Preamble

Zoology is a vital stream of science, it gives an insight into the essence of life. It helps for the betterment of human race through various fields. It unravels the magic of co-existence and ecological balance by creating awareness of conservation of biodiversity. After completing the graduate degree the candidates have tremendous opportunities for higher studies and lots of job opportunities both in public and private sectors.

Vision: To prepare young women face the challenges of life through education, an ideal weapon for empowerment.

Mission: To impart knowledge and skills in Zoology through specialization in recently emerging technologies and thereby to produce quality graduates capable of contributing to the development of knowledge based society.

Programme Outcome:

PO.No.	**After completion of the Undergraduate programme the students of St. Mary's College will be able to**
PO-1	develop language, numerical, experimental, analytical and computing skills.
PO-2	pursue higher education programmes.
PO-3	excel in the recent trends of the world, enhancing the level of knowledge to emerge as a holistic person.
PO-4	function effectively as an individual in multidisciplinary settings and develop their ethical, social and cultural values to serve the nation.
PO-5	be proficient in the fields of Arts, Science and Management Studies to qualify for the job.
PO-6	develop their communicative skills using a range of technologies which enable them to express their ideas and views effectively.
PO-7	become an environmentally conscious citizen.
PO- 8	be an empowered and economically independent woman with efficient leadership qualities in an egalitarian society through liberative education.

Programme Specific Outcome

PSO No.	Upon completion of the B.Sc Zoology Degree programme, the graduates will be able to	PO Mapped
PSO - 1	acquire comprehensive knowledge on the extensive diversity and grades of complexity of various life forms	PO - 3
PSO - 2	explicate the interconnectedness of life and relationship between structure and functions at different levels of biological organization – molecules, cells, organs, organisms, populations and species	PO –3,7
PSO -3	explore physiological adaptations, development, reproduction and behaviour in different forms of life	PO -3
PSO - 4	master skills in the analysis and integration of biological data using statistical tools and packages	PO -6
PSO - 5	apply the knowledge of Zoology to understand the complexity of life processes and phenomena and conservation of resources and sustainability	PO - 7
PSO 6	evolve critical thinking skills/ lab techniques/virtual laboratory and capable of carrying out experiments, formulate research ideas and communicating the reports	PO –1,6
PSO 7	develop aptitude for self- employment through the entrepreneurial competence imparted through skill based courses	PO - 8
PSO -8	build foundation to cater the professional and industrial needs of the society	PO -2,5

Department of Zoology
Course Structure (w.e.f. 2021)
Semester –I

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max. Marks		
						CIA	ESE	Total
I	Tamil /	21ULTA11	பொதுத்தமிழ் தாள் - 1 இக்கால இலக்கியம் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, சிறுகதை)	6	3	40	60	100
	French	21ULFA11	Introductory French Course					
II	General English	21UGEN11	Poetry, Prose, Extensive Reading and Communicative English-I	6	3	40	60	100
III	Core I	21UZOC11	Invertebrata	6	6	40	60	100
	Core Practical I	21UZOCR1	Invertebrata	2	1	40	60	100
	Allied I	21UCHA11	Allied Chemistry - I	4	3	40	60	100
	Allied Practical I	21UCHAR1	Allied Chemistry – I Practical	2				
IV	Skill Enhancement Course - I	21UZOPE1	Professional English for Zoology - I	2	2	20	30	50
	Ability Enhancement Course – I	21UAVE11	Value Education	2	2	20	30	50
Total				**30**	**20**			

Semester II

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max. Marks		
						CIA	ESE	Total
I	Tamil /	21ULTA21	பொதுத்தமிழ் தாள் 2 சமய இலக்கியங்களும் நீதி இலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, வாழ்க்கை வரலாறு)	6	3	40	60	100
	French	21ULFA21	Intermediate French Course					
II	General English	21UGEN21	Poetry, Prose, Extensive Reading and Communicative English-II	6	3	40	60	100
III	Core II	21UZOC21	Chordata	6	6	40	60	100
	Core Practical II	21UZOCR2	Chordata	2	1	40	60	100
	Allied II	21UCHA21	Allied Chemistry – II	4	3	40	60	100
	Allied Practical I	21UCHAR1	Allied Chemistry – II Practical	2	2	40	60	100
IV	Skill Enhancement Course - II	21UZOPE2	Professional English for Zoology - II	2	2	20	30	50
	Ability Enhancement Course – II	21UAEV21	Environmental Studies	2	2	20	30	50
Total				**30**	**22**			

Semester III

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
I	Tamil / French	21ULTA31 21ULFA31	பொதுத்தமிழ் தாள் 3 :காப்பியங்களும் சிற்றிலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை,புதினம்) Advanced French Language	6	4	40	60	100
II	General English	21UGEN31	Poetry, Prose, Extensive Reading and Communicative English-III	6	4	40	60	100
III	Core III	21UZOC31	Developmental Zoology	4	4	40	60	100
	Core Practical III	21UZOCR3	Developmental Zoology	2	2	40	60	100
	Allied III	21UBOA31	Plant Diversity	4	3	40	60	100
	Allied Practical II	21UBOAR1	Plant Diversity – Practical	2				
	Skill Based Elective	21UZOS31/ 21UZOS32	A. Fishery Products B. Aquarium Management	2	2	20	30	50
	NME I	21UZON31	Basic Biotechnology	2	2	20	30	50
IV	Ability Enhancement Course - III	21UAWS31	Women's Synergy	2	2	20	30	50
	Self Study/ MOOC / Internship (Compulsory)	21UZOSS1	Wildlife Conservation		2		50	50
Total				**30**	**25**			

