப்படுத்துதல்
4. மொழித்திறன் வளர்த்தல்.

**பயன்கள்:**

1. வாழ்க்கையின் பல்வகை நிலைகளையும் உணர்ந்து செயல்படச் செய்தல்
2. தன்னைத் தானே நெறிப்படுத்திக்கொள்ள, பயன்பாடடைய இலக்கியம் வழிகாட்டுவதை புரிந்துகொள்ளச் செய்தல்.
3. இடைவிடாத முயற்சியின் வெற்றிப்படிகளைக் கண்டுணர்ந்து மேன்மை அடையச் செய்தல்.
5. இருமொழிப் புலமையை வளர்த்தல்.

**அலகு:1** செய்யுள்

**1. குறுந்தொகை**

1. கொங்கு தேர் வாழ்க்கை அஞ்சிறைத் தும்பி - இறையனார்
2. யாரும் இல்லை தானே கள்வன் - கபிலர்
3. வேம்பின் பைங்காய்என் தோழி தரினே – மிளைக் கந்தன்
4. உள்ளது சிதைப்போர் உளரெனப் படாஅர் - பாலை பாடிய பெருங்கடுங்கோ
5. நோற்றோர் மன்ற தோழி – குறுங்குடி மருதன்

**2. நற்றிணை**

1. மனையுறை புறவின் செங்கால் பேடை
2. நீள்மலைக் கலித்த பெருங்கோற் குறிஞ்சி - பாண்டியன் மாறன் வழுதி
3. ஆய்மலர் மழைக்கண் தெண்பனி உறைப்பவும் - நல்விளக்கனார்
4. சிறுவீ முல்லைப் பெரிது கமழ் அலரி - மதுரை பேராலவாயர்

**3. கலித்தொகை**

1. எறித்தரு கதிர்தாங்கி ஏந்திய குடைநீழல் - கபிலர்
2. பாடுகம் வா வாழி தோழி - கபிலர்

**அலகு:2** செய்யுள்

**4.புறநானூறு**

1. நின் நயந்து உறைநர்க்கும் - பெருஞ்சித்திரனார்
2. காய்நெல் அறுத்துக் கவளம் கொளினே - பிசிராந்தையார்
3. படைப்புப் பலபடைத்து - பாண்டியன் அறிவுடைநம்பி
4. கேட்டல் மாத்திரை – கோப்பெருஞ்சோழன்
5. ஈன்று புறந்தருதல் என்தலைக் கடனே - பொன்முடியார்

**5. பதிற்றுப்பத்து - ஐந்தாம் பத்து**

1. சுடர் வீ வேங்கை
2. தசும்பு துளங்கு இருக்கை
3. ஊன்துவை அடிசில்

**6. திருக்குறள்**

1. அறத்துப்பால் - இனியவை கூறல்
2. பொருட்பால் - வினை செயல்வகை
3. காமத்துப்பால் - புலவி நுணுக்கம்

**அலகு:3**

தமிழ் இலக்கிய வரலாறு (துறை வெளியீடு)

சங்ககாலம் - சங்கம் மருவியகாலம்

எட்டுத்தொகை, பத்துப்பாட்டு, பதினெண்கீழ்க்கணக்கு நூல்கள்

**அலகு:4**

**வாழ்க்கை வரலாறு**

அன்னை தெரசா - பா. தீனதயாளன்

**அலகு:5**

பொது – மொழிபெயர்ப்பு

**பாட நூல்கள்**

1. செய்யுள் நூல் - தமிழாய்வுத்துறை வெளியீடு
2. தமிழ் இலக்கிய வரலாறு - தமிழாய்வுத்துறை வெளியீடு
3. **வாழ்க்கை வரலாறு**

   பா.தீனதயாளன் - அன்னை தெரசா
4. மொழிபெயர்ப்பு - தமிழாய்வுத்துறை வெளியீடு

(for the candidates admitted from June 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI-620002**

**DEPARTMENT OF HINDI**

**PART – I LANGUAGE HINDI FOR B.A, B.Sc & B.Com**

**HINDI PAPER-IV FUNCTIONAL HINDI & TRANSLATION**

**SEMESTER – IV**

**HRS/WEEK : 5** **CODE: U15HN4HIN04**

**CREDITS : 3** **MARKS : 100**

**UNIT – I** Functional Hindi

**UNIT- II** Adhunic Kaal

**UNIT- III** General Essays

Parishram Ka Mahatva, Anushasan, Paropakar, Jawaharlal Nehru, Deepavalli, Bharath Mein Computer

**UNIT- IV** Letter Writing

**UNIT- V** Anuvad Abhyas - III

Books Prescribed :

- General Essays - D.B.H.P. Sabha Publishers, Chennai-17
- Abinava Patra Lekhan - D.B.H.P. Sabha Publishers, Chennai-17
- Anuvad Abhyas – III - D.B.H.P. Sabha Publishers, Chennai-17

# HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2

## DEPARTMENT OF FRENCH

**SEMESTER IV**

**PART I - LANGUAGE - FRENCH PAPER IV [**LANGUAGE & CULTURE (ÉCHO A2 2e édition)]

(For candidates admitted 2015 onwards)

**HRS/WEEK : 5** **CODE : U16FR4FRE04**
**CREDIT : 3** **MARKS : 100**

**Unit 1 C'est la fête !**

Les pronoms objets directs et indirects – parler d'une fête – exprimer des goûts et des préférences – fêtes sans frontières – plats des fêtes – les jours fériés – les saisons

**Unit 2 Vous plaisantez !**

Le conditionnel présent, la distinction du futur et du conditionnel – le mouvement en général – raconter une anecdote – journée de détente – la naissance d'un chef d'œuvre - l'art au début du 20e siècle – le plaisir de jeux de mots.

**Unit 3 On s'entend bien !**

Les constructions « faire + verbe » et « laisser + verbe », le discours rapporté – décrire le caractère ou le comportement, exprimer l'accord et le désaccord – le langage des couleurs – sujets de conversation – sujets d'étonnement.

**Unit 4À vos risqué et périls !**

Le subjonctif présent, la voix passive – l'aventure d'aujourd'hui – travailler pour la planète – réussites et échecs - marathon de Paris – plaisir des sports – les sports les plus regardés et pratiqués - les français et les sports.

**Unit 5La vie est dure**

Les pronoms possessifs, les adjectifs, les pronoms indéfinis – parler de ses activités quotidiennes, exprimer la confiance ou la méfiance – les taches ménagères – la France insatisfaite - sans travail.

**TEXT BOOKS :**

ECHO A2 – METHODE DE FRANÇAIS & CAHIER PERSONNEL D'APPRENTISSAGE
Authors: J. Girardet and J. Pécheur
Publication: CLÉ INTERNATIONAL, 2013.

(for candidates admitted from June 2016 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2.**

**II YEAR UG – SEMESTER IV**

**PART II – ENGLISH 4 - GENERAL ENGLISH IV**

**HOURS : 6** **CODE : U15EL4GEN04**

**CREDIT : 3** **MARKS: 100**

## EMPLOYABILITY SKILLS

**OBJECTIVES:**

1. To develop both receptive (reading, listening) and productive (speaking, writing) skills through communicative classes.
2. To acquire proficiency in oral and written language.
3. To train the students for employability skills such as team skills, communication skills and presentation skills.
4. To acquire values related to personal integrity and excellence in work propagated in the literary works.
5. To create interest among students for self-learning.

### UNIT I – Personal integrity –Honesty, dependability, adaptability and loyalty.

**Listening** to identify a person's attitude, values, situation and the decision made.
**Speaking** about one's action, expressing opinions, character analysis.
**Reading** for comprehension(inferring a character's method of managing a situation, adaptability and the like).
**Writing**recommendations.
**Grammar –** use of appropriateadjectives and adverbs in contexts and reporting speeches
**Vocabulary –** differentiating shades of meaning, use of idioms and phrases in sentences
**Composition –** Your thoughts are the architects of your destiny – David O' Mckay
Honesty is the first chapter in the book of wisdom – Thomas Jefferson

**TEXTS**

1. *"How far is the river"* by Ruskin Bond
2. *The Pie and the Tart* by Hugh Chesterman.
3. An excerpt from Shakespeare's *"Julius Caesar"* Act III Scene II Lines 13 - 33– Antony's speech

### UNIT II – Key to success – Self-esteem, perfection and excellence

**Listening** to differentiate dutyfrom obligation.
**Speaking –** Discussing one's knowledge about different subjects, learning skills, thirst for knowledge, learning form experiences.
**Reading** for comprehension exhibiting higher perception of life's experiences.
**Writing**paragraphs with cause and reason, analyzing motives behind people's actions and behavior.
**Grammar –** use of cohesive devices
**Vocabulary –** figures of speech– simile, metaphor.
**Composition –**
1. Excellence is not a destination, it is a continuous journey that never ends – Brian Tracy
2. To be perfect is to change often – Winston Churchill

**TEXTS**

1. Our urgent need for self-esteem by Nathaniel Brandon.
2. Five senses by Judith Wright
3. Three questions by Leo Tolstoy

### UNIT III – Team skills

**Listening** to speaker's ideas, opinions, and suggestions and analyzing their character.
**Speaking –**Discussing, questioning, interacting, respecting, sharing and participating.
**Reading** for comprehension – absorbing the attitude of the people.
**Writing** – personal essays and report writing

**Grammar –** use of inverted structures
**Vocabulary –**New words in current usage.
**Composition –1.** "Talent wins games, but teamwork and intelligence wins championships."
**2.** "It takes two flints to make a fire."

**TEXTS**
1. "The Little Black Boy" by William Blake
2.How to get cooperation by Dale Carnegie.

**UNIT IV – Communication skills for interpersonal relationship**
**Listening** to specific information and guessing.
**Speaking** –Facing interview and situational speeches (Master of ceremony, felicitation and the like).
**Reading** for comprehension to identify the methods of persuasion.
**Writing**formal letters and invitations.
**Grammar –** Transformation of sentences.
**Vocabulary –** Words related to technical registers.
**Composition –1.** "Communication is an art form that is crafted throughout our lives."
**2.**Birds of same feather flock together.

**TEXTS**
1.The Refund by Fritz Karinthy

**UNIT V –Presentation skills**
**Listening** to commands,information, announcements, and discussions in a meeting.
**Speaking –**role play in panel discussion, mock parliament and public speaking.
**Reading** for comprehension.
**Writing**agenda, minutes, memo, notice, circular, project proposal.
**Grammar –** use of simple, compound, complex, imperative sentences and punctuations.
**Vocabulary –** Business terms.
**Composition –** writing a project.

**TEXTS**
1.An excerpt from Abraham Lincoln's speech in Gettysburg.

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**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**

**II B. Sc. ZOOLOGY (With Specialization in Biotechnology)**

(For the candidates admitted from 2015 onwards)

**SEMESTER IV**

**MAJOR CORE 6 – PRACTICAL – II**

**(CELL BIOLOGY, GENETICS AND BIOCHEMISTRY)**

**Total Hours: 75**

**Hours/Week: 5** **Code:U15ZO4MCP06**

**Credits:5** **Marks:100**

**General Objective:**

Student learns the skills pertaining to cell biology, genetics and biochemistry through experimental analysis.

**Course Objectives**:

**The student will be able to**

1: understand and analyze the variations in cell types and significance of polytene chromosomes

2: understand, apply and critically analyze the scientific evidences on cellular processes

3: apply, analyze and evaluate the basic techniques in genetics by means of problem solving and experimental analysis

4: understand and analyze the life cycle and mutations in *Drosophila* and operon model in *E.coli*

5: analyze and experiment the biochemical components of biological samples qualitatively and quantitatively

**Cell Biology**

Different types of cells.

Preparation of polytene chromosomes in salivary gland of Chironomous larva/ Drosophila larva

Study of mitotic stage in onion root tip

Study of meiosis in Grasshopper testis

**Genetics**

Blood group inheritance – A, B, O and Rh

Pedigree analysis

Syndromes and their karyotypes

Preparation of buccal cells

Hardy – Weinberg law Calculation of ABO, MN blood grouping and PTC tasters.

Observation of Drosophila life cycle using culture.

Drosophila mutants.

Operon model in E.coli using virtual class study.

**Biochemistry**

Quantitative estimation of proteins in a biological sample

Quantitative estimation of carbohydrates in a biological sample

Quantitative estimation of cholesterol in a biological sample

Quantitative estimation of urea and creatinine in a biological sample

Analysis of human urine for sugar and albumin

Analysis of sodium, potassium and calcium (minerals) using Flame photometer.

**A record of the work done is to be submitted at the time of examination.**

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**

**B.Sc. ZOOLOGY (With Specialization inBiotechnology)**

(For the candidates admitted from2015onwards)

**SEMESTER IV**

**MAJOR ELECTIVE: 1 – BIOCHEMISTRY AND BIOSTATISTICS**

**Total Hours : 75 hours**

**Hours /Week:5** **Code:U15ZO4MET01**

**Credits:5** Marks:100

## BIOCHEMISTRY

**General Objective:**

The student will learn the structure, classification and metabolism of specified biomolecules like carbohydrates, proteins, lipids, nucleotides and the classification of enzymes and their mechanisms of action.

## BIOSTATISTICS

**General Objective:**

The Student will learn the steps in the collection, classification, tabulation and presentation of data and the tools to describe the data and the applications of statistical tests.

**Course Objectives:**

**The student will be able to**

1: Understand the structure and classification of carbohydrate, proteins and lipids.

2: Understand the metabolism of carbohydrate, proteins and lipids.

3: Understand the biologically important nucleotides, classification of enzymes and their mechanism of enzyme action

4: Understand and analyze the process of collection, classification, tabulation and presentation of data and apply various tools to describe the data.

5: Explain and apply statistical tests, Correlation, regression, Student t test and Chi-square ($X^2$) test to infer on the given data.

**UNIT I: Structureandclassification (15 hrs)**

Carbohydrates – Structure and classification – monosaccharides, disaccharides, oligosaccharides andpolysaccharides.

Amino acids- Structure, classification and properties.

Proteins – Structure (primary, secondary, tertiary & quartenary) and classification.

Lipids- Structure and classification.

**Extra Reading/Key words:** *Distribution of biomolecules, Macronutrient requirements in regular and modified diet.*

**UNITII:Metabolism (15hrs)**

Carbohydrate – Glycolysis, Citric acid cycle, Glycogenesis, Glycogenolysis, Gluconeogenesis and HMPShunt.

Lipid- Biosynthesis of long chain fatty acids, Oxidation of fatty acids – β oxidation – Significance of omega fatty acids.

Aminoacid- Transamination, deamination, decarboxylation, oxidative deamination and Urea cycle.

**Extra Reading/Key words:** *Case study of disorder of Carbohydrates, aminoacid and Lipids metabolism.*

**UNIT III: NucleotideandEnzymes (15hrs)**

Nitrogenous bases, nucleosides, nucleotides – Biologically important nucleotides.

Enzymes – Nomenclature, classification, Mechanism of enzyme action – Fischer's lock and key model and Koshland's induced fit model, Michaelis – Menten hypothesis, Factors affecting enzyme action, Coenzymes.

**Extra Reading/Key words:** *Application of enzymes. Enzyme inhibitors, Coenzymes.*

**UNIT IV:DescriptiveStatistics (15hrs)**

Definition and scope – Variables in biology – Data collection – Classification – Tabulation, Diagrammatic representation – Bar, Pie and Histogram.

Measures of central tendency – Mean (Arithmetic), Median, Mode

Measures of dispersion – Standard deviation, Standard error, Co-efficient of variance.

**Extra Reading/Key words:** *Data analysis using basic statistical tools and inference*

**UNIT V:InferentialStatistics (15hrs)**

Test of significance – hypothesis testing – Type 1 error – Type II error, Level of significance.

Student t test – comparison of mean of two samples.

Chi-square ($X^2$) test – Test for goodness of fit.

Correlation – Graphic and Mathematical method (Karl Pearson's correlation coefficient)

Regression – simple linear regression.

**Extra Reading/Key words:** *statistical analysis using tests of significance and derive inference*

**Note: Texts given in the Extra Reading / Key words must be tested only through Assignment and Seminars.**

**Course Outcomes:**

1. Explain the structure and classification of carbohydrate, proteins andlipids.
2. Explain the reactions of Glycolysis, TCA cycle, Glycogen metabolism, Gluconeogenesis and HMPShunt.
3. Explain the general reactions in aminoacid metabolism, Urea cycle, Fatty acid synthesis and βoxidation
4. Outline the biologically important nucleotides, explains classification of enzymes and their mechanism of enzymeaction
5. Explain the process of collection, classification, tabulation and presentation ofdata.
6. Describe and calculate mean, median, mode, standard deviation and Co-efficient of variance.
7. Explain and calculate Karl Pearson's correlation coefficient and simple linear regression.
8. Explain the test of significance and calculates Student t test and Chi-square ($X^2$) test to infer on the givendata.

**BIOCHEMISTRY**

**Text Book:**

Satyanarayanan, U (2004). *Essentials of Biochemistry*, Uppala Author – Publisher Interlinks, Vijayawada.

Jain, J.L., Sunjay Jain and Nitin Jain (2007). *Fundamentals of Biochemistry*, S. Chand & Company Ltd., New Delhi.

**Books for Reference:**

Jain, J.L., Sunjay Jain and Nitin Jain (2007). *Fundamentals of Biochemistry*, S. Chand & Company Ltd., New Delhi.

Murray, R.K., Granner, D. K., Mayes, P.A., Rodwell, V.W (2000). *Harper's Biochemistry*, Prentice Hall International Inc.,

Stryer, L (1988). *Biochemistry*. W.H. Freeman and Company, New York.

**BIOSTATISTICS**

**Text Book:**

Palanichamy, S. & Manoharan,M. (1991). *Statistical methods for biologists.* Palani, Paramount Publications, Palani, Tamil Nadu.

**Books for Reference:**

Bailey, N.T.J. (1959). *Statistical Method in Biology.* The English Language book society and English University Press Ltd.

Snedecor, G.W. and William, G. (1975). *Statistical Methods.* Harvard University, Oxford & IBH Publication Co., Calcutta. Bombay, New Delhi.

Sokal, R. and James, F.R. (1973). *Introduction to Bio-statistics,* W.H. Freeman & Company, Toppan company, Ltd., Tokyo, Japan.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**B.Sc. ZOOLOGY (With Specialization in Biotechnology)**
(For candidates admitted from 2015 onwards)
**SEMESTER IV**
**MAJOR ELECTIVE: 1 - AQUACULTURE**

**Total Hours: 75**
**Hours/Week: 5** **Code:U15ZO4MET02**
**Credits:5** **Marks:100**

**General Objective:**

The student will learn about the methods of culturing economically viable species of fish. Prawn farming, oyster and clam farming are also introduced along with fish farming. Common fish diseases and methods of their control are also learnt.

**Course Objectives:**
**The student will be able to**
1: analyse and evaluate the freshwater and brackish water resources for aquaculture
2: understand, analyse and construct fish ponds
3: analyse and apply the knowledge of aquaculture in composite fish farming
4: understand and apply the concept of integrated farming
5: analyse fish diseases and induced breeding techniques

**UnitI:** **(15 hrs)**
Need and scope of aquaculture, Fresh water, brackish water and near shore resources of India for aquaculture: Qualities of fresh water and brackish water aquaculture - Environmental problems caused by aquaculture.
**Extra Reading/Key words:** *Agriculture in backwaters*

**UnitII:** **(15 hrs)**
Different aquaculture practices – Selection of sites for aquaculture practices – Engineering aspects of fish pond construction. Preparation of fish ponds – Fertilization – Formulation and preparation of fish feeds – culture of live food organisms.
**Extra Reading/Key words:** *Visit to fish culture units in Thittai*

**UnitIII:** **(15hrs)**
Culturable species of fin fish and shell fish and their characteristics. Composite fish culture – Murrel and Tilapia. Prawn and Tilapia farming – oyster and clam farming. Shrimp culture.
**Extra Reading/Key words:** *Maintain a composite fish pond in the garden*

**UnitIV:** **(15 hrs)**
Culture of cat fish, Integrated farming of fish with agriculture crops (i.e) paddy cum fish culture and live stock – (Chick, duck, and pig) – Sewage fed fish culture.
**Extra Reading/Key words:** *Visit to a farm house*

**UnitV:** **(15hrs)**
Common fish diseases and methods of control. Induced breeding and fish seed production. Prawn seed production through eye stalk ablation. Economic returns – starting investments. Bank Facility, Marketing, byproducts.
**Extra Reading/Key words:** *Fish feed formulations*

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

**Course outcomes:**

1. Evaluate the freshwater and brackish water resources foraquaculture.
2. Identify the environmental caused byaquaculture
3. Describe different aquaculturepractices
4. Apply the knowledge of aquaculture in composite fishfarming
5. Apply the concept of integratedfarming
6. Discuss the sewage fed fishculture
7. Identify fish diseases and explain induced breedingtechniques
8. Discuss the economic returns ofaquaculture.

**Text Book:**

Santhanam,R. Sukumaran,N. and Natarajan, P. (1990) A manual of fresh water aquaculture. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.

**Books for Reference:**

Bardach, J.E.et al., (1972) Aquaculture John Wiley and sons. New York.

Jhingaran,V.G. (1983) –Fish and fisheries of India‖. Hindustan Publishing Corporation, NewDelhi.

Shukla,G.S. and Upadhyay, V.B. (1997): Economic Zoology, Rakesh Rastogi, Meerut.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2**

**(For the candidates admitted from 2015 onwards)**

**SEMESTER IV**

**ALLIED ZOOLOGY 5 – ZOOLOGY AND HUMAN WELFARE**

**(Compulsory for Botany students)**

**Total Hours: 60**

**Hours/Week:4** **Code:U15ZO4ACT05**

**Credits:4** **Marks:100**

**General Objective**

The student will be able to signify the culture of commercially important animals and analyze the important agricultural pests along with their control. They will analyze the bacterial, viral, protozoan and helminth diseases with causative organism, symptoms and treatment.

**Course Objectives:**

**The student will be able to**

1. exemplify the culture methods of different commercially importantanimals.
2. differeniate the bacterial, viral, protozoan and helminth diseases of man along with causative organism, symptoms andtreatment.
3. analyze the various cells and organs of immune system; discuss the vaccination schedule ofchildren.
4. discuss the important agricultural pests and methods of theircontrol.
5. understand, analyse and exemplify the principle ofgenetics.
6. use combinational ideas to detect errors in pregnancy and justify the need forgenetic counseling.

**UNITI** **(12hrs)**

**Culture methods of commercially important animals**

Apiculture, Prawn culture and Fish culture.

**Extra Reading/Key words:** *Sericulture*

**UNITII** **(12hrs)**

Causes - modes of transmission, symptoms and preventive measures of the following.

**Viral diseases -** Polio, rabies, mumps, influenza, measles, Japanese encephalitis, hepatitis group of virus - water borne (A and E), Blood borne- (B, C and D), AIDS.

**Bacterial diseases** –Dysentery, cholera, tuberculosis, tetanus, diphtheria, typhoid, STD – gonorrhea and syphilis and Leptospirosis

**Extra Reading/Key words:** *H17N10 and Ebola*

**UNITIII** **(12hrs)**

**Protozoan diseases** – Amoebiasis and malaria.

**Helminthiasis -** Taeniasis, ascariasis, ancylostomiasis and elephantiasis

**Immune system** – Organs, cells, antigens, antibodies, immune response; Vaccination schedule for children in India.

**Extra Reading/Key words:** *Types of immunity*

**UNITIV** **(12hrs)**

**Insects of agricultural importance:**

Any two pests of paddy (*Leptocorisa varicornis*&*Spodoptera mauritia*), sugarcane (*Tryporiza novella* &*Pyrilla perpusilla*), coconut (*Oryctes rhinoceros*&*Rhynchophorous ferrugineus*), vegetables (*Epilachna vigintioctopunctata*&*Leucinodes orbonalis*) and stored products (*Tribolium casteneum*&*Sitophilus oryzae*)– their life cycle andcontrol.

**Extra Reading/Key words:** *Biological control of pest*

**UNITV** **(12hrs)**

**GENETICS**

Blood group inheritance A, B, AB, O & Rh.

Sex-determination and sex linked inheritance in man - haemophilia and colour blindness.

Inborn errors of metabolism – phenylketonuria,

Chromosomal abnormalities –Syndromes in man- Down's, Klinefelter, Turner's & Cri-du-chat.

Genetic counseling – amniocentesis.

**Extra Reading/Key words:** *Prenatal Diagnosis*

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

**Course Outcomes**

1. Choose the appropriate culture method for different commercially importantanimals
2. Identify the causative organism, symptoms and treatment of bacterial, viral, protozoan and helminth diseases ofman
3. Describe the cells and organs of immune system and evaluate the vaccination schedule of children.
4. Discuss the important agricultural pests and methods of theircontrol.
5. Predict errors in pregnancy and justify the need for geneticcounseling.

**Books for Reference:**


Chandler, A.(2007). Introduction to Parasitology. John Wiley & SonsPublications, 10th Edition

Ekambaranatha Ayyar. M. and Ananthakrishnan. T. N. (1988) Outlines of Zoology (for B.Sc. Ancillary) Vishwanathan Printers and Publishers Private Limited, Chennai.

Gardener, A. and Davies, T. (2010). Human Genetics (2nd edition). Viva Books Private limited.

Jawaid, A. and Subhas ,P. S. (2000). A hand book on Economic Zoology, 5th edition.. S.Chand
Publications.

Jhingaran,V.G.(2009). Fish and Fisheries of India. Second Edition, Hindustan Publishing Corporation (India).

John.B.Walter (2015). An Introduction to the Principles of Disease, second edition, Elsevier Health Sciences publisher,

Kuby,J. (2006) Immunology. (Sixth edition) W.H.Freeman and company, New York.

Manju Yada, 2010. Economic Zoology, Discovery Publishing House, New Delhi

Paul.A.Ketchuns (1984) Microbiology. John Wiley and Sons, New York.

Rajesh,,K. and Ajit, D.( 2012). Medical Parasitology, third ediion, Books & Allied (P) Ltd. Kolkata
Ramakrishnan Ayyar (1992) Handbook of Economic Entomology For South India. Narendra Publishing House
Shukla & .Upadhyaya, S. (2014). Economic Zoology, Rastogi Publications.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI – 2**

(For the candidates admitted from 2015 onwards)

**SEMESTER IV**

**ALLIED ZOOLOGY 6 - PRACTICAL**

**(Compulsory for Botany students)**

**Total Hours: 60**
**Hours/Week: 4** **Code:U15ZO4ACP06**
**Credits:3** **Marks:100**

**General Objective:**

Student learns the skills of performing experiments and virtual dissections, analyzing the results and discussing the economic importance and observations pertaining to various animal specimens and products studied.

**Course Objectives:**

**The student will be able to**

1: understand, apply and analyze the anatomy and functional aspects of animal systems
2: understand and apply the genetic aspects like inheritance and syndromes
3: understand, apply and analyze the biological importance of animal specimens
4: apply and analyze the economic importance of animal products, ornamental and edible fishes
5: understand and apply the significance of endoparasites and the stages of meiosis

1. Anatomy of cockroach/ Earthworm- Digestive system and Nervous system-Virtualclass study.
2. Prawn - Appendages
3. Temporary mounting ofPediculus/mosquito.
4. Buccal Smear – Barrbody
5. Bacteria - Gram Staining, AntibioticSensitivity
6. Frog– Digestive system and reproductive system – Virtualclass
7. Measurement of bloodpressure.
8. Blood groupidentification.
9. Qualitative tests for free sugar and albumin inurine.
10. Study of Mendeliantraits
11. Pedigree analysis (Autosomal dominant, recessive and Sexlinked)
12. Syndromes – Down, Turner &Klinefelter

**Spotters – Animals of Biological/Economic interest**

| | |
|---|---|
| Protozoa | - Entamoeba |
| Coelenterata | - Aurelia, Corals |
| Platyhelminthes | - Taenia |
| Annelida | -Leech |
| Arthropoda | - Prawn and any two insect pests ofcrops |

Mollusca - Pila
Echinodermata - Starfish
Prochordata -Amphioxus
Chordata - Naja naja, Pigeon,Mammal

**Animal products of economic importance** – honey and silk thread.

Ornamental fishes (any 3) Edible fishes (any 3)

Slides of Endoparasites (any 5) Meiosis in Grasshopper Testis.