Semester IV

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
I	Tamil / French	21ULTA41 21ULFA41	பொதுத்தமிழ் தாள் 4: சங்க இலக்கியம்: (செய்யுள், இலக்கணம்,இலக்கிய வரலாறு, உரைநடை, நாடகம்) French Course and Literature	6	4	40	60	100
II	General English	21UGEN41	Poetry, Prose, Extensive Reading and Communicative English-IV	6	4	40	60	100
III	Core IV	21UZOC41	Biochemistry and Bioinstrumentation	4	4	40	60	100
	Core Practical IV	21UZOCR4	Biochemistry and Bioinstrumentation	2	2	40	60	100
	Allied IV	21UBOA41	Angiosperm Taxonomy and Plant Physiology	4	3	40	60	100
	Allied Practical II	21UBOAR1	Angiosperm Taxonomy and Plant Physiology and Plant Diversity – Practical	2	2	40	60	100
	Skill Based Elective	21UZOS41/ 21UZOS42	A. Clinical Laboratory Technology B. Nutrition and Health	2	2	20	30	50
	NME II	21UZON41	Applied Biotechnology	2	2	20	30	50
IV	Ability Enhancement Course - IV	21UAYM41	Yoga & Meditation	2	2	20	30	50
	Self Study / Online course / Internship (Optional)	21UZOSS2	Animal Care and Services		+2		50	50
V	NCC, NSS & Sports Extension Activities / CDP				1 +1			
Total				**30**	**26+3**			

Semester V

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
	Core V (Common Core)	21UBCC51	Biotechnology	4	3	40	60	100
III	Core VI	21UZOC51	Animal Physiology	4	4	40	60	100
	Core VII	21UZOC52	Cell Biology and Genetics	4	4	40	60	100
	Core VIII	21UZOC53	Ecology	4	4	40	60	100
	Core Practical V	21UZOCR5	Animal Physiology, Cell Biology and Genetics & Ecology	6	3	40	60	100
	Common Core Practical VI	21UBCCR1	Biotechnology	2	1	40	60	100
	Core Elective	21UZOE51 21UZOE52	A. Introduction to Research B. Evolutionary Biology	4	3	40	60	100
IV	Common Skill Based Course	21UCSB51	Computer for Digital Era and Soft Skills	2	2	20	30	50
	Self Study/ Online course / Internship (Optional)	21UZOSS3	Animal Behaviour	--	+2		50	50
Total				**30**	**24+2**			

Semester VI

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
III	Core IX	21UZOC61	Immunology and Microbiology	4	4	40	60	100
	Core X	21UZOC62	Biostatistics and Bioinformatics	4	4	40	60	100
	Core XI	21UZOC63	Marine Biology	4	4	40	60	100
	Core XII	21UZOC64	Economic Zoology	4	4	40	60	100
	Core Practical VII	21UZOCR6	Immunology and Microbiology & Biostatistics and Bioinformatics	4	2	40	60	100
	Core Practical VIII	21UZOCR7	Marine Biology & Economic Zoology	4	2	40	60	100
IV	Project	21UZOP61		6	3	40	60	100
Total				**30**	**23**			
Total				**180**	**140+5**			

Semester	Hours	Credits	Extra Credits
I	30	20	---
II	30	22	---
III	30	25	--
IV	30	26	3
V	30	24	2
VI	30	23	--
Total	**180**	**140**	**5**

Courses	**Number of Courses**	**Hours / week**	**Credits**	**Extra Credits**
Tamil	4	24	14	--
English	4	24	14	--
Core	12T+8P	52T+24P	50T+14P	--
Skill Based Elective	2	4	4	--
Core Elective	1	4	4	--
Group Project	1	6	3	--
Allied	4T+2P	16T+8P	12T+4P	--
NME	2	4	4	--
Skill Enhancement Course	2	4	4	--
Ability Enhancement Course	4	8	8	--
Common Skill Based Course	1	2	2	--
NCC, NSS & Sports		--	1	
Extension Activities		--		1
Self Study Papers (Optional)	2	--		4
Self Study Papers (Compulsory)	1	--	2	--
Total		**180**	**140**	**5**

பாடத்திட்டத்தின் நோக்கங்கள்

1. அனைத்துத் துறைமாணவர்களும் பயன்பெறும் வகையில் பாடத்திட்டம் வரையறை செய்யப்பட்டுள்ளது.
2. தமிழ் இலக்கியக் கல்வியை எளிமையுடன் ஆழமாக்கிக் கற்பிக்கும் விதமாகஇக்கால இலக்கியம் தொடங்கி சங்க இலக்கியம் வரைகற்பித்தல்.
3. தமிழ் மொழியில் பிழையின்றிக் கற்கும் விதமாக எழுத்து, சொல், பொருள், யாப்பு,அணி என இலக்கணத்தைப் பயிற்றுவித்தல்.
4. மாணவர்களின் நலன் கருதி இலக்கிய வரலாற்றுப் பகுதியானது செய்யுள்அமைப்பிற்கேற்ப வகைப்படுத்தப்பட்டுக் கற்பிக்கப்படுதல்.

பயன்கள்

1. காலந்தோறும் வளர்ந்துவரும் தமிழ்க் கவிதைகளின் வடிவினையும், கருத்தோட்டத்தினையும் மாணவியர் அறிந்துகொள்வர்.
2. தமிழ் மொழியைப் பிழையின்றி எழுதவும் பேசவும் முடியும்.
3. தன்னம்பிக்கை உருவாகும்
4. தகவல் தொடர்புச் சாதனங்கள் தமிழ் வளர்ச்சிக்குப் பயன்படுவதை அறிந்துகொள்வர்.
5. படைப்பாற்றலை வளர்த்துக் கொள்வர்.
6. தமிழ் இலக்கியங்கள் அன்று முதல் இன்றுவரை பெற்றுவரும் சிறப்பை உணர்வர்.
7. இலக்கியவரலாற்றின் வழி மொழியின் வளர்ச்சியையும் காலந்தோறும் மாறிவரும் இலக்கியங்களின் பல்வேறு வகைகளையும் தெரிந்துகொள்வர்.
8. துறைதோறும் தமிழ் மொழியின் வளர்ச்சியை அறிவர்.
9. சங்கம் வைத்துத் தமிழாய்ந்த மன்னர், புலவர், மக்கள் இவர்களின் வாழ்வியல் அறங்களைக் கண்டறிவர்.
10. பண்பாட்டுச் சிறப்பினை மொழியின் வழி அறிந்து தம் வாழ்வில் கடைப்பிடிப்பர்.
11. வேலை வாய்ப்பிற்கான தேர்வுகளில் திறமையுடன் பங்கேற்பர்.