**A record of the work done is to be submitted at the time of examination.**

**(For Candidates admitted from June 2015 onwards)**
**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**B.A. /B.Sc. / B.Com. / BBA/ B.C.A. DEGREE COURSE LIFE ORIENTED**
**EDUCATION ETHICS – II: EMPOWERMENT OF WOMEN**

**HRS / Wk : 1** **CODE: U15VE4LVE02**
**CREDIT : 1** **MARKS : 100**

**OBJECTIVES:**

- To make the learners aware of various gender and social issues and Cyber Crimes.
- To make the learners understand and appreciate the role of media, in facing the challenges on various life issues.
- To enable the learners to understand the ways of empowering women and cyber crime against women

**UNIT – I: GENDER ISSUES**

Feminism, Responsibilities of men and women towards Egalitarian society, Gender Identity-Factors contributing to gender identity (Family values, culture, tradition, religion, societal values, mass media)

**UNIT – II: SOCIAL ISSUES RELATED TO WOMEN**

Eve teasing, Rape, Dowry, Harassment in marriage, Divorce and Widows Remarriage, HIV & AIDS, Transgender, Female Genocide, sex workers, trafficking, fugitive, Female foeticide, handicapped children and women and evils of drug abuse.

**UNIT – III: WOMEN AND MEDIA**

Portrayal of women in media world - News paper, Magazine, Cinema, TV, Video and Advertisements - Morality in Media and Right use of Media

**UNIT – IV: WAYS OF EMPOWERING WOMEN**

Need for empowerment –Skills required for empowerment and Career Oriented Skills, Women's bill- Property rights, Models of Empowered Women- St. Teresa of Kolkata, Indira Gandhi, Helen Keller, Chanu Sharmila and Malala

**UNIT – V: CYBER CRIME AGAINST WOMEN**

Harassment and Spoofing via e-mail, Cyber Stalking, Cyber Pornography, Morphing. Cyber Laws, Social network: Face book, Twitter and Whatsapp

**REFERENCES:**


1. Dr.M.Arumairaj et al., 1999, "Marching towards the Millenium ahead".
2. Thomas Anjugandam, 1999, "Grow Free Live Free" Salesian Publicaiton.
3. H.C Pretti Nandhini Upretti, jaipur 2000 "Women and problems of Gender Discrimination".
4. Thomas B.Jayaseelan, 2002, "Women: Rights and law" Indian Social Institute, New Delhi.
5. Reni Jacob vol I & II, April- June 2004, "Vikasimi – The journal of Women's Empowerment, Ed,"

**(For Candidates admitted from June 2015 onwards)**
**HOLY CROSS COLLEGE (AUTONOMOUS) TRICHIRAPALLI-2.**
**B.A/B.Sc./B.Com /B.C.A – DEGREE COURSES**
**LIFE ORIENTED EDUCATION**
**BIBLE STUDIES – II: OLD TESTAMENT**

**HRS / Wk :1** **CODE: U15VE4LVBO2**
**CREDIT : 1**
**MARKS : 100**

**OBJECTIVE:**

- To enable the students to understand the desires of God through Prophetic revelation and to become sensitive to the heart beat of God.

**UNIT – I: PURPOSE OF LIFE**

Creation of man – fall of man (Gen 1-4) Plan of redemption through the life of :

- Noah (Gen 6-9); Abraham (Gen 12-18);
- Joseph (Gen 37-40); Moses (Exo 4-5);
- Joshua (Joshua 1-8)

**UNIT – II: JUDGES AND KINGS**

- Judges: Deborah (Judges 4); Samson (Judges 6-8); Gideon (Judges 13-16)
- Kings**:** David (I Sam 17-31, II Sam 1-12); Solomon (I Kings 1-11)

**UNIT – III: MINOR PROPHETS**

Brief Life History and teachings of

- Amos
- Jonah
- Micah
- Nahum
- Habakkuk

**UNIT – IV: MAJOR PROPHETS**

Brief Life History and teachings of

- Isaiah (Is 1,6,11,36-38,40-42,44,50,53,61)
- Jeremiah (Jer 1-3,7-12,18-19,23)
- Ezekiel (chapters 1,2,3,5,8,12 visions)
- Daniel (Daniel 1-6)

**UNIT – V: WOMEN IN THE BIBLE**

Women in the Old Testament

- Eve (Gen 3)
- Ruth (Ruth 1-4)
- Hannah (I Sam 1:1-28)
- Esther (Esther 1-6)

**REFERENCES:**


1. Russell Fueller (1999) The Text book of the Twelve Minor Prophets. Wipf &Stock Publishers, UK.
2. Willis Judson Beecher (2002) The Prophets and The Promise. Wipf & Stock Publishers, UK

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-2**
**(For Candidates admitted from June 2015 onwards)**
**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2**
**B.A./ B.Sc./ B.Com/ BBA/ B.C.A - DEGREE COURSES**
**LIFE ORIENTED EDUCATION**
**CATECHISM – II: CHURCH AND SACRAMENTS**

**HRS / Wk : 1** **CODE : U15VE4LVC02**
**CREDIT : 1** **MARKS : 100**

**OBJECTIVES:**

- To enable the students to understand the ways of Christian living with the Church
- To understand God's gift of the Holy Spirit.
- To understand the methods of building relationship with Jesus.
- To learn the life of Sacraments and Prayer
- To enrich our devotion to Mother Mary and Saints.

**UNIT – I: MISSION OF THE CHURCH**

What is church (attributes) – Interpretation: body of Christ- Bride of Christ, goal of all things- Historical as well as spiritual- Mystery and Sacrament-Pilgrim Church.

**UNIT – II: PARTICIPATORY CHURCH**

Work of the Holy Spirit- Salt and leaven in the world "Church of modern World" Church as community – Its important aspect, early Christian Church – People of God as Church- Its characteristics and structure

**UNIT – III: THE FUNCTIONARY CHURCH AND I**

Ministerial Church – Relating Church –Parish Church- Role of lay faithful in the Church – Its challenges – Church and I.

**UNIT – IV: SACRAMENTS**

Sacraments – Initiation– Healing – Service (all the seven) – Emphasis on Confession, Confirmation and Holy Communion. Sacramental: holy "things" used –Their sanctity.

**UNIT – V: MARY AND SAINTS**

Mary as a young virgin- Disciple- Her role in the Catholic Church-Annual feasts-Pilgrimages-Devotion to Mary, Dogmas. Saints in the Church- Prominent Women in the old testament

**REFERENCES:**


1. "Vatican II Revised" Archbishop Angelo Fernandes Published by X.Diax de Rio S.J. Gujarat Sahitya Prakash, P.O.Box. 70, Gujarat, 388001, India.
2. "The Sacraments The Word of God at the Mercy of the Body" Claretian Publications, Malleswaram, Bangalore 560055.
3. Documents of Vatican II – St. Paul's Publications, Bombay 1966.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-2**

**B.Sc. ZOOLOGY (With Specialization in Biotechnology)**

(For the candidates admitted from 2015 onwards)

**SEMESTER V**

**MAJOR CORE7 - DEVELOPMENTAL BIOLOGY AND EVOLUTION**

**Total Hours: 75**

**Hours/Week: 5** **Code:U15ZO5MCT07**

**Credits:5** **Marks:100**

**General Objective:**

To enable the students to understand the fertilization and development of the individual organism and emergence of evolutionary thoughts.

**Course Objectives:**

**The student will be able to**

1: understand and apply the concepts of developmental process.

2: understand and analyse the development of organs in chordates.

3: understand, apply and analyse the post embryonic development and regeneration in invertebrates and vertebrates.

4: understand and analyse the evolutionary concepts.

5: apply and analyse the molecular evolution.

**UNITI** **(15hrs)**

**Fertilization:** Physico-chemical aspects of fertilization and its significance.

**Parthenogenesis**: Natural and artificial – significance.

C**leavage:** Types (Holoblastic& meroblastic) and patterns of cleavage (radial, spiral, bilateral, rotational, determinate and indeterminate cleavage).

**Gastrulation:** Fate map, morphogenetic movements – Gastrulation in frog, chick and mammals.

**Extra Reading/Key words:** *Fertilization in sea urchin, Parthenogenesis in insects.*

**UNITII** **(15hrs)**

**Organogenesis -** Ectodermal derivatives – Development of brain and eye of frog.

Mesodermal derivatives – Heart and Kidney of mammals.

**Extra embryonic membranes** in chick.

**Placentation** in mammals – Types and functions

**Nuclear transplantation** in Amphibia.

**Extra Reading/Key words:** *Development of ear, fetal membranes in mammals.*

**UNITIII** **(15hrs)**

**Organiser** – Spemann‘s embryonic induction and chain of induction

**Post embryonic developments** -insects and amphibians.

**Regeneration** - invertebrates and vertebrates. Development of immune system in vertebrates.

**Aging** – concepts and Models.

**Extra Reading/Key words:** *Metamorphosis, Asexual reproduction.*

**UNITIV** **(15hrs)**

**Emergence of Evolutionary thoughts:** Lamarckism & Neo- Lamarckism. Darwinism & Neo – Darwinism. Mutation theory – Mutation and their role in evolution.

Animal colouration and Mimicry. Isolating mechanisms.

Modes of speciation. Adaptive radiation in reptiles, Golden ages of reptiles and mammals.

Origin of prokaryotic and eukaryotic cells.

**Extra Reading/Key words:** *Synthetic evolution, Polymorphism, Neoteny.*

**UNITV** **(15hrs)**

**Molecular Evolution:** Stages of primate evolution, Human evolution, Future of human.

Concepts of neutral evolution, molecular divergence and molecular clocks.

Fossils – fossil formation, types of fossils- Dating of fossils.

Indian fossils. Living Fossils. Extinction – extinct animals, types of extinction, rates, causes and significance of extinction.

**Extra Reading/Key words:** *Patterns of animal distribution, extinct animals in India.*

**Note: Texts given in the Extra reading/Key words must be tested only through Assignment and Seminars.**

**Course outcomes:**

1. Illustrate the events that occur duringfertilization.
2. Outline the types and patterns ofcleavage.
3. Summarize the ectodermal and mesodermalderivatives.
4. Analyse the Spemann‘s embryonicinduction.
5. Compare the evolutionarythoughts.
6. Explain the mutation inevolution.
7. Describe humanevolution
8. Analyse living and extinctfossils.

**DEVELOPMENTAL BIOLOGY**

**Text Book:**

Arumugam, N. (1988) A Text Book of Embryology. Saras Publication, Nagercoil.

**Books for Reference:**

Balinsky, B.I. (1970) An Introduction to Embryology. Saunders Press, Phil. 3rd Edn.

Berril, N.C. (1971) Developmental Biology, McGraw Hill, New York.

Berril, R. (1979) Developmental Processes in Higher Vertebrates. Logos Press.

Bodmer, (1978) Modern Embryology. HR & W. New York.

Nelson.O.E.(1953) Comparative Embryology of the Vertebrates.McGrawHill,New York.

Scott, F & Gilbert F.S (1988) DevelopmentalBiology. Sinauer associates Inc.Publishers.

Sunderland Massachusetts.

Subramaniam, T. (2002) Developmental Biology, Narosa Publishing House, New Delhi.

**EVOLUTION**

**Books for Reference:**

Darwin,C(1990).The origin of species. 6e.oup. Desmond MorrisCrownPub.Co., London.

EarnstMayr (1966). Animal species and Evolution. The Belknap Press of Harvard University Press, Cambridge, Massachusetts.

Theodore H. Eaton Jr. (1970). Evolution. Thomas Nelson and Sons Ltd, Trinidad

Theodosius Dobzhansky (1967). Evolutionary Biology. Appleton- Century – Crofts, Division of Meredith Publishing Company, New York.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-2**
**B.Sc. ZOOLOGY (With Specialization in Biotechnology)**
(For the candidates admitted from 2015 onwards)
**SEMESTER V**
**MAJOR CORE: 8 -FUNDAMENTALS OF BIOTECHNOLOGY**

**Total Hrs: 75**
**Hours/Week: 5** **Code:U15ZO5MCT08**
**Credits:4** **Marks:100**

**General Objective**

Students understand the methods in genetic engineering such as isolation of genes, gene transfer, selection and screening, plant, animal and stem cell culture and learn the principles of blotting techniques and DNA sequencing.

**Course Objectives:**
**The student will be able to**
1: remembers, understands and applies the basic tools and techniques of gene cloning.
2: remembers the gene transfer technique, host cell and selection strategy to synthesize a gene clone and understands, applies, evaluates and creates an appropriate vector to produce multiple copies.
3: remembers and understands the principle of blotting, gene sequencing and micro array techniques.
4: understand the DNA finger printing, gene knockout techniques, biosafety andIPR.
5: understand and demonstrate the plant and animal tissue culturetechniques.