SEMESTER - 1			
Part – 1 பொதுத்தமிழ் தாள் - 1 இக்கால இலக்கியம் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, சிறுகதை)			
Course Code: 21ULTA11	**Hrs/Week:6**	**Hrs/Semester: 90**	**Credits: 3**

Objectives:

- மாணவியருக்கு நல்ல மதிப்பீடுகளைக் கற்பித்து வாழ்வில் அவற்றைப் பின்பற்ற வழிவகுத்தல்.
- இலக்கிய மாந்தரின் வாழ்க்கை அனுபவங்கள் மூலம் வாழ்வில் பிரச்சனைகளைஎதிர்கொள்ளும் திறம், தன்னம்பிக்கை, ஆளுமைத்திறம், மொழிஅறிவு இவற்றை உருவாக்குதல்.

Course Outcome:

CO.NO	**இப்பாடத்திட்டம் மாணவியருக்கு**	**அறிவுசார் மதிப்பீடு**
CO-1	பெண் சார்ந்த விடுதலை, பொதுமைச் சிந்தனை உணர்வையும் வளர்க்கிறது	வளர்ச்சி
CO-2	இயற்கையைப் பேணுதற்கும் வாழ்வின் வளர்ச்சி நிலையை மேம்படுத்திக் கொள்ளுதற்கும் உதவுகிறது.	நடைமுறைப்படுத்துதல்
CO-3	சமய நல்லிணக்கம், ஒற்றுமை உணர்வு, இறை நம்பிக்கை இவற்றை உருவாக்குகிறது.	உருவாக்கம்
CO-4	மொழியைப் பிழையின்றி பேசவும் எழுதவும் உதவுகிறது.	புரிதல் திறன் மேம்பாடு
CO-5	தனிமனித வாழ்க்கைச் சிக்கல்கள், சமுதாயப் பிரச்சனைகள் எதிர்கொள்ளும் திறனை எடுத்துரைக்கிறது.	நடைமுறைப்படுத்துதல்
CO-6	போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல் திறன் மேம்பாடு

SEMESTER - 1			
Part – 1 பொதுத்தமிழ் தாள் - 1 இக்கால இலக்கியம் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, சிறுகதை)			
Course Code: 21ULTA11	Hrs/Week:6	Hrs/Semester: 90	Credits: 3

அலகு – 1 செய்யுள் - 2 மணி

1. தமிழ்மொழி வாழ்த்து – பாரதியார்
2. புதுமைப் பெண் - பாரதியார்
3. புதிய உலகு செய்வோம் - பாரதிதாசன்
4. உலகை மாற்றுவோம் - கவியரசு முடியரசன்
5. கண்ணீரின் இரகசியம் - அப்துல் ரகுமான்
6. மரங்கள் - மு.மேத்தா
7. கால வித்தியாசம் - வைரமுத்து
8. வையத்தை வெற்றி கொள்ள - சி.சிவரமணி
9. கவிதைப் பூங்காடு – பா.விஜய்
10. பெண் இனமே – மைத்ரேயி
11. ஹைக்கூ கவிதைகள்
12. நாட்டார் பாடல்கள்

அ. தாலாட்டுப் பாடல்

ஆ. மீனவர் பாடல்

அலகு - 2 இலக்கணம் - 1 மணி

எழுத்து

1. எழுத்து - விளக்கம்,
2. முதலெழுத்துகள், சார்பெழுத்துகள்
3. சுட்டெழுத்துகள், வினா எழுத்துகள்
4. மொழி முதல் எழுத்துகள், மொழி இறுதி எழுத்துகள்
5. வல்லினம் மிகும் இடங்கள், வல்லினம் மிகா இடங்கள்
6. மொழிப்பயிற்சி : புதுக்கவிதை, சிறுகதை, பத்திரிகைக்குச் செய்தி அனுப்புதல்

அலகு - 3 இலக்கிய வரலாறு - 1 மணி

1. புதுக்கவிதை தோற்றமும் வளர்ச்சியும்
2. சிறுகதை தோற்றமும் வளர்ச்சியும்
3. உரைநடை தோற்றமும் வளர்ச்சியும்
4. நாட்டுப்புற இயல் அறிமுகம்

அலகு - 4 உரைநடை - 1 மணி

நீயே வெல்வாய் - க.ப.அறவாணன்

அலகு – 5 சிறுகதை - 1 மணி

1. கேதாரியின் தாயார் - கல்கி
2. விடியுமா? - கு.ப.ராஜகோபாலன்
3. காலனும் கிழவியும் - புதுமைப்பித்தன்
4. கருப்பண்ணசாமி யோசிக்கிறார் - அறிஞர் அண்ணா
5. நாற்காலி - கி.ராஜநாராயணன்
6. ராஜா வந்திருக்கிறார் - அழகிரி சாமி
7. ஜோடிப் பொருத்தம் - ஜெயரதி அகஸ்டின்

SEMESTER – I			
Course Title : PART – I French Paper – I Introductory French Course			
Course Code :21ULFA11	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 3**

Objectives

To initiate a beginner to the francophonic world and to train them to make their maiden efforts in spoken and written French.

To create a number of real-life situations to make the learner express herself in the target language through experiential teaching method.

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	make the initial conversation in French	Un, Re
2.	understand the basic sentence structures and make sentences of their own	Un, Ap
3.	analyse and evaluate intercultural factors	An
4.	understand grammar and apply the acquired grammatical knowledge in solving grammar exercises	Un, Ap
5.	differentiate the French culture	An
6.	understand the French and francophonic lifestyle	Un, Re

SEMESTER – I			
Course Title : PART – I French Paper – I Introductory French Course			
Course Code :21ULFA11	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 3**

Unit 1 – Bienvenue !

1.1- Une introductionà la langue française
1.2 – Les Salutations
1.3 – Les pronoms
1.4 – Les couleurs
1.5 – Dans la classe

Unit 2 – Et vous ?

2.1 – Se présenter, demander de se présenter
2.2 – Donner des informations personnelles
2.3 – Demander et donner des coordonnes
2.4 –Artistes francophone
2.5 – Réaliser une fiche d'identité

Unit 3 – On va où ?

3.1 – Demander / Indiquer un chemin
3.2 – Comprendre un itinéraire
3.3 – Se déplacer en métro ou en bus
3.4 – Paris / Montréal : deux villes à découvrir
3.5 – Réaliser un questionnaire sur la vie dans un quartier

Unit 4 – Qu'est-ce qu'on mange ?

4.1 – Comprendre / Donner des horaires
4.2 – Faire des courses / Commander au restaurant
4.3 – Exprimer ses gouts
4.4 – Québec / France : qu'est-ce que vous mangez ?
4.5 – Créer la carte d'un bar a jus

Unit 5 – Les soldes, c'est parti !

5.1 – Situer un moment dans une année
5.2 – Parler du métro
5.3 – Demander / dire la taille et la pointure
5.4 – Décrire un objet, dire à quoi ça sert
5.5 – Demander / Dire un prix

Prescribed Textbook :

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz.*Edito A1Méthode de français*. Paris : Didier, 2016.

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Cahier d'exercises*. Paris : Didier, 2016.

Books, Journals and Learning Resources

- J.Girardet & J.Pécheur avec la collaboration de C.Gibble.*Echo A1*. Paris : CLE International, 2012.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I*. Paris : CLEInternational, 2003.
- Cocton Marie-Noëlle.*Génération 1 Niveau A1, Méthode de français et cahier d'exercices*.Paris : Didier, 2016.
- Dintilhac Anneline, De Oliveira Anouchka, Ripaud Delphine, DupleixDorothée, Cocton Marie-Noëlle.*Saison 1 Niveau 1, Méthode de français et cahierd'exercices*. Paris : Didier, 2015
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com

SEMESTER-I			
Part II General English	**Poetry, Prose, Extensive Reading and Communicative English-I**		
Course Code 21UGEN11	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits:3**

Objectives:

- To provide adequate exposure and opportunities for students to imbibe, develop, practise and use LSRW skills
- To help students read and comprehend contents in English

Course Outcome:

CO. No.	**Upon completion of this course, students will be able to**	PSO Addressed	**Cognitive Level**
CO- 1	understand and extend their listening and writing skills.	1	Un
CO- 2	apply and incorporate basic grammar and mechanics in writing.	3	Ap
CO- 3	understand literary texts in its socio-cutural contexts	2, 4	Un, Ap
CO- 4	communicate in English with confidence for employability.	3	Ap
CO- 5	appreciate and imbibe ethical and moral values through the study of the literary pieces.	5	Ap, Ev
CO- 6	construct simple sentences and short paragraphs in response to reading and writing.	8	Cr

SEMESTER-I			
Part II General English	**Poetry, Prose, Extensive Reading and Communicative English –I**		
Course Code 21UGEN11	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits:3**

Unit I –Poetry

Rabindranath Tagore – Leave This Chanting

W.W. Gibson – The Stone

Ted Hughes – Hawk Roosting

Unit II – Prose

Stephen Leacock – My Lost Dollar

J.B. Priestley – On Doing Nothing

Robin Sharma – Your Commitment to Self- Mastery: Kaizen

Unit III – Short Story

Oscar Wilde – The Model Millionaire

Leo Tolstoy – Three Questions

K.A. Abbas – The Refugee

Unit IV – Grammar

Parts of Speech – Noun, Pronoun, Article, Adjective, Verb - Modals and Auxiliaries – Types of Sentences - Subject -Verb Agreement

Unit V- Communication Skills

Vocabulary, Listening Comprehension – Speaking – Reading, Filling Forms

(TANSCHE – Module I)

Text Books:

Units I-III – To be compiled by the Research Department of English

Unit IV- Joseph, K.V. *A Textbook of English Grammar and Usage*. Chennai: Vijay Nicole Imprints Private Limited, 2006. Print.

Unit – V – CLIL (Content & Language Integrated Learning) – Module I by TANSCHE (Tamil Nadu State Council for Higher Education)

SEMESTER I			
Core I	**Invertebrata**		
Course Code: 21UZOC11	**Hrs/Week : 6**	**Hrs/Sem : 90**	**Credits : 6**

Objectives:

- To impart knowledge on invertebrate animals.
- To elaborate the organization, functional morphology, anatomy and taxonomic position of representative invertebrates.

Course Outcomes:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO- 1	explain the distinctive features of taxonomic classes within the phyla covered	1	Un
CO – 2	illustrate the important concepts in invertebrate body structure and organization, including body symmetry, body cavity, gut formation, segmentation	2	Un
CO – 3	examine the important biological processes in invertebrates, including locomotion, body support, reproduction, development, feeding, digestion, excretion, osmoregulation etc.	3	An
CO – 4	outline the ecological and economic importance of invertebrates.	3	An
CO – 5	analyse of the importance and diversity of invertebrates	5	An
CO – 6	develop basic laboratory skills including microscopy, dissection and careful observation.	6	Cr

SEMESTER I			
Core I	**Invertebrata**		
Course Code: 21UZOC11	**Hrs/Week : 6**	**Hrs/Sem : 90**	**Credits : 6**

Unit I Protozoa and Porifera

Salient features of invertebrates.

Protozoa- General characters and outline classification up to classes with Indian or local examples.

Type study: *Paramecium caudatum*: Morphology, nutrition, osmoregulation, excretion. Reproduction (Binary fission and conjugation).

General topic: Life cycle, pathogenicity and control measures of *Entamoeba histolytica.*

Porifera - General characters and outline classification up to classes with Indian or local examples.

Type study: *Leucosolenia*- External morphology – body wall – Reproduction.

General topics – Canal system in sponges

Unit II Coelenterata and Platyhelminthes

Coelenterata - General characters and outline classification up to classes with Indian or local examples.

Type study: *Obelia* – External characters and reproduction

General topic: Polymorphism in coelenterates.

Platyhelminthes - General characters and outline classification up to classes with Indian or local examples.

Type study: *Taenia solium*- Morphology and reproduction

General topic: Parasitic adaptations in Platyhelminthes

Unit III Aschelminthes and Annelida

Aschelminthes - General characters and classification up to classes with Indian or local examples.