**UNIT I** **(15hrs)**

**Definition and scope of biotechnology**
Introduction and techniques in genetic engineering**.** Isolation of DNA – shot gun technique, cDNA, artificial gene.PCR amplification – types and their application.c-DNA and genomic DNA libraries
**Molecular tools-**Restriction enzymes – discovery, nomenclature, types and uses DNA ligase, DNA polymerases, Reverse transcriptase, terminal transferases, $T_4$ polynucleotide kinases, methylases, Dnases, Ribonucleases, alkaline phosphatases, S1 nucleases.
**Linking of recombinant DNA with vector** – linkers, adapters and homopolymer tails, terminal dinucleotides.
**Extra Reading/Key words:** *DNA Markers and protein engineering*

**UNITII** **(15hrs)**
**Vectors:** plasmid- Col E1, pBR322; bacteriophage- M13 and λ phage, cosmid, phagmid, YAC, BAC, animal and plant viruses as vectors, shuttle vector, cloning and expression vectors.
**Host:** *E. coli, Bacillus***,** yeast and mammalian cells
**Gene transfer techniques:** Bacterial transformation, calcium phosphate co-transformation, transduction, protoplast fusion, electroporation and microinjection.
**Selection and screening;** Insertional inactivation, Immunological screening, DNA hybridization, reporter gene. Concept of fusion protein.
**Extra Reading/Key words:** *DNA & RNA labeling by radioactive and non-radioactive methods.*

**UNITIII** **(15hrs)**

**Principles of blotting techniques:** Immuno blot, Southern, Northern and Western, dot blot; PCR – Principle and applications

**DNA sequencing:** DNA sequencing methods-Maxim Gilbert and Sanger‘s method and next generation sequencing.

**Human genome project**- Salient features of human genome.

**DNA microarray:** Principle and applications.

**Extra Reading/Key words:** *RACE PCR, Techniques in HGP.*

**UNITIV** **(15hrs)**

**Gene knockout technique** and its significance.

**DNA Finger printing:** principle and applications

**Safety in Biotechnology.**

**Intellectual property rights and patenting.**

**Extra Reading/Key words:** *DNA footprinting and their applications*

**UNIT V** **(15hrs)**

**Plant tissue culture and preservation:** Culture media. Methods-cell culture, suspension culture, organ culture, callus culture, embryo culture. Organogenesis – Somatic embryogenesis. Somatic Hybridization – Protoplast isolation, fusion, regeneration of hybrids. Cybridization, Somaclonal Variation. Haploid production – anther culture – pollen culture. Application of plant tissueculture.

**Animal cell culture:** Primary and secondary culture, continuous cell lines, culture media and applications.

**Stem cell culture** and its applications.

**Extra Reading/Key words:** *International Rice Genome Sequencing Project, Human stem cellcloning*

**Note: Texts given in the Extra Reading / Key words must be tested only through Assignment and Seminars.**

**Course Outcomes**

1. Apply the basic tools and techniques ofgene cloning in new innovativestrategies.
2. Interpret and predict the appropriate vector for a genetransfer
3. Decide a gene transfer technique, host cell and selection strategy to synthesize a gene clone and to produce multiplecopies.
4. Relate the principle of blotting, gene sequencing and micro array techniques with genome analysis.
5. Explain the DNA finger printing and Gene knockouttechniques
6. Discuss the concept of bio-safety andIPR.
7. Demonstrate the plant and animal tissue culturetechniques.

**Text Book:**

Dubey, P.C. (1994) Text Book of Biotechnology, Chand and Co., New Delhi.

**Books for Reference:**

Gupta, P.K. (2004) Elements of Biotechnology, Rastogi Publication, Meerut

Irfan Ali Khan and Athiya Khanum (2004) Fundamentals of Molecular biology, Genetic engineering and Biotechnology, Ukaaz Publication, Hyderabad

Old R.W. and Primrose. S.B. (1989) Principles of Gene Manipulation, BlackwellScientific Publications.

Primrose. S.B. and R.M. Twyman (2006) Principles of Gene Manipulation and Genomics Blackwell Publishing, UK.
Satyanarayana (2006) Biotechnology, Books and Allied (P) Ltd., Lolkata.
Smith John.E. (1988) Biotechnology, Edward Arnold, London.
Walker, J.M. and Gingold, E.D. (Eds) (1992) Molecular Biology and Biotechnology, Panima Educational Book Agency. New Delhi.
Watson, J.D., Michael G., Tam Witkowski and Mark Zollew (1999) Recombinant DNA, Scientific American Books, New Delhi

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**B. Sc. ZOOLOGY (With Specialization in Biotechnology)**
(For the candidates admitted from 2015 onwards)
**SEMESTER V**
**MAJOR CORE 9 - BIOLOGICAL TECHNIQUES**

**Total hours: 75**
**Hours/Week:5** **Code:U15ZO5MCT09**
**Credits:4** **Marks:100**

**General Objective:**

The student will be able to understand the basic principles and analyze the applications of units of measurement, microscopy, spectrophotometers, centrifugation, chromatography& electrophoresis, radioactivity &nanobiology.

**Course Objectives:**

The student will be able to
1: apply the knowledge of measurements and micro techniques in the preparation of solutions and histological slides respectively.
2: understand and analyze the principle and applications of different types of microscopy and pH meter.
3: understand the principles and analyze the applications of spectrophotometer and radioactivity.
4: acquire knowledge on the principle, types and applications of centrifugation and chromatography.
5: analyze and apply the different electrophoretic techniques and nanobiology.

**UNITI** **(15hrs)**

**Units of measurement and Preparation of solutions:** Percentage, Normality, Molarity, ppm, buffers, stock and working solution.
**Microtechnique**– Fixatives and principles of fixation; Tissue preparation, block making and sectioning. Stains and principles of staining; Haematoxylin and Eosin staining method for histology and mounting.
**Extra Reading/Key words:** *Interpretation of histological sections taking one asexample*

**UNITII** (**15hrs)**

**Microscopy -** Principle and applications of Light microscope, Phase contrast, Confocal scanning light microscopy, Fluorescence and Electron (TEM, SEM and STEM) microscopy, X-ray crystallography.
**pH meter**- principle and application.
**Extra Reading/Key words:** *Repair and rectification of microscope*

**UNITIII** **(15hrs)**

**Spectrophotometery**
Electromagnetic spectrum and its properties.
Principle and applications of Colorimeter; Spectrophotometer; Flow cytometer and Nuclear magnetic resonance
**Radioactivity**- Detection and measurement of radioactivity: autoradiography; Geiger Muller and Scintillation counter.
**Extra Reading/Key words:** *Interpretation of spectrophotometric results*

**UNITIV** **(15hrs)**

**Centrifugation** –concepts of relative centrifugal force and sedimentation coefficient. Principle and applications of Preparative Centrifuge –Differential and Gradient centrifugation; Analytical centrifuges- Ultracentrifuge.

**Chromatography** - Principle and applications of Paper, Thin layer, Column, HPLC, Gas-liquid, Ion-exchange, Affinity and Gel permeation, GC-MS, MALDI TOF, LC-MS.

**Extra Reading/Key words:** *Hierarchy of chromatography and their applications, taking a case study*

**UNITV** (**15hrs)**

**Electrophoresis** – Principle and applications of Paper, Polyacrylamide gel electrophoresis - PAGE and SDS – PAGE, Agarose gel electrophoresis (AGE) Immunoelectrophoresis and Isoelectricfocussing.

**Introduction to Nanobiology.**

**Extra Reading/Key words:** *Nanoparticle synthesis*

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

**Course Outcome:**

1. Experiment with different types ofsolutions.
2. Classify and compare the types of microscopes and pHmeters.
3. Explain the principle and applications of spectrophotometer and also discover on radioactivity.
4. Illustrate the process of centrifugation andchromatography
5. Classify and distinguish the types ofelectrophoresis
6. Discover nanobiology and its applications in variousfields

**Books for Reference:**


Upadhyay, A., Upadhayay, K. and Nirmalendu, N. (2002), Biophysical Chemistry. Himalayan Publishing House, Mumbai.

Casey, E. J., (1962). Biophysics - Concepts and Mechanisms. East West Press Pvt., Ltd., New Delhi.

Daniel, M., (2005). Basic Biophysics for Biologist. Agro Botanical Publishers, Bihaner, India.

Narayanan, P., (2007). Essentials of Biophysics. New Age International (P) Ltd. Publishers. Plummer T. D., (1978). An introduction to Practical Biochemistry. Tata McGraw Hill Publishing Company Limited, New Delhi.

Skoog, A. D. and James, J. L. (1992). Principles of Instrumental Analysis. Saunders Golden Sunberst Series

Vasanthan, P. andGautham, N. (2002). Biophysics. Narosa Publishing House, New Delhi.

Veeralakumari, l., (2006). Bioinstrumentation. MJP Publishers, Chennai.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-2**

**B.Sc. ZOOLOGY (With Specialization in Biotechnology)**

**(**For the candidates admitted from 2015 onwards)

**SEMESTER V**

**MAJOR CORE 10 - PRACTICAL – III**

**(DEVELOPMENTAL BIOLOGY, EVOLUTION, MICROBIOLOGY, BIOTECHNOLOGY & BIOINFORMATICS**)

**TotalHours:75** **Code:U15ZO5MCP10**

**Hours/Week:5** **Marks:100**

**Credits: 4**

**Generalobjective:**

Student will learn the skills of performing experiments, analyse results and discuss the observations

**Course Objectives:**

**The student will be able to**

1: Understand, Observe and Evaluate Sperm suspension, developmental stages, Regeneration and Placentation.

2: Analyse Variation, Mimicry and Adaptive Radiation.

3: Apply and evaluate the various Microbiological technique like Staining, Fermentation, Water potability test and sensitivity assay

4: Understand and Apply DNA isolation techniques and immobilization of enzymes.

5: Retrieve, Analyse and Align Protein and nucleotides using Bioinformatics tools.

**Developmental biology**

Preparation and observation Sperm suspension

Observation of slides pertaining to development of frog and chick.

Artificial parthenogenesis

Regeneration in amphibians.

Placenta in mammals.

**Evolution**

Variation – Homologous and Analogous organs.

Mimicry.

Adaptive Radiation.

**Microbiology**

Microscopic observations of bacterial types and Gram staining

Culturing – agar slant and stab and observation of bacterial colonies

Observation of Antibiotic sensitivity test.

Serial dilution technique.

Observation of fermentation in grapes

Milk quality test-methylene blue reductase test, phosphatase test.

LPCB mount- fungal staining

Water potability test-MPN test

**Biotechnology**

Isolation of Genomic DNA (Individual Work)

Agarose gel electrophoresis to show DNA (Individual work)
Blotting techniques –Southern, and Western (Group Work)
Immobilization of enzymes (Individual Work)
Demonstration of PCR

**Bioinformatics**

Retrieving the sequence using Fasta
Protein sequence analysis – SwissProt
Pairwise sequence alignment – BLAST
Nucleotide sequence analysis – MEGA/GenBank
Multiple sequence alignment –CLUSTALW and Phylogenetic analysis, ORF prediction

**A record of the laboratory work should be maintained and submitted at the time of external practical examination**

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-2**
**B.Sc. ZOOLOGY (With Specialization in Biotechnology)**
**(**For the candidates admitted from 2015 onwards)
**SEMESTER V**
**MAJOR ELECTIVE 2: MICROBIOLOGY AND BIOINFORMATICS**
**Total Hours: 75**

**Hours/Week:5** **Code:U15ZO5MET03**
**Credits: 4** **Marks:100**

**General Objectives:**
**Microbiology:** To enable the student to classify microorganisms and learns the structure with emphasis on the culture methods and impacts of microbes in soil, water, dairy, medicinal industries**.**
**Bioinformatics:** The student learns the structure and functional relationship of genes and proteins related to trace the phylogenetic relationship between the organisms.

**Course objectives:**
**The student will be able to**
1: Remember and understand the classification and culturing of microorganisms
2: Understand and analyse the role of microorganism in environment and Industry
3: Understand and analyse how pathogen cause infectious disease and its control measures.
4: Remember and understand the fundamental conceptsof database andgene organization.
5: Understand and evaluate the data analysis technique to solve biological problem.

## MICROBIOLOGY

**UNITI** **(15hrs)**

**Microbes and Bacterial culture methods**
Whittaker‘s classification of microorganisms and scope of microbiology.
Structure of Bacteria, Actinomycetes and Viruses – T4 phage and HIV.
Nutritional requirements, types of culture media; culture and growth characteristics.
Methods in microbial culture – sterilization, inoculation and incubation; preparation of pure culture and maintenance.
**Extra Reading/Key words:** *Atomic force microscope, Confocal Microscope, Virus culture*

**UNITII** **(15hrs)**

**Environmental and Industrial microbiology**
Common air and soil microbes
Food microbiology: Microbial food spoilage, food poisoning, physic-chemical methods in food preservation.
Water microbiology: Common pathogenic microbes in water.
Basic design of fermenter, industrial fermentation of ethanol, penicillin and enzymes.
Dairy microbiology: Pasteurization, fermented milk products (Curd and Cheese).
**Extra Reading/Key words:** *Bioterrorism, Biopigments*

**UNITIII** **(15hrs)**

**Medical microbiology**
Study of common bacterial and viral diseases in man: causative organisms, mode of transmission, pathogenicity, symptoms and preventive measures.

Diseases of
Gastro-enteric system: Cholera, Typhoid and Viral hepatitis.
Respiratory system: Influenza, Pneumonia and Tuberculosis.
Nervous system: Meningitis, Leprosy, Tetanus, Polio, Rabies and Herpes.
Genital system: Gonorrhea, Syphilis and Candidiasis and AIDS.
**Extra Reading/Key words:** *Epidemic disease, Pandemic diseases.*

## BIOINFORMATICS

**UNITIV** **(15hrs)**

**Proteomics and Genomics**

History, Scope and application of Bioinformatics. Accessing bioinformatics resources from databases: Sequence databases –. Nucleotide sequence databases – NCBI, PubMed,EMBL, Genbank, DDBJ. Protein sequence databases – SWISS-PROT, TrEMBL and PIR.
Structure of DNA, RNA. ORF, Genetic code. Structure and organization of genomes-Prokaryotes (E.coli), Eukaryotes (Yeast andHuman).
**Extra Reading/Key words:** *Cyber-crime, cyber security*

**UNITV** **(15hrs)**

**Protein structure, sequence analysis and phylogenetic analysis**

Protein structure prediction and homology modeling. Pairwise alignment and its significance. Multiple sequence alignment and its application. Phylogenetic tree: clustering and cladistic methods. Computer assisted drug design- outline of methods and tools employed.
**Extra Reading/Key words:***Metabolomics, Transcriptomics*

**Note: Texts given in the Extra Reading/Keywords must be tested only through Assignment and Seminars.**

**Course outcomes:**

1. Outline, classify and asses the structure, growth requirements and maintenanceof differentmicroorganisms.
2. Explain and identify the role of pathogen in water and food spoilage and to assessvarious food preservationmethods.
3. Acquire, design and apply the principles of fermenter in fermented food andindustrial products.
4. Explain, examine and discuss the etiological agent causing infectious diseases andits clinicalmanifestations.
5. Apply, analyze and determine the different sequence databases, finally construct and organize the gene structure according to itsfunctions.
6. Organize and examine the protein prediction and its alignment to formulatedrug designingtools.

## MICROBIOLOGY

**Text Book:**

Mani, A., Narayanan, L.M., Selvaraj, A.M., amdArumugam, N (1996). Microbiology, Saras Publication, Kanyakumari.

**Books for Reference:**

Anathanarayanan, R and JeyaramPanikar, C.K (1990). Text book of Microbiology, Orient Longman.

Deb, W.C (1982). Microbes and Diseases of Man. Text book of Microbiology (including parasitology) CBS publishers and Distributors, New Delhi.

Kalaichelven, P.T (2005). Microbiology and Biotechnology – A Laboratory Manual, MJP Publishers, Chennai.
Ketchuns, P.A (1984). Microbiology, John Wiky and Sons, New York.
Pelzer, M.J AND Reid, R.D (1965). Microbiology, McGraw Hill Book Company, New Delhi.
Sharma, P (1995). Microbiology, Rastogi and Company, MEERUT, India.
Sullila, S.B and Shantharm, S (1998). General Microbiology, Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi.

**BIOINFORMATICS**

**Text Book:**

Arthur M. Lesk (2003). Introduction to Bioinformatics, Oxford Univerity Press.

**Books for Reference:**

Irfan A, Khan and Atiya A Khanum (2003). Recent Advances in Bioinformatics, Ukaaz publishers, Hyderabad.
Mani K and VijayarajN(2003). Bioinformatics for Beginners, KalaikathirAchagam, Tamilnadu.
Murthy C.S.V (2003). Bioinformatics, Himalaya Publishing House, Mumbai.
Subramanian C (2004). A Textbook of Bioinformatics. Dominant Publishers and Distributors – New Delhi.
Westhead, D.R., Parish, J.H., and Twyman, R.M (2003)- Instant notes-Bioinformatics, Viva Books Private Limited, New Delhi.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**B. Sc. ZOOLOGY (Specialization in Biotechnology)**
(For the candidates admitted from 2015 onwards)
**SEMESTER V**
**MAJOR ELECTIVE 2: APPLIED ENTOMOLOGY**

**Total hours: 75**
**Hours/Week:5** **Code :U15ZO5MET04**
**Credits:4** **Marks:100**

**General Objective:**
The student will acquire knowledge of entomology, the uses and menace of insects to man, and the application of insects in apiculture and sericulture.

**Course Objectives:**
**The student will be able to**
1: understand the general organization and applications of insects
2: analyse the beneficial uses of insects to man
3: analyse the harmful effects of insects
4: apply the beneficial role of insects in apiculture, sericulture
5: understand and evaluates the measures of control of insects

**UnitI** **(15hrs)**
**Introduction to Entomology**
Mention Agricultural entomology, Forest entomology, Veterinary entomology, Medical entomology, Forensic entomology, Industrial entomology, Nutritional entomology, Cultural entomology. Classification of Class Insecta down to orders, General organization of an insect.
**Extra Reading/Key words:** *Characters of Arthropods*

**UnitII** **(15hrs)**
**Insects as Service to Man**
Useful products, Useful body, Galls, Pollinators, Destroyers of insect pests,
Serve as food for animals and even man, Destroyers of weeds, Improve soil fertility, Act as scavengers, Aid in scientific research, Aesthetic and entertainment value, Use in medicine, Pollution indicators, Arrow poisons, Cold light, Insects in forensic science, Utility of insect pheromones and hormones
**Extra Reading/Key words:** *Biological Control Agents*

**UnitIII** **(15hrs)**
**Insects as enemies of Man**
Morphology, damages caused and control measures of the following:
**Pests of coconut:** *Oryctes rhinoceros, Rhyncophorus ferrugineus, Nephantis serinopa*, eriophid mite ( *Aceria guerreronis* ),
**Pest of paddy:** *Leptocorisa acuta, Spodoptera mauritia*, Rice stem borer (*Scirpophaga incertulas, Nilaparvata lugens)*
**Pest of stored food products:** *Trogoderma granarium, Tribolium castaneum, Sitophilus oryzae*
**Extra Reading/Key words:** *Evaluate the pests in the kitchen*

**UnitIV** **(15hrs)**

**Productive Insects**

**Honey bee:** Apiculture and its scope; Different species, Social organization, structure of worker bee, life history and communication; Bee products: Honey and Bee wax, Composition and Uses, Bee diseases.

**Silk moth:** Different types of silkworms, life cycle; Sericulture, moriculture, Processing and extraction of silk, Diseases of silk worms, composition and uses ofsilk.

**Lac insect**: Different strains of Lac insects; cultivation, inoculation and harvesting, propagation of lac ; composition and uses of lac, enemies of lacinsects.

**Extra Reading/Key words:** *Visit to sericulture unit*

**UnitV** **(15hrs)**

**Control Measures:** a) Natural control (b) Applied control or Artificial control: Prophylactic and Curative methods [cultural, mechanical, legal methods (brief account), biological and chemical methods].

**Biological control:** History; Ecological, biological and economic dimensions of biological pest control methods, Mention any 3 important biological control project undertaken in India. Merits and demerits.

**Chemical control:** Classification, Insecticides of plant origin; Insecticides, Mention insecticide residue, resistance and resurgence of insect pests; Pesticide appliances (Hand compression sprayer, Knapsack sprayer and Rocker sprayer); Precautions in handling insecticides.

Modern methods of Pest control: Autocidal and Pheromonal control

**Integrated Pest Management (IPM):** Features, advantages

**Extra Reading/Key words:** *Parasitoids*

**Note: Texts given in the Extra Reading / Key words must be tested only through Assignment and Seminars.**

**Course Outcomes:**

1. List and summarize the various fields of application ofentomology
2. Define the general structure of insects and classify them up toorders
3. Identify and examine the benefits of insects toman
4. Identify and examine the insectpests
5. List the species of honeybees, silkworms and lac insects and theirdiseases
6. Outline and model the life cycle of honeybees, silkworms and lac insects and list their products and theuses
7. Summarize and criticize the control measures

**Books for References:**


Atwal, A.S and Dhaliwa, G.S.(2008) Agricultural Pests of south Asia and their Management. Kalyani Publishers.

Bhaskaran, K.K and Francy, C. F (2010) Elements of Applied Entomology, Manjusha Publications.

Dhaliwal, G.S. *et al*., (2008) Essentials of Agricultural Entomology, Kalyani Publishers

Metcalf, C.L. & Flint, W.P. (1973) Destructive and Useful Insects, USTMH

Nair, M.R.G.K. (1989) A Monograph on Crop pests of Kerala and their control. KAU Publ., Vellanikkara.

Ramakrishna Ayyar, T.V. Maras, 1963. Handbook of Economic Entomology for SouthIndia,

Srivastava,K. P. A (1988) Text book of Applied Entomology , Vol. I & Vol. II, Kalyani Publishers, Ludhiana, New Delhi, Noida.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**DEPARTMENT OF ZOOLOGY**
**(For candidates admitted from 2015 onwards)**
**FOR B.A/ B.Sc./ B.Com./ B.C.A/B.R.Sc./BBA Degree Course**
**SEMESTER V**
**NON-MAJOR ELECTIVE: 1 - ORNAMENTAL FISH CULTURE**

**Total Hours: 30**
**Hours/Week:2** **Code:U15ZO5NMT01**
**Credits: 2** **Marks:100**

**General objective**

Student will learn the importance of ornamental fish culture, maintain an aquarium, know the common ornamental fishes and explore the self employment opportunities.

**Course Objectives:**
**The student will be able to**

1: evaluate the present status of world aquarium and apply knowledge on construction of aquarium and transportation methods offishes.
2: analyze the major marine and fresh water ornamental fishes in India and evaluate the compatible group of fishes for homeaquarium.
3: apply different methods to prepare artificial fish feed
4: analyze the diseases of ornamental fishes and apply different treatment methods and apply knowledge on breeding of aquarium fishes for commercial purposes.
5: apply knowledge and create new steps for maintenance of aquarium in the lab.

**UNITI** **(7hrs)**

Importance of ornamental fish culture – World Aquarium trade and present status.
Design and setting up of fish tank - Construction and maintenance of home aquarium, requirements and design for the commercial production units of ornamental fishes and transportation methods. Aquarium plants and their uses.
**Extra Reading/Key words:** *List of fishes banned for trading, Identification of local demand of ornamental fishes.*

**UNITII** **(8hrs)**

Major marine ornamental fish resources of India.
Popular tropical fresh water ornamental fishes and their characteristics- Live bearers- guppy, molly, platy and swordtail - any two. Egg layers- fighter, gourami, angelfish, red tailed shark and gold fish. – any two. A compatible group of fishes for home aquarium.
**Extra Reading/Key words:** *Identification of fishes that can withstand in sub-tropical Indian climate, Taxonomy of important fresh water and marine ornamentalfishes.*

**UNITIII** **(7hrs)**

Different kinds of feeds- culture of fish food organisms, preparation of artificial feeds, feeding methods and vacational feed.
**Extra Reading/Key words:** *Preparation of Alternate food for regular breeding of fishes.*

**UNITIV** **(8hrs)**

Diseases and treatment methods in brief- ectoparasite- anchor worm and argulus, white spot, fin rot, mouth fungus, dropsy and velvet disease.

Breeding of aquarium fishes for commercial purpose

**Extra Reading/Key words:** *Identification of general diseases in fish and guidelines for their better upkeep.*

**UNIT V**

**Maintenance of Aquarium in the lab (Lab work)**

Note: The students maintain an aquarium in the lab and document the observations.

**Extra Reading/Key words:** *Steps to avoid harsh conditions of ornamental fishes in Lab. aquarium.*

**Note: Texts given in the Extra reading /Key words must be tested only through Assignment and Seminars.**

**Course Outcomes:**

1. Construct an aquarium and organize the interior of aquarium withequipments.
2. Evaluate the compatible group of fishes for homeaquarium.
3. Develop different methods to prepare artificial fishfeed.
4. Categorize the diseases of ornamental fishes and its treatmentmethods.
5. Plan new methods for breeding of aquarium fishes for commercialpurposes.

**Text Books:**

Ahilan. B, Felix. N and Santhanam.R., 2008. Text book of Aquariculture. Daya Publishing House, New Delhi. p.157.

Ramanathan et al., (2000), Tropical freshwater ornamental fish culture, Department of fisheries farm management, Veterinary and animal sciences university, Tamil Nadu.

**Book for Reference:**

Dey,V.K., (1995), Hand book of aqua forming. MPEDA India.

Jameson, J.D., Srinivasan.A and Venkataramanujam. (1995) Ornamental fish culture technology, TANUVAS publication Chennai.

Jameson, J.D.and Santhanam,R., (1996), Manual of ornamental fishes and farming technologies. Peejay, Thoothukkudi.

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2**
**DEPARTMENT OF ZOOLOGY**
(for candidates admitted 2017 onwards)
**SEMESTER V**
**SBE – 4 ANIMAL SCIENCE SKILLS FOR CHEMISTRY STUDENTS**
**(LAB CUM THEORY)**

**Total hours: 30**
**Hours/Week: 2** **Code:U17ZO5SBP04**
**Credits:2** **Marks:100**

**General Objective**:

To enable the students to learn the skills of performing experiments, analyzing the results and discussing the observations interlinking the information of biology to Chemistry.

**Course Objectives:**
**The learner will be able to**

1: understand, apply and evaluate the chemical changes within the body due to the Biological Adaptations of selected examples in invertebrates and chordates.
2: remembers and understands the different types of cells involved in functioning of the biological systems and how chemical molecules influence.
3: apply, analyse and evaluate the knowledge of Cell Biology through selected techniques.
4: evaluate the techniques relating to the Physiology oforgans and organ systems, and how they work within the body to respond tochallenges.
5: understand and apply the concepts of heredity and inheritance in Genetics

**Unit I: Biological adaptation in invertebrateandchordate (6hrs)**

Protozoa: Plasmodium vivax, Porifera – Gemmule, Coelenterata- obelia colony
Platyhelminthes:Taenia scolex, Larval types for dispersal of their population,
Annelida :Leech(Triradiate bite), Arthropoda: Honey- bee and Hornet, Mollusca: Radula Echinodermata- Water vascularsystem
Pisces:Swimming adaptation , Amphibia-Parental care, Reptilia-Identification of poisonous and Non- Poisonous snakes in India, Aves : Flight adaptation, Mammals: Animal behaviour

**Extra Reading/Key words:** *Structural adaptations changes the actual shape of an organism.*

**Unit: IIBiologicalSystems (6hrs)**

Observation of different types of animal cells
Observation of different types of animal tissues
Differential count of Blood cells
Preparation of Buccal cells
Preparation of vaginal cells

**Extra Reading/Key words:** *How small molecules affect biological systems.*

**Unit III:CellBiology (6hrs)**

Preparation of polytene chromosomes in salivary gland of Chironomous larva
Study of mitotic stage in onion root tip
Differentiation of Normal and abnormal cells
Observation of sperm suspension.
Study of abnormal sperm.
Isolation of DNA from Human buccal wash

**Extra Reading/Key words:** *The smallest particle of an element that still retains its distinctive* chemical *properties*

**Unit IV: Physiology**

Measurement of their ownBloodPressure (**6hrs)**
Determination of Bleeding time & Clottingtime
Determination / Estimation of Heamoglobin in Blood.
Preparation of Haemin crystals from human blood.
Recording of Electrocardiogram & whole body Scan.
Determination of Human salivary amylase in optimum temperature.
Test for presence of sugar inurine/serum.