Type study: *Ascaris* – External morphology and life cycle

General topic: Nematode parasites – *Wuchereria bancrofti, Ancylostoma duodinale*

Annelida- General characters and classification up to classes with Indian or local examples.

Type study: Earthworm – Morphology and reproduction

General topic: Biological significance of earthworm

Unit IV Arthropoda

General characters and classification up to classes with Indian or local examples.

Type of study: *Penaeus* – external morphology – reproduction and life history.

General topic: Beneficial insects (Honey bee).

Unit V **Mollusca and Echinodermata**

Mollusca -General characters and classification up to classes with Indian or local examples.

Type of study: *Pila globosa*– morphology, reproduction and nervous system

General topic: Pearl formation in bivalves

Echinodermata - General characters and classification up to classes with Indian or local examples.

Type study: *Asterias* – External morphology – water vascular system

General topic: Larval forms of echinoderms and their phylogenetic significance.

Text Books:

1. Kotpal R.L. *Modern Text Book of Zoology: Invertebrates.* Meerut: Rastogi Publications 2009.
2. EkambaranathaIyer M. and T.N. Ananthakrishnan. *A Manual of Zoology*. Vol. 1. India: S. Viswanathan Pvt Ltd 1977.

Books for Reference

1. Nair N.C. Leelavathi. S and N.A. Soundara Pandian. *Text book of Invertebrates*. Nagercoil: Saras Publication 2006.
2. Murugan. T and N. Arumugam. *Invertebrates*. Nagercoil: Saras Publication, 2006.
3. Jordan. E.L and P.S. Verma. *Invertebrate Zoology*. New Delhi: S. Chand and Company Ltd, 2007.
2. Mary. S. Gardiner. *The Biologyof Invertebrates*. New York : Mc Graw-Hill Book Company 1972.
5. Robert. D Barnes. *Invertebrate Zoology*. Japan Holt Saunders, International Editions 1982.

Websites for Reference

http://www.enchantedlearning.com/subjects/invertebrates/index.shtml

http://animalkingdom.net/category/invertebrates/

http://animaldiversity.org/

PRACTICALS

Course Code: 21UZOCR1

Hrs / Week – 2 **Credit: 1**

I. Dissections

Cockroach: Digestive system and Nervous system

II. Mountings

Cockroach: Mouthparts

Earthworm: Body setae and pineal setae

Prawn: Appendages

III. Spotters

Studies of the animals with classification upto order with ecological importance of the following animals :

Paramecium, Entamoeba histolytica, Leucosolenia, Sycon, Obelia colony, *Physalia, Taenia solium, Fasciola, Ascaris lumbricoides,* (male & female), *Wuchereria bancrofti, Anchylostoma*, Earthworm, Nereis, *Penaeus, Oryctus rhinoceros, Pila*, Sepia, *Asterias*, Sea cucumber.

Observation of the following permanent slides

Taenia solium- scolex, larval forms of *Fasciola hepatica* (Redia, cercaria), larval forms of *Penaeus* (nauplius, zoea, protozoea, mysis), larval forms of Echinoderms (bipinnaria, auricularia).

IV. Collection and submission of any five invertebrate specimens

Books for Reference

1. Nair N.C. Arumugam N. Leelavathi. S. Soundara Pandian N. and T. Murugan. *Practical Zoology Invertebrata Vol. 1*. Nagercoil: Saras Publication 2013.
2. Richard A. Boolootain and Donald Heyneman. *An Illustrated Laboratory Text in Zoology*. U.S.A: Holt, Rinehart and Winston 1977.

SEMESTER I			
PROFESSIONAL ENGLISH FOR ZOOLOGY – I			
Course Code:21UZOPE1	**Hrs/ Week : 2**	**Hrs/ Sem : 30**	**Credits : 2**

Objectives:

- To develop language and communication skills of the students by offering adequate practice in professional contexts.
- To enhance competence in reading, writing, listening and speaking.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	implement their skills in conversing with confidence in an intelligible and acceptable manner	7,8	Ap
CO-2	apply their reading skills to read unfamiliar scientific texts independently and comprehend it	7,8	Ap
CO-3	infer the significance of scientific writing and apply it for writing scientific articles in journals	7,8	Un
CO-4	identify the various types of sentences and use them in the relevant context	7,8	Ap
CO-5	listen to lectures and interpret critically	7,8	Ev
CO-6	develop their communication and presentation skills	7,8	Cr

SEMESTER I			
PROFESSIONAL ENGLISH FOR ZOOLOGY – I			
Course Code:21UZOPE1	**Hrs/ Week : 2**	**Hrs/ Sem : 30**	**Credits : 2**

UNIT 1: COMMUNICATION

Listening: Listening to instructions and following– Instructions to use microscope.

Speaking: Pair walk- dialogue between a patient and nutritionist (formal conversation)

Reading: Comprehension passage - Professor Har Gobind Khorana.

Writing: Developing stories from pictures - Life Cycle / Metamorphosis of a Butterfly

Vocabulary: Unit specific - Incorporated into the LSRW tasks

UNIT 2: DESCRIPTION

Listening: Listening to descriptive video clip and gist writing - How to grow Hibiscus cutting in water.

Speaking: Role play - Conversation between a Zoology teacher and a student

Reading: Skimming/Scanning - Ultra sound scanning machine

Writing: Compare and contrast expressions – plant and animal cell

Vocabulary: Unit specific - Incorporated into the LSRW tasks

UNIT 3: NEGOTIATION STRATEGIES

Listening: Listening to interviews of specialist - Mario Molina (Ozone scientist)

- https://www.youtube.com/watch?v=iGf4TGHO_Jc

Speaking: Brain storming - Mind Mapping**(**Microorganisms)

Reading: Passage reading - The basic macronutrients and micronutrients

Writing: Essay Writing - Essay on Conservation of Nature

Vocabulary: Unit specific - Incorporated into the LSRW tasks

UNIT 4: PRESENTATION SKILLS

Listening: Listening to lecture and syllabification - Iron deficiency (https://www.youtube.com/watch?v=Q3b-Vsh5NEo)

Speaking: Preparation for a short speech - Chocolate is a psycho addictive food

Reading: Reading comprehension passage - Louis Pasteur-Synonyms

Writing: Recommendations (Using laptop or PC)

Vocabulary: Unit specific - Incorporated into the LSRW tasks

UNIT 5: CRITICAL THINKING SKILLS

Listening: Listening and comprehending – Introduction to enzymes

Speaking: Making a power point presentation - Do's and Dont's.

Reading : Note making - Water cycle

Writing: Problem and Solution essay - Non-biodegradable waste

Vocabulary: Unit specific - Incorporated into the LSRW tasks

Books for Reference

English for Life Sciences, Tamil Nadu State Council for Higher Education (TANSCHE)

SEMESTER I			
Allied I	**Invertebrate & Chordate Zoology**		
Course Code: 21UZOA11	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Objectives:

- To enlighten the students about the diverse forms of invertebrates and vertebrates
- To develop broad foundational knowledge of the extreme diversity in animal form, function, adaptation and natural history.

Course outcome:

Co. No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	differentiate the invertebrate and chordate animals	1	Un
CO-2	identify the common and distinctive features of invertebrate phyla	2	Re
CO-3	associate the parasitic adaptation through their mode of life	3	Un
CO-4	analyse the unique features and evolutionary relationship between each chordate group	1	An
CO-5	apply the knowledge of biological diversity to our daily life and conservation of bioresources	5	Ap
CO-6	evaluate the interaction of organisms with environment and their adaptive mechanisms	3	Ev

SEMESTER I			
Allied I	**Invertebrate & Chordate Zoology**		
Course Code: 21UZOA11	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

UNIT I

General characters of invertebrates

Protozoa: General characters–*Paramecium caudatum*–external morphology – reproduction – binary fission and conjugation

Porifera: General characters

Leucosolenia - external morphology

Coelenterata: General characters

Obelia - structure

General Topics: Protozoan parasites – *Entamoeba histolytica*

UNIT II

Platyhelminthes: General characters - *Fasciola hepatica* - external morphology and life cycle Annelida: General characters – *Hirudinaria* (Leech) – external morphology

General Topic: Human Helminth parasites – *Ascaris lumbricoides* – life cycle, pathogenecity and control measures

UNIT III

Arthropoda: General characters – *Periplaneta americana* - external morphology and digestive system – mouth parts of honey bee.

Mollusca: General characters

Lamellidens marginalis - external characters

Echinodermata: General characters

Asterias rubens – external characters

UNITIV

General characters and outline classification of

Chordata upto classes Pisces: General characters

– *Scoliodon* – external characters

Amphibia: General characters – *Rana hexadactyla* - external characters and respiratory system. Reptilia: General characters

Calotes versicolor – external characters.

General topic: Identification of poisonous and non poisonous snakes

UNIT V

Aves: General characters - *Columba livia* – external characters

Mammalia: General characters – *Oryctolagus cuniculus*–external characters and urinogenital system.

General topic: Adaptations of aquatic mammals.

Text Books

1. Nair, N.C, Leelavathi, S and Soundara Pandian, N.A. *Text book of Invertebrates*. Nagercoil: Saras Publication, 2006.
2. Thangamani. A, Prasanna Kumar. S. Narayanan. L.M, and Arumugam, N. *Chordata*. Nagercoil: Saras Publication, 2006.

Books forReference

1. Ekambaranatha Ayyer M.A and Viswanathan S. *Manual of Zoology*. Vol I Chennai : Viswanathan Printers and Publishers, 1993.
2. Ekambaranatha Ayyer M.A and Viswanathan S. *Manual of Zoology*. Vol II Chennai : Viswanathan Printers and Publishers, 1993.
3. Arumugam N. *Text Book of Chordates*. Revised edition. Nagercoil: Saras Publication, 2010.
4. Jordon E.C and Verma P.S. Invertebrate Zoology. Revised edition. New Delhi : S. Chand and Company Ltd., 2009.
5. Shukla G.S. and Upadhyay V.B. Economic Zoology. First edition. Meerut : Rastogi Publication,1985.

PRACTICALS

Course Code : 21UZOAR1

Hrs/Week–2 **Credit–1**

Cockroach : Digestive system
Mounting**:**
Honey bee – Mouth parts
Earth worm – Body setae
Shark – Placoid scale
Virtual dissection
Frog (Respiratory System)

Slides/ Models/ Charts:
Invertebrata: *Paramecium caudatum*, *Leucosolenia*, *Obelia*, *Entamoeba histolytica, Fasciola hepatica, Ascaris lumbricoides* (male and female), sea anemone, hermit crab, *Asterias*, redia and cercaria

Chordata: *Amphioxus*, *Scoliodon*, *Naja naja*, *Rana hexadactyla*, *Columba livia*, aquatic mammals - *Orcinus* (killer whale) and *Delphinus* (dolphin)

Books forReference

1. Leelavathy S., Soundara Pandian N. and Murugan T. *Practical Zoology* Vol. I *Invertebrata.* Nagercoil : Saras Publication, 2013.
2. Verma P.S. *A manual of Practical Zoology, Chordates*. Ramnagar, Delhi: S. Chand and Company Ltd, 2008.

SEMESTER - I			
Ability Enhancement Course -Value Education			
Code : 21UAVE11	**Hrs/Week : 2**	**Hrs / Semester: 30**	**Credits : 2**

Unit I: Introduction to Value Education

Concept of Values -Types of Values- Approaches to values - Benefits of Value Education-Characteristics of Values

Unit II: Human Values

Human Values -Sources of Human Values - Love -Compassion - Gratitude - Courage - Optimism - Forgiveness- the need and urgency to reinforce Human Values

Unit III: Social Values

Role of family and society in teaching values - Role of educational institutions in inculcating values-Three general functions of education for society-Self-Reflection- Our society's needs - Social Responsibilities of a student

Unit IV: Spiritual Values

Spiritual Values - Spiritual Development -Moral Development - Importance of Spiritual Values - Cultivation of Spiritual Values -Five most common spiritual values - Spiritual Resources

Unit V: Values for Life Enrichment

Goal Setting - Building relationship - Friendship - Love relationship - Family relationship - Professional relationship Interpersonal Relationship -Essential Life Skills that Help in Students Future Development-Life Enrichment Skills Domain