**Extra Reading/Key words:** Chemistry *explains how the cells function.*

**UnitV:Genetics (6hrs)**

Survey of Mendelians Traits
Pedigree analysis
Syndrome and their Karyotypes
Analyzing their Blood Groups
Operon model in *E.coli* using virtual class study

**Extra Reading/Key words:** *The phenotype is disturbed not by introduction of mutations, but by exposure to smallmolecule.*

**Course outcomes:**

1. Describes the structural adaptation of the organism to continue their mode ofliving.
2. Learns the skill of identifying the cells and itsrole.
3. Identifies the genetic role of thecell.
4. Learns the skill of finding the physiology ofcells.
5. Analyse the genetics and the inheritancepattern.

**Books for Reference:**

Ekambaranatha Iyer, M. & Ananthakrishnan, T.N. (1990) Outlines of Zoology (Viswanathan Publishers) Vol. I & II.

Verma P.S. & Agarwal V.K. (1998). Cell Biology, S.Chand and Company Ltd, New Delhi.

Mariakuttikan, A and Arumugam, N. (2007). Animal Physiology, Saras Publication,TamilNadu.

Alice Marcus (2009) Genetics, MJP Publishers, Chennai.

Halliday Resnick W, 2001. Fundamentals of Physics, VI Edition, John Wiley and SonsInc.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**DEPARTMENT OF ZOOLOGY**
**(For candidates admitted from 2015 onwards)**
**SEMESTER V**
**SBE- 4: BIOLOGICAL SKILLS FOR CHEMICAL SCIENCES-ADVANCED**
**(Theory cum Lab. - For Chemistry Students)**

**TotalHours:30** **Code:U17ZO5SBT04**
**Hours/Week: 2** **Credits:2**
**Marks: 100**

**General Objective:**
The student understands the principles of a biological system, molecular biology, and computational tools including computer aided drug design.

**Course Objectives:**
**The learner will be able to**
1. Understand the organization of genes and the concept ofoperon
2. understand and apply the fundamentals of rDNAtechnology
3. apply, analyse the use of computer tools in structural studies and drugdiscovery
4. Apply and analyse the bioinformatics tools for in silico gene finding and proteinstudies
5. apply and evaluate the tools for structure representation, cheminformatics andreaction databases

**UNITI** **(6hrs)**
**Molecular Biology:** Organization of gene exon- intron- functional genes- organization of operon: promoter, operator, regulator, enhancer, repressor

**UnitII** **(6hrs)**
Recombinant-DNA technology – DNA as universal molecule- construction of r DNA-vector- cloning methods- examples for transgenic plants and animals.

**UNITIII** **(6hrs)**
Role of computers in chemical research; Structure representation; Chemical Databases – Design, Storage & Retrieval methods, 2D and 3D structures, reaction databases, similarity searches; Modelling of small molecules; Chemoinformatics tools for drug discovery

**UNITIV** **(6hrs)**
**Bioinformatics:** Introduction to data bases and retrieval of information. Introduction to Genomics- sequence alignment, gene finding.
**Introduction to Proteomics-** protein prediction, and visualization using various tools. Applications of Bioinformatics

**UNITV** **(6hrs)**
**Structure representation:** Chemsketch, ISIS Draw; Chemical database: Pubchem, chem bank, Drug Bank, Chem finder, Organic Syntheses, Chem mine; Reaction database: Chemogenesis, Web reactions database, Organic Synthesis(ORGSYN) database, and synthetic Pages database. Tools for chemo informatics: Chem spotlight, Molinspiration

**Course outcomes:**
1. Explain and identify operons, its components andfunctions

2. Outline the construction of vectors and discover the applications of RecombinantDNA technology in cloningexperiments
3. Utilize in silico tools and databases and design molecules with relevance tothe pharmaceuticalindustry
4. Identify genes and proteins with similarity and utilize them in research andanalysis
5. Utilize databases and tools to identify chemicalstructures

**Books for Reference**

Arthur M. Lesk (2003) Introduction to Bioinformatics, Oxford University Press.
Attwood, T.K. and D.J. Parry-Smith, (2001). Introduction to Bioinformatics, Pearson Education (Singapore Pvt. Ltd., Delhi, India.)
De Robertis, E.D.P. and De Robertis, E.M.F. (1995) Cell and Molecular Biology. Saunders College, PA.
Mani K. and Vijayaraj N.(2003) Bioinformatics for Beginners, Kalaikathir Achchagam, Tamil Nadu
Murray, R. K., Granner, D. K., Mayes, P. A., Rodwell, V. W. (2000). Harper‘s Biochemistry, Prentice Hall International Inc..
Palanichamy, S. & Manoharan,M. (1991) Statistical methods for biologists. Palani, Paramount Publications, Palani, Tamil Nadu.
Power,C.B. Cell Biology. (1991). Himalaya Publishing House, Mumbai, India.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI-2**
**B.Sc. ZOOLOGY (With Specialization in Biotechnology)**
(For the candidates admitted from 2015 onwards)
**SEMESTER VI**
**MAJOR CORE 11 – ANIMAL PHYSIOLOGY**

**Total Hours: 90**
**Hours/Week: 6** **Code:U15ZO6MCT11**
**Credits:5** **Marks:100**

**General Objective:**

To enable the students to understand the homeostasis, physiology and functions of organs in animals.

**Course Objectives:**

**The learner will be able to**

1: understand and analyse the principles of homeostasis in invertebrates and vertebrates.
2: remember, understand and analyse the physiology of circulation, respiration and excretion.
3: understand and analyse the physiology of effectors, receptors and neuronal conduction.
4: understand and analyse the physiology of endocrine glands and animal behavior.
5: understand and analyse the physiology of reproductive organs and apply the ART techniques forinfertility.

**UNITI** **(18hrs)**

Introduction to Animal Physiology, scope of physiology
**Principles of Homeostasis:**
**Osmo- ionic regulation** in crustaceans and fishes.
**Thermoregulations** in poikilotherms and homeotherms.
**Digestion:** Digestion of food and absorption (in mouth, stomach, duodenum and intestine).
**Extra Reading/Key words:** *osmoregulation in reptiles and mammals.*

**UNITII** **(18hrs)**

**Circulation:** Composition of blood, blood-clotting mechanisms, heartbeat – origin, conduction; cardiac cycle, bloodpressure.
**Respiration:** Respiratory pigments; structure of haemoglobin; transport of respiratory gases- $O_2$ dissociation curve, $CO_2$ transport; Haemoglobin as a buffer.
**Excretion:** Biosynthesis of nitrogenous waste products – ammonia, urea, uric acid; physiology of urine formation, acid -base balance.
**Extra Reading/Key words:** *Ischemic heart disease, ECG, Dialyzer.*

**UNITIII** **(18hrs)**

**Muscle Contraction:** Structure and molecular organization of skeletal muscle; mechanism and chemistry of muscle contraction; Cori cycle, energetics of muscle contraction.
**Neural conduction:** Resting potential, conduction of nerve impulse, synaptic transmission, neuromuscular junction, reflexes.
**Receptor Mechanisms: Photoreception** – structure of retina – visual pigments, photochemistry;
**Chemoreception** – gustatory, olfactory;
**Mechanoreception**– Pacinian corpuscle; **Phonoreception.**
**Extra Reading/Key words:** *Kymograph, autonomic nervous system.*

**UNITIV** **(18hrs)**

**EndocrineglandsI:** Hypothalamus, Pituitary, pineal, thyroid, parathyroid, pancreas and thymus.

**Endocrine glands II:** Adrenal cortex and medulla, ovary and testis- structure, hormones and their functions.

**AnimalBehaviour:** Kinesis, taxis, instinctive behaviour,learnedbehaviour. Biological clock-circadian, lunar and circannualrhythms.

**Extra Reading/Key words:** *Endocrine disorders, Social behavior, Defensive behavior*

**UNIT V** **(18hrs)**

**Reproduction:** Anatomy of reproductive system in Human; Menstrual cycle and contraception.

**Hormonal Control** of implantation, gestation, parturition; Infertility.

**Assisted Reproductive technologies (ART)** – Artificial insemination, surrogate motherhood, IVF, GIFT, ZIFT and ICSI ; Oocyte banking anddonation.

**Extra Reading/Key words:** *Estrous cycle, Ethics of ART.*

**Note: Texts given in the Extra reading/Key words must be tested only through Assignment and Seminars.**

**Course outcomes:**

1. Explain the principles ofhomeostasis.
2. Describe the digestion and absorption offood.
3. Summarize the clotting mechanism and cardiaccycle.
4. Analyze the transport of respiratorygases.
5. Explain the mechanism of muscle contraction and itsenergetics.
6. Evaluate neural conduction and receptormechanisms.
7. Explain all the endocrine glands andhormones.
8. Enumerate the various assisted reproductivetechnologies.

**Text Book:**

Mariakuttikan, A. and Arumugam, N. (2007). Animal Physiology, Saras Publication, TamilNadu.

**Books for Reference:**

Hoar, S.W. (1987). General and Comparative Physiology. Prentice Hall.

Knut Schmidt Nielson, (1985). Animal Physiology. Adaptation and Environment, Cambridge, University Press.

Murray, R.K., Mayes, P.A. Granner, D.K. and Rodwell, V.W. (1990). Harpers' Biochemistry, Tweny Second edition, Prentice Hall Internation Inc.

Parameswaran, R., Ananthakrishnan, T.N., Anantha Subramanian, K.S (1998) Outlines of Animal Physiology, S. Visuwanathan Pvt. Ltd, Chennai.

Philips, P. and MurrayMooyoung (1989). Animal Biotechnology, Pergamm Press, Oxford.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**B. Sc. ZOOLOGY (With Specialization in Biotechnology)**
(For the candidates admitted from 2015 onwards)
**SEMESTER VI**
**MAJOR CORE12- APPLIED BIOTECHNOLOGY**

**Total hrs: 90**
**Hours/Week: 6** **Code:U15ZO6MCT12**
**Credits:5** **Marks:100**

**General Objective:**

To enable the students to understand the applications of biotechnological principles for the improvement of industrial production, medical products for treatment and prevention of diseases, for waste disposal, environmental cleanup, agricultural technologies and fish and livestockfarming.

**Course Outcomes:**
**The student will be able to**
1: remember, understand and apply the principle of transgenic plants.
2: remember the sericulture techniques, transgenic fishes, ethics on GMO‘s and policies of ELSI.
3: remember, understand and evaluate the role of a microorganism in health care and environmental protection.
4: remember and understand the role of Biotechnology in diagnosis, vaccine production and therapy for disorders.
5: remember, understand and apply the strategies of biodegradation of the wastes and pollutants and the concept of bioremediation using microbes.

**UNIT I**
**PlantBiotechnology (18hrs)**
Applications of plant tissue culture; Transgenic plants – Agro bacterium-mediated transformation, Principles in the production of golden rice, flavr savr tomato, insect-resistant and disease-resistant plants. Concept of biofuel-types and applications.
**Extra Reading/Key words:** *International Rice Genome Sequencing Project, intergeneric cytoplasmic hybridization in Radish and Grape*

**UNIT II**
**AnimalBiotechnology (18hrs)**
Sericulture- Definition, Silk production. Seri- Biotechnology. Potential, strengths and challenges of sericulture industry in India.
Ploidy induction in fish; Transgenic fishes- principles and applications and transgenic live stock-production and application.
GMO- regulations - risk assessment; Bioethics- ELSI.
**Extra Reading/Key words:** *Role of Modified ruminant microorganisms on livestock, MolecularPharming*

**UNIT III**
**MicrobialBiotechnology (18hrs)**
Microbial enzymes- types and applications.Immobilization of enzymes.Industrial scale production of enzyme-protease.
Concept of bio-pesticides and bio-fertilizers.
Single cell protein- production and applications.

**Extra Reading/Key words:** *Recombinant therapeutic proteins from transgenic microbes.*

**UNIT IV**

**MedicalBiotechnology (18hrs)**

Production of humulin. Recombinant growth hormone. Recombinant vaccines: r-subunit vaccine, r-live vaccines, Anti-idiotypic, edible vaccines, HIV, Malarial vaccine.
Monoclonal antibodies- applications
Gene therapy – types, Ex Vivo and in Vivo methods, treatment of genetic disorders. Principle and protocol for ADA deficiency- future prospects
**Extra Reading/Key words:** *The program for appropriate technology in health (PATH), Nanotechnology as diagnostic tool.*

**UNIT V**

**EnvironmentalBiotechnology (18hrs)**

Biotechnology of sewage treatment and effluent treatment for tannery, textile and paper;
Concept of bio-monitoring, biofilters, biosensors, bioscrubbers, eDNA.
Bioremediation of heavy metal and oil - super bug;
Concept of biopolymers.
**Extra Reading/Key words:** *Biopulping and Bioplastics*

**Note: Texts given in the Extra Reading / Key words must be tested only through Assignment and Seminars.**

**Course Outcomes:**

1. Interpret and apply the principle of transgenic plants in the production of new transgenic plant.
2. Describe sericulture techniques, transgenicfishes,
3. Spell out the ethics on GMO‘s and policies ofELSI.
4. Determine the role of a microorganism in health care and environmentalprotection.
5. Explain the role of Biotechnology in diagnosis, vaccineproduction
6. List the disorders and select specific therapy for specificdisorders.
7. Apply the strategies of biodegradation of the wastes and pollutants using microbes to evolve a newstrategy
8. Construct a new bioremediation usingmicrobes.

**Text Book**

Dubey and Maheswari (2006) Text Book of Biotechnology, Chand and Company, New Delhi

**Books for Reference:**


Annual Report of Central Sericultural Research and Training Institute (2014). Central Silk Board, Mysore.

Babiuk, L.A., J.P.Philips and M.M.Young (1989) Animal Biotechnology, Pergamaness,Oxford.

Balasubramanianet al.(1996) Concepts in Biotechnology. Universities Press, Hyderabad.

Chrispeels. M.J. and Sadava, D.E (1994) Plants, Genes and Agriculture . Jones and Bartelett Publishers, Boston.

Ganga, G. and SulochanaChetty, J. (1997).An Introduction to Sericulture. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi

Gupta, P.K. (2004) Elements of Biotechnology, Rastogi Publication, Meerut.

Old R.W. and Primrose. S.B.(1989) Principles of Gene Manipulation, Blackwell Scientific Publications.
Primrose, S.B. and R.M. Twyman (2006) Principles of Gene Manipulation and Genomics, Blackwell Publishing, UK.
Sathyanarayana, U. (2006) Biotechnology, Books and Allied (P) Ltd Kolkota, India
Watson, J.D., M.Gilman, J.Witkowski and M. Zoller (1999).Recombinant DNA.ScientificAmerican Books. W.H. Freeman and Company, NewYork.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**B. Sc. ZOOLOGY (With Specialization inBiotechnology)**
(For the candidates admitted from 2015onwards)
**SEMESTER VI**
**MAJOR CORE 13 – PRACTICAL IV - ANIMAL PHYSIOLOGY, ENVIRONMENTAL BIOLOGY AND IMMUNOLOGY**

**Total Hours: 90**
**Hours/Week:6** **Code:U15ZO6MCP13**
**Credits:5** **Marks:100**

**General Objective:**
The Students will acquire the skill to perform experiments, analyze results and discuss the observations.

**Course Objective:**
**The learner will be able to**
1: analyze the oxygen consumption and Q10 in fishes: nitrogenous excretory products in animals, composition of blood in man and ECG recording.
2: construct ecological pyramids, analyze different fauna
3: analyze the water samples and animal associations
4. understand the organization of the immuneorgans
5: evaluate haemagglutination andimmunodiffusion

**ANIMAL PHYSIOLOGY**
1. Oxygen consumption in an aquatic animal –fish
2. Determination of $Q_{10}$infish
3. Analysis of excretory products in animals of different habitats (ammonia, urea and uric acid)
4. Analysis of ECGrecording
5. Differential count of WBC
6. Total count ofRBC
7. Total count of WBC andPlatelets
8. Measurement of human bloodpressure
9. Estimation of Haemoglobin content – Sahli'smethod.

**ENVIRONMENTAL BIOLOGY**
1. Construction of ecological pyramid to study the structural andfunctional relationship of different tropiclevels
2. Analysis of the fauna and their adaptations to the respective habitat - rockyshore, sandy shore, muddy shore and deepsea
3. Analysis of marine and freshwaterplankton
4. Analysis of water samples for pH, $O_2$, salinity, carbonates andbicarbonates
5. Estimation of primary productivity of apond
6. Animal associations (symbiosis, mutualism, commensalism and parasitism)
7. Live feed culture(*Artemia)*

**IMMUNOLOGY**
1. Organs of immunesystem

2. Histology of spleen, lymph node andthymus
3. Haemagglutination test (Individualwork)
4. Immunodiffusion (Individualwork)

**A record of the laboratory work should be maintained and submitted at the time of external practical examination.**

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**B. Sc. ZOOLOGY (With Specialization inBiotechnology)**
(For the candidates admitted from 2015onwards)
**SEMESTER VI**
**MAJOR ELECTIVE: 3 –IMMUNOLOGY**

**Total Hours : 75 hours**
**Hours/Week:5** **Code:U15ZO6MET05**
**Credits:5** **Marks:100**

**General Objective**

Student learns about the types of immunity, organization of immune system, antigens, vaccines, immunoglobulins, humoral and cell mediated immune responses, Major histocompatibility complexes, Organ transplantation, and immunological techniques.

**Course Objectives:**
**The student will be able to**

1: understand the structure and functions of lymphoid organs, Lymphoid Cells and Types of Immunity.
2: understand the Structures, types and properties of antigens and immunoglobulins and analyse the types of vaccine & its schedule
3: explain the process and mechanism of Humoral and Cell mediated immune response and Complement pathways
4: understand and analyse the structure and function of MHC, its significance in Organ transplantation and understand the concept of autoimmunity.
5: exemplify hypersensitivity reactions, antigen –antibody reactions, immunological techniques inclinical diagnosis and understand the concept ofimmunotherapy.

**UNITI** **(15hrs)**
**Scope of Immunology - Types of Immunity**
**Lymphoid system -** Organs – Structure and Functions.
**Lymphoid Cells –** Types – Haematopoietic stem cells – Significance -Origin and differentiation oflymphocytes.
**Extra Reading/Key words:** *Application of Haematopoietic stem cells*

**UNITII** **(15hrs)**
**Antigens :** Structure – Properties, Factors affecting antigenecity.
**Vaccine** – Types, Vaccination Schedule.
**Immunoglobulins:** Structure, types, distribution and biological functions.
**Extra Reading/Key words:** *New vaccine in clinical trial, revised vaccination schedule*

**UNITIII** **(15 hrs)**
**Immune response:** Humoral response-antigen processing and presentation, clonal proliferation, cell-cell interaction, antibody secretion; Primary and secondary immune response.
**Cell mediated immune response-** Mechanism and target cell lysis.
**Complements** – Classical and Alternative pathways, role in immunity.
**Extra Reading/Key words:** *Type of immune response in microbialinfection*

**UNITIV** **(15hrs)**
**Introduction to HLA –** HLA complex-Structure and Function of molecules.

**Organ transplantation-** types of graft, mechanism of allograft rejection.
**Immunosuppression** (Basic concepts).
**Autoimmune Diseases** –Concept and types (Graves's disease and Rheumatoid arthritis).
**Extra Reading/Key words:** *Case study of Organ transplantation and autoimmune disease.*

**UNITV** **(15hrs)**

**Hypersensitivity –**Types with example.

**Immunological Techniques in Clinical Diagnosis**:Antigen – antibody reactions – agglutination, precipitation and immunodiffusion. Widal test – Pregnancy test – ELISA

**Introduction to Immunotherapy.**

**Extra Reading/Key words:** *Visit to immunology laboratory to study the applications of immunotechniques*

**Note: Texts given in the Extra Reading / Key words must be tested only through Assignment and Seminars.**

**Course Outcomes:**

1. Explain the scope of Immunology and types ofImmunity.
2. Describe the structure and functions of lymphoid organs and LymphoidCells.
3. Explain the structures, types and properties of antigensand immunoglobulins.
4. Outline and compare the types of vaccine & Vaccinationschedule.
5. Explain Humoral, Cell mediated immune response and Complementpathway.
6. Describe the structure and function ofMHC
7. Explain and analyse the immune reactions in Organ transplantation andautoimmunity.
8. Describe the types of hypersensitivity reaction with suitableexamples.
9. Explain antigen – antibody reactions and its clinicalapplication.

**Text Book:**

Nandhini, S. (1994). Immunology- Introductory Text Book. New Age Int. (P) Ltd. Publication, New Delhi

Kuby,J. (2007) Immunology. (Sixth edition) W.H.Freeman and company, New York.

**Books for Reference:**

Kuby,J. (2007) Immunology. (Sixth edition) W.H.Freeman and company, New York.

Roitt, I. (1987) Essential Immunology. P.G. Publishing PVT. Ltd., New Delhi.

Sell,S.(1987) Basic Immunology. Elsevier Science Publishing Company.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**B.Sc. ZOOLOGY (With Specialization in Biotechnology)**
**(For the candidates admitted from 2015 onwards)**
**SEMESTER VI**
**MAJOR ELECTIVE: 3 – ENVIRONMENTAL SCIENCE**

**Total hours: 75**
**Hours/Week:5** **Code :U15ZO6MET06**
**Credits:5** **Marks:100**

**General Objective**

The student will be able understand the different types of habitats, community, characteristics of community, pollution, disasters and measures to control environment.

**Course Objectives:**
**The student will be able to**
1. analyse the components of environment, and different types ofhabitat
2. understands the characteristics of population andcommunity
3. analyse and evaluates the impacts of different types ofpollution
4. analyse the impact of fragile environment and different types ofdisasters
5. understand the laws for the conservation ofenvironment

**UNIT-I** **(15hrs)**

**Physical Environment and Habitat**

Definition and Scope of Environmental Science – **Environment:** Physical environment – Light, temperature, soil and water. Basic concepts of limiting factors - Leibig's law of minimum and Shelford's law of tolerance. **Habitat: Fresh water habitat** - lentic and lotic habitat. **Marine habitat**- Pelagic, benthic and deep sea.**Estuarine habitat** - characteristics and adaptations. **Terrestrial habitat**- characteristics. **Biomes** - Forest and desert biomes. Grass land ecosystem.

**Extra Reading/Key words:** *Fauna in the different habitat*

**UNIT-II** **(15hrs)**

**Population and Community**

**Population -** Characteristics of population, regulation of population- density dependent and density independent factors, age structure of populations. **Biotic community -** Community structure and characteristics, Ecotone and edge effect, ecological niche. **Biotic environment -** Inter specific interactions - symbiosis, commensalisms and antagonism.

**Extra Reading/Key words:** *Population explosion*

**UNIT-III** **(15hrs)**

**Environmental Pollution**

**Water pollution** – Eutrophication, Minamata episode, Post gulf war (1990) effect, Bombay high oil slick (1993), WHO standard for drinking water. **Airpollution –** Global warming, stone leprosy and Tajmahal, Bhopal tragedy, Emission standard and control measures. **Radiation pollution episodes -** Hiroshima and Nagasaki, Chernobyl, Fukushima. **Pesticide pollution -** Biomagnification, biological control, biopesticides, integrated pest management.

**Extra Reading/Key words:** *Biological control agents, biosensors*

**UNIT-IV** **(15hrs)**

**Environmental Disaster and Fragile Ecosystems**

**Environmental Disaster:** Definition, **Earth Quake -** Kashmir Earth quake 2005, **Tsunami-** Case study India - 2004, **Cyclones and Anticyclones, Floods, Drought. Natural disaster management. Fragile Ecosystem:** Coral reef ecosystem, Mangroves, Wetlands, Mountain environment.

**Extra Reading/Key words:** *Endangered coral reefs, alayathi kadugal*

**UNIT-V** **(15hrs)**

**Environmental Institutions, International Co-operation and Law**

International Union for Conservation of Nature and Natural Resources (IUCN), World Wildlife Fund (WWF), US Environmental Protection Agency (EPA), **Indian Environmental Institutions –** Ministry of Environment, Forest and Wildlife (Government of India). Central Pollution Control Board (CPCB). **Environmental Laws/Acts –** Indian Forest Act, Forest Conservation Act, Wildlife Act, Air Act, Water Act. **Environmental Movement in India –** Chipko Movement, Silent Valley Movement

**Extra Reading/Key words:** *Visit to Pollution control boards*

**Note: Texts given in the Extra Reading / Key words must be tested only through Assignment and Seminars.**

**Course Outcomes:**

1. Compare the different zones in marineenvironment.
2. Distinguish Biome andEcosystem.
3. List out the characters ofpopulation
4. Distinguish symbiosis andCommensalism.
5. Evaluate the effect of water pollution inenvironment.
6. Analyse the effect of Tsunami on theenvironment.
7. Analyse and appreciate the effects of Chipko movement and Silent Valleymovement.
8. List out the environmental laws in India for conservation ofenvironment.

**Text book:**

Veer Bala Rastogy and Jayaraj, M. S.(1980).Animal Ecology and Distribution of Animals, Kendar Nath Ram Nath, Meerut, Delhi

**Books for Reference:**

Odum, E.P. and Barrett, G.W.(2005).Fundamental of Ecology. Latest Ed., Cengage Learning India. New Delhi.

Peter, J.R., Stephan, L.W., Paule, H., Ceche, S. and Bevlerly, (2008).M. Ecology. Cengage learning India. New Delhi.

Rana, S.V. S. (2007).Essentials of Ecology and Environmental Science, Latest Ed. Prentice –Hall of India Pvt. Ltd. New Delhi.

Smith, T.M. and Smith, R.L.(2008). Elements of Ecology. Latest Ed., Pearson Education. New Delhi.

Wright, R.T.(2008).Environmental Science. Latest Ed., Pearson Education. New Delhi.

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**DEPARTMENT OF ZOOLOGY**
**B.A/ B.Sc./ B.Com/ B.C.A/B.R.Sc./BBA Degree Course**
**(For the candidates admitted from 2015 onwards)**
**SEMESTER VI**
**NON- MAJOR ELECTIVE: 2 - FIRST AID AND HOME NURSING**

**Total Hours: 30**
**Hours/Week:2** **Code:U15ZO6NMT02**
**Credits:2** **Marks:100**

**General Objective:**

The student will be able to understand and analyze the principles of first aid, home nursing, trauma first aid, advanced first aid, basic home nursing and apply at the time of emergency, illness and trauma.

**Course Objective:**
**The student will be able to**

1: understand and analyze the principles of first aid, human anatomy and first aid kits
2: understand, analyze and apply the first aid for injuries including electric shock, facial, head & spine, abdominal and epilepsy
3: understand, analyze and apply the advanced levels of first aid which includes CPR, EAR, oxygen administration, analgesic administration and also on the topics accidents and injuries
4: understand and apply the principles of home nursing in normal day today life.
5: understand, analyze and apply the first aid techniques for both adult and children in the emergency conditions.

**UNITI** **(6hrs)**

Introduction to First – Aid
Principles ofFirst-Aid - An outline of human Anatomy, Carrying Posture at emergency - First - aid Kit; Emergencycenters.
**Extra Reading/Key words:** *Emergency contact numbers in Tamil Nadu*

**UNITII** **(6 hrs)**

**Trauma First – Aid.**

Bleeding (External and Internal); Electric shock – Facial injuries (Ear injuries, Eye injuries, Tooth injuries); Head injuries ; Spinal injuries; Chest injuries; Abdominal injuries; Epilepsy/Convulsions – Cuts, Incisions and Abrasions .
**Extra Reading/Key words:** *Seizure, cerebral death*

**UNITIII** **(6hrs)**

**Advanced First – Aid**

Sprains and fractures-Bandages and slings
Expired Air Resuscitation (EAR) – Cardiopulmonary Resuscitation (CPR) - Oxygen administration – Analgesic administration; road traffic accidents; fire accidents; Burns and scales, Common minor sports injuries; back injuries.
**Extra Reading/Key words:** *Emergency contact numbers of leading hospitals and medical centers*

**UNITIV** **(6hrs)**

**Introduction to Home Nursing**

Principles of Home Nursing –Room maintenance, temperature taking, Care of the hair and skin, administration of medicines, bed making, bed pan, hot water bottle, ice cap and inhalation.