Books for Reference:

1. Sneha M. & K. Pushpanadham Joshi. *Value Based Leadership in Education Perspective and Approaches,* Anmol Publications Pvt. Limited, 2002.
2. Venkataiah.N. *Value Education,* APH Publishing, 1998
3. Pramod KumarM.*A Handbook on Value Education,* Ramakrishna Mission Institute of Culture (RMIC) 2007
4. Jagdosh Chand.*Value Education*. Shipra Publication 2007
5. Indrani Majhi (Shit)Ganesh Das, *Value Education,* Laxmi Publication Pvt. Ltd., 2017
6. Arumugam, N. S. Mohana, Lr.Palkani, *Value Based Education,* Saras Publication 2014

SEMESTER - II			
Part -1 பொதுத்தமிழ் - தாள் 2 சமய இலக்கியங்களும் நீதி இலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு,உரைநடை, வாழ்க்கை வரலாறு)			
Course Code: 21ULTA21	**Hrs/Week:6**	**Hrs/ Semester : 90**	**Credits :3**

Objectives:

- வாழ்வியல் நன்னெறிகளான மனிதநேயம், சமத்துவம் போன்றவற்றை வளர்த்துக் கொள்ளக் கற்றுக் கொடுத்தல்
- அறநெறியைக் கடைப்பிடிப்பதே நிலையானதும் நீடித்ததுமான நன்மையைத் தருவது என்பதைச் சான்றோரின் வாழ்க்கை நெறிகள் மூலம் உணரச்செய்தல், மொழி அறிவு, இலக்கிய அறிவு இவற்றை வளர்த்துக் கொள்ளக் கற்றுக் கொடுத்தல்

Course Outcome

CO.No.	இப்பாடத்திட்டம் மாணவியருக்கு	அறிவுசார் மதிப்பீடு
CO-1	இறை ஆற்றலை உணர்ந்துகொள்ள உதவுகிறது	மதிப்பீடு
CO-2	நல்ல நண்பர்களையும் நல்ல மனிதர்களையம் இனம் கண்டுகொள்ளவும், அன்பு, இரக்கம், நற்சொல், நற்செயல் போன்ற நற்பண்புகளோடு வாழவும் வழி வகுக்கிறது.	நடைமுறைப்படுத்துதல்
CO-3	மனித நேய பண்புகளோடு வாழ்ந்த சான்றோரின் அனுபவங்களைப் பெற்றுக்கொள்ள உதவுகிறது	நடைமுறைப்படுத்துதல்
CO-4	தனிமனித வாழ்க்கைச் சிக்கல்களையும் பிரச்சனைகளையும் எதிர்கொள்ளும் ஆற்றலை உருவாக்குகிறது.	நடைமுறைப்படுத்துதல், திறன் மேம்பாடு
CO-5	இறைவன் முன் அனைவரும் சமம் என்ற சிந்தனையை உருவாக்குகிறது.	மதிப்பீடு
CO-6	போட்டித்தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல்

SEMESTER - II			
Part -1 பொதுத்தமிழ் - தாள் 2 சமய இலக்கியங்களும் நீதி இலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, வாழ்க்கை வரலாறு)			
Course Code: 21ULTA21	**Hrs/Week:6**	**Hrs/ Semester : 90**	**Credits :3**

அலகு - 1 செய்யுள் - 2 மணி

சமய இலக்கியங்கள்

இறைவணக்கம் - திருநாவுக்கரசர்

சைவம் 1. தேவாரம் - திருஞான சம்பந்தர், திருநாவுக்கரசர், சுந்தரர்

2. திருவாசகம் - மாணிக்கவாசகர்

3. திருமந்திரம் - திருமூலர்

4. திருப்புகழ் - அருணகிரி நாதர்

வைணவம்: 1. திருப்பாவை - ஆண்டாள்

2. திருவாய்மொழி- நம்மாழ்வார்

பௌத்தம்: மணிமேகலை - சீத்தலைச் சாத்தனார்

கிறித்தவம்: 1. தேம்பாவணி - வீரமாமுனிவர்

2. இயேசு காவியம் - கவிஞர் கண்ணதாசன்

இசுலாமியம்: பேட்டை ஆம்பூர் அப்துல் காதிர் சாகிபு பாடல் - சக்கறாத்து நாமா

நீதி இலக்கியங்கள்

1. திருக்குறள் - ஊக்கமுடைமை
2. நாலடியார் - 1. நன்னிலைக் கண்

2. உறங்கும் துணையது
3. பழமொழி நானூறு- 1. பொல்லாத சொல்லி

2. வருவாய் சிறிதெனினும்

அலகு - 2 இலக்கணம் - 1 மணி

1. சொல்லின் பொது இலக்கணம்
2. ஓரெழுத்து ஒருமொழி, சொல்லின் வகைகள்
3. பெயர்ச்சொல் - அறுவகைப் பெயர்கள்
4. வினைச்சொல் - வகைகள்- முற்று, எச்சம், ஏவல், வியங்கோள், செய்வினை, செயப்பாட்டுவினை, தன்வினை, பிறவினை
5. இடைச்சொல் - ஏகார, ஓகார, உம்மை இடைச்சொற்கள்
6. உரிச்சொல் - இலக்கணம், வகைகள்

மொழிப்பயிற்சி–ஒலி வேறுபாடு அறிதல்

அலகு - 3 இலக்கிய வரலாறு – 1 மணி

1. சைவ இலக்கியங்கள்
2. வைணவ இலக்கியங்கள்
3. கிறித்தவம் தமிழுக்குச் செய்த தொண்டு
4. இசுலாமியம் தமிழுக்குச் செய்த தொண்டு
5. பதினெண் கீழ்க்கணக்கு நூல்களில் 11 அறநூல்கள்

அலகு - 4 உரைநடை - 1 மணி

நிறைவான வாழ்க்கைக்கு நேரம் ஒதுக்குங்கள் - ஜே.மௌரஸ்

(10 முதல் 19 வரை உள்ள கட்டுரைகள்)

அலகு – 5 வாழ்க்கை வரலாறு - 1 மணி

மனிதமே புனிதம் - சுடர்ந்தெழு - முனைவர் அருட்சகோதரி ஆ.மரிய சாந்தி

SEMESTER – II			
Course Title : PART – I French Paper – II Intermediate French Course			
Course Code :21ULFA21	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 3**

Objectives

To develop and improve upon the acquisition of four competencies of language learning.