Home Remedies for general ailment.

**Extra Reading/Key words:** *Hair loss, dry skin, herbal remedies*

**UNITV** **(6hrs)**

**Childhood and adult illnesses care.** Vomiting, diarrhoea and dehydration; anaphylaxis - asthma – common cold, cough and fever; hyperventilation; fainting, stroke (Paralysis); diabetes; Blood pressure; Heart attack; Choking; Poisoning: Food, Drug Overdose; Drowning; Snake and Insectstings.

**Extra Reading/Key words:** *Poisonous snakes, ORS, 1st Golden Rule*

**Note: Texts given in the Extra Reading / Key words must be tested only through Assignment and Seminars.**

**Course outcome:**

1. Analyze the principles of firstaid
2. Explain the structures of humananatomy
3. Demonstrate different types of first aid given foremergency
4. Apply the home remedies for dailylife
5. Analyze and categorize the first aid techniques for child and adultillness

**Books for Reference:**

Bhave,V. N., Deodhar, N.S., Bhave, S.V. and Sathe R. V. (1983) You and Your Health, Vol.I, National Book Trust ,India.

First Aid to the injured. (2009) St.John Ambulance, 5th edition

Harold, S and Hubert, O.S. Your health and You, 1970.Vol I &II . The Stanborough Press Ltd, Alma Park, Grantham, Lincolnshire England.

Muthu, Era. Su. (2004) First - Aid, Sura Books (Pvt) Ltd, Chennai, Bangalore & Kolkata.

Subramanian, R. (2005). First – aid and Home – Nursing, Sindmayam Publishing,Tirunelveli.

**HOLY CROSS COLLEGE (AUTONOMOUS), TRICHIRAPPALLI-2**
**DEPARTMENT OF ZOOLOGY**
**(**For the candidates admitted from 2015 onwards)
**SEMESTER VI**
**SKILL BASED ELECTIVE: 5- ANIMAL CELL CULTURETECHNIQUES (THEORY CUMLAB)**
**(For ZoologyStudents)**

**Total Hours: 30**
**Hours/Week: 2** **Code:U15ZO6SBT05**
**Credits: 2** **Marks:100**

**General Objective:**

The student will learn the basic requirements for cell culture,itsmaintenance and recognize the applications of stem cells in biologicalscience.

**Course Objectives:**

The student will be able to
1: understand and evaluate the major components and requirements of cell culture
2: describe the steps involved in culturing of primary cell lines.
3: understand the concept of secondary cell lines and analyzing its applications.
4: understand, analyze and apply the knowledge of stem cells in stem cell bank, its applications and ethical legal issues.
5: analyze the signal transduction pathways and identifying the normal and diseased cell conditions

**UNITI** **(6hrs)**

Requirements for Animal Cell culture – Laboratory media, glass ware
1. Exercise: Preparation of media- Balanced salt solution andsterilization
**Extra Reading/Key words:** *Types of laminar hoods, Laboratory safety*

**UNITII** **(6hrs)**

Preparation of Primary cell culture
2. Exercise: Cell viability and cyto-toxicityassays.
**Extra Reading/Key words:** *Preservation of cell culture, storage of cell culture*

**UNITIII** **(6hrs)**

Maintenance of Secondary Culture, Application of Cell culture
3. Exercise: Subculturing
**Extra Reading/Key words:** *Cell therapies, gene therapies*

**UNITIV** **(6hrs)**

Stem cell – types and its applications. Stem cell bank. Ethical legal social issues. Molecular taxonomy
4. Exercise: Identification of stem cell types(Spotters)
**Extra Reading/Key words:** *Bioethics, Stem cell therapy*

**UNITV** **(6hrs)**

Signal transduction pathways: receptor- types & cellular responses in normal and diseased condition.
5. Exercise: Identification of abnormal cellular response and differentiating them from normal.

**Extra Reading/Key words:** *Molecular biology of cancer.*

**Note: Texts given in the Extra Reading/Keywords must be tested only through Assignment and Seminars.**

**Course outcomes:**

1. Develop and classify the media constituents, its formulation in establishment of cell lines and theirmaintenance.
2. Demonstrate and measure the cell viability and toxicity through *in vitro*models.
3. Explain and analyze how stem cells are specified and maintained to provide regenerative therapies.
4. Identify and explain the major signaling pathways that coordinate the cellularresponse.

**Books for Reference:**


Babiuk , L .A ., John . P.Phillips and Murray Moo-young (1989), Animal Biotechnology Pergammpress , Oxford.

Freshney. R.I. (2000), Culture of Animal cells: Manual of Basic technique, 4th edition. John WileyPublications.

Gor Dard and Lucessen, E. (1993) In-vitro Culture of Animal Cells. Butterworth – HeinemannPublications.

Stewart Sell 2003(Ed) Stem Cells Handbook, Humana Press, NY.


(For candidates admitted from 2015 onwards)

**HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-2**
**SEMESTER VI**

# RESEARCH METHODOLOGY

**Credits -2** **Hrs – 2/Week**
**Code: U15DS6SBT06**

**General Objective:**
Students get introduced to concept of research and to carryout research projects.

**Unit I Introduction to research:**

Definition - Types – Nature and Scope of Research – Research Design – Plagiarism

**Unit II – Data Collection**

Types – Primary and Secondary data collection – Data processing –Hypothesis Testing

**Unit III – Plan and Execution**

Methodology – Work Plan and Execution – Analysis –Interpretation - Documentation

**Unit IV - Format and Presentation of Project Report**

Art of writing and Structure of Project report – Viva Voce

**Unit – V Project –**

Project Work ( Applying Real Expertise in the Project Work)

**The students will be evaluated internally by a test for 50marks. The Project will be evaluated by an external evaluator and a viva-voce will be conducted for 50marks.The students can carry out their projects individually or in groups.**

**REFERENCES:**
Blaxter,L., Hughes,C. and Tight(1999) How to research? Viva Book private Limited

Kothari,C.R.(2004)research Methodology-Methods and Techniques, New Age International Publishers, India

Lal,B.(2002) Research Methodology, ABD Publishers. India

**HOLY CROSS COLLEGE ( AUTONOMOUS), TIRUCHIRAPPALLI-2**

**B.A. /B.Sc. / B.Com. / BBA/ B.C.A. DEGREE COURSE**

**LIFE ORIENTED EDUCATION**

**ETHICS – III: FAMILY AND CAREER DEVELOPMENT**

**HRS / Wk : 1** **CODE: U15VE6LVE03**

**CREDIT : 1** **MARKS : 100**

**OBJECTIVES:**

- To help the students acquire skills, knowledge and talents to lead a meaningful life.
- To make the students learn skills of nurturing family and children.
- To make the students aware of emotional intelligence and choose their career.

## UNIT – I: PERSONAL COMPETENCE

Emotional Intelligence for Professional growth, Management Vs Leadership-Management and Leadership Skills - Conflict Management - Tips for Professional growth

## UNIT – II: MARRIAGE AND FAMILY

Family Vision - Family Values, Family relationship, Family Management, Sex in Marriage, Emotional Balance and Imbalance, Compatibility between Husband and Wife

## UNIT – III: PARENTHOOD

Bringing up Children - Development stages (Eric Ericson model), Spirituality: Spirituality in Family - Prayer, God's Will , Role of Mother

## UNIT – IV: PERSONALITY DEVELOPMENT

Self Analysis; interpersonal relation, introspection – Character formation towards positive personality- Values, self and college motto, punctuality, good moral, poverty, honesty, politeness, humanity, gentleness, friendship, fellowship and patriotism

## UNIT – V: CAREER CHOICE

Career Choice according to Personality, Preparation for Competitive Exams, Sources of Knowledge, Memory Techniques, Mind Mapping

**REFERENCES:**


1. Tony B and Barry Buzan(2003), The mind map book, BBC world wide limited, London.
2. Susan Nash(2005), Turning team performance inside out, Jai CO. publishing House, New Delhi.
3. Fr. Ignacimuthu (1999) "Values for Life", Vaigarai Pathipagam.
4. Grose. D.N. (2000), "A text book on Value Education", Dominant Publishers.

**HOLY CROSS COLLEGE(AUTONOMOUS) TRICHIRAPALLI-2.**
**B.A/B.SC/B.COM/ B.C.A – DEGREE COURSES**
**LIFE ORIENTED EDUCATION**
**BIBLE STUDIES – III: ESSENCE OF CHRISTIAN LIVING**

**HRS / Wk : 1** **CODE: U15VE6LVB03**
**CREDIT : 1** **MARKS : 100**

**OBJECTIVE:**

- To prepare the students to practice Christian principles in family, church and society as young women

**UNIT – I: ESSENTIALS OF CHRISTIAN FAITH**

- Salvation – Deliverance from sin (Is 53),Assurance of salvation and New life (II Cor 5:17)
- Sacraments – Baptism (Luke 3: 6-14), Lord's Supper (I Cor 10: 16,17; 11: 23-29)
- Trinity– One in three and three in one. Illustrations from the Bible. (John 14: 16,17)
- Heaven and Eternal life (John 14: 13, 3: 13-21)

**UNIT – II: MARRIAGE AND FAMILY LIFE**

- Finding the God's Will - Issac (Gen 24)
- Man and woman as Partners – Abraham and Sarah (Gen 16-18,22), Aquila and Priscilla (Acts 18: 1-3,26)
- Evils to be avoided – Premarital Sex, Extramarital Sex, Homosexuality, Abortion(Heb 13: 4, Psalm 127 : 4)
- Ideal Wife – Sarah (I Peter 3: 1-6), Ruth,(Eph 5)

**UNIT – III: CHRISTIAN HOME**

- Parental Responsibilities and bringing up children – Abraham (Gen 22), Eli (I Sam 2: 24-36,3: 11- 18), Mary, Mother of Jesus (Luke 2: 51,52)
- Caring for the Aged (I Sam 2: 31,32)

**UNIT – IV: CHRISTIAN ETHICS**

- Holiness – Joseph (Gen 39:9) Levi 11: 45, Ecc 12
- Obedience to God - Abraham (Gen 12) ; St.Paul (Acts 9)
- Freedom and Accountability
- Justice and Love
- Choices in Life – Making Decisions (Studies, job, life Partner)
- Model to follow – Who is your model? (John 15: 1-17)
- Social Evils – Dowry, Caste discrimination, Accumulation of wealth

**UNIT – V: MISSIONARIES DOWN THE LANE**

- William Carrie (Calcutta)
- Pandithar Rama Bai (Karnataka)

- Amy Carcheal (Dohnavur)
- Dr. Ida Scuddar (Vellore)
- Devasagayam (Nagercoil)
- St. John De Britto (Oriyur)
- Graham Staines & Family (Odisha)
- St. Mother Teresa (Calcutta)

**REFERENCES:**


1. Alban Douglass (1982) One Hundred Bible Lessons. Gospel Literature Service, Mumbai.
2. Derek Prince (1993) Foundations for Righteous Living. Derek Prince Ministries-South Pacific, New Zealand.
3. Derek Prince and Ruth Prince (1986) God is a Match maker. Derek Ministries, India.
4. Ron Rhodes(2005) Hand book on Cults. Amazon.com
5. Stanley.R. (1997) With God Again. Blessing Youth Mission, India.
6. Taylor.H. (1993) Tend My Sheep. SPCK, London.

**(For Candidates admitted from June 2015 onwards)**

**HOLY CROSS COLLEGE (AUTONOMOUS) TIRUCHIRAPPALLI – 2**

**B.A./B.Sc./B.Com/BBA./B.C.A - DEGREE COURSES LIFE ORIENTED EDUCATION**

**CATECHISM – III: LITURGY AND CHRISTIAN LIFE**

**HRS / Wk : 1** **CODE:U15VE6LVC03**

**CREDIT : 1** **MARKS : 100**

**OBJECTIVES:**

- To prepare the students to participate meaningfully in the liturgical celebration and experience GOD in their day today life.
- To enable the students to become living witnesses to Jesus Christ in their personal, family and social life.

**UNIT – I: LITURGY**

Personal prayer ( Know oneself) – Vocal prayer – Community prayer – Meditation – Contemplation – Knowing the prayers : Our Father – Hail Mary – Holy Rosary – Mysteries of the Rosary- Litany of Mary – Family prayer-Popular devotion

**UNIT – II: HOLY SACRIFICE OF THE MASS**

Significance – Meaning and need for spiritual growth – Mass prayers – Part of the mass – Liturgical year, its division and its significance. – The Creed – Act of contrition – Discernment of spirits – Counseling – Spiritual direction.

**UNIT – III: CHRISTIAN VOCATION AS DISCIPLE FOR THE KINGDOM OF GOD**

Who am I as a Christian? – Christian dignity and others – The values of the Kingdom opposing to the values of the World – Christian social conscience – Christian in the reformation of the world – A call to be salt and light in today's context.

**UNIT – IV: CHRISTIAN FAMILY**

Holy Family- Characteristic of good family – Bible centered, Prayer centered, Christian centered– Responsibilities of parents and children in the family –Laws of the Church towards marriage-Pro life (Abortion, Euthanasia) – Lay Vocation – Lay Participation – Lay associates.

**UNIT – V: CONSECRATED LIFE**

"Come and follow me" – special disciples - Religious vocation – "I have called you to be mine"- Role of Nuns and Priest - called to be prophets and agents for God's Kingdom – nucleus of the church – Eschatological signs of the God's Kingdom.

**REFERENCES:**

1. Compendium – Catechism of the Catholic Church Published by Vaigarai Publishing House for the Catholic Church of India.

2. You are the light of the World, A course on Christian living for II year Religion published by Department of Foundation Courses, St. Joseph's College (Autonomous), Tiruchirappalli– 620 002.

3. Documents of Vatican II – St. Paul's Publications, Bombay 1966.