To motivate the learner through role plays as to create real life situations. To prepare her for the real communication challenges.

Course Outcomes

CO	**At the end of this course, the students will be able to**	**CL**
1.	listen, understand and make basic conversation in French	Un, Ap
2.	demonstrate proficiency in vocabulary	Re, Ap
3.	be involved in simulation and role-play	Re, Ap
4.	analyse her culture and compare it with French Culture	Re, Un
5.	create passages on her own	Ap, Cr
6.	get a gist of the French literature	Un

SEMESTER – II			
Course Title : PART – I French Paper – II Intermediate French Course			
Course Code :21ULFA21	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 3**

Unit 1 – C'est quoi le programme ?

1.1 –Parler de ses activités quotidiennes
1.2 – Demander/ Dire l'heure
1.3 – Proposer/ fixer / accepter ou refuser un rendez-vous.
1.4 – Réserver par téléphone
1.5 – Créer un mini-article sur un loisir

Unit 2 – Félicitations !

2.1 – Comprendre un arbre généalogique
2.2 – Présenter sa famille
2.3 – Féliciter / adresser un souhait
2.4 – Décrire le physique et le caractère d'une personne
2.5 – Créer les personnages d'une famille pour un film

Unit 3 – Chez moi

3.1 – Comprendre un état des lieux simple
3.2 – Se renseigner sur un logement
3.3 – Comprendre un règlementintérieur d'immeuble
3.4 – Exprimer des règles de vie commune
3.5 – S'excuser dans un message

Unit 4 – Bonnes vacances

4.1 – Comprendre un site de réservation en ligne
4.2 – Exprimer la préférence / Hésiter
4.3 – Ecrire un mail formel / une carte postale
4.4 – Exprimer des sensations, une émotion positive, la surprise
4.5 – Ecrire une liste de voyage

Unit 5 – Le texte littéraire

5.1. Le Petit Prince (Chapitre 1) - Antoine de Saint Exupéry
5.2. La colombe poignardée et le jet d'eau – Calligramme - Guillaume Apollinaire

Prescribed Textbook :

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1Méthode de français*. Paris : Didier, 2016.

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Cahier d'exercises*. Paris : Didier, 2016.

Books, Journals and Learning Resources

- J.Girardet&J.Pécheur avec la collaboration de C.Gibble.*Echo A1*. Paris : CLE International, 2012.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I*. Paris : CLEInternational, 2003.
- Cocton Marie-Noëlle.*Génération 1 Niveau A1, Méthode de français et cahier d'exercices*.Paris : Didier, 2016.
- Dintilhac Anneline, De Oliveira Anouchka, Ripaud Delphine, DupleixDorothée, Cocton Marie-Noëlle.*Saison 1 Niveau 1, Méthode de français et cahier d'exercices*. Paris : Didier, 2015
- Apollinaire Guillaume, *Calligrammes :Poèmes de la paix et de la guerre 1913-1916*.Paris: Gallimard, 1966.
- Antoine de Saint-Exupéry.*Le Petit Prince*. Paris : Gallimard, 2007.
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com

SEMESTER-II			
Part II General English	**Poetry, Prose, Extensive Reading and Communicative English –II**		
Course Code 21UGEN21	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits:3**

Objectives

- To help students realise how life, literature and language are closely connected
- To expose students to language skills through the core subjects

Course Outcome:

CO.No.	**Upon completion of this course, students will be able to**	PSO Addressed	**Cognitive Level**
CO-1	enhance their vocabulary through the texts.	1	Un
CO- 2	demonstrate effective communication skills.	3	Un, Ap
CO- 3	comprehend passages and interpret on their own.	1,2	Un, Ap
CO- 4	construct paragraphs and essays, make notes and sum up passages.	8	An
CO- 5	analyse literary pieces and inculcate ethical values.	5	An
CO- 6	evaluate how language and literature are closely related to life.	5,6	Cr

SEMESTER-II			
Part II General English	**Poetry, Prose, Extensive Reading and Communicative English–II**		
Course Code: 21UGEN21	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits:3**

Unit I –Poetry

William Wordsworth – Resolution and Independence
Henry W. Longfellow – Psalm of Life
Toru Dutt – The Lotus

Unit II – Prose

A.G. Gardiner – On Courage
Desmond Morris – A Little Bit of What You Fancy
Kalpana Chawla – The Sky is the Limit

Unit III – Short Story

Saki – Mrs. Packletide's Tiger
Liam O'Flaherty – The Sniper
Langston Hughes – Thank You Ma'am

Unit IV – Grammar

Tenses: Present, Past and Future

Unit V- Communication Skills

Listening, Reading, Pronunciation, Key Functions, Speaking (TANSCHE - Module - II)

Text Books:

Units I-III – To be compiled by the Research Department of English

Unit – IV - Joseph, K.V. *A Textbook of English Grammar and Usage*. Chennai: Vijay Nicole Imprints Private Limited, 2006.

Unit - V – CLIL (Content & Language Integrated Learning) – Module II by TANSCHE (Tamil Nadu State Council for Higher Education)

SEMESTER II			
Core II	**Chordata**		
Course Code: 21UZOC21	**Hrs/ Week : 6**	**Hrs/ Sem : 90**	**Credits : 6**

Objective:

- To impart information on the morphology and comparative anatomy of chordates.
- To provide knowledge on the organization and diversity of chordates.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain the fundamental organization of chordates.	1	Un
CO-2	discuss the basic concepts of chordate diversity	3	Un
CO-3	analyze the characters of different classes of the chordates	2,3	An
CO-4	categorize the inclusion of different representative animals in particular class	2	An
CO-5	evaluate the correlation of structural organization of chordates from evolutionary point of view	1	Ev
CO-6	compare the anatomical features and their respective functions in chordate animals	2	An

SEMESTER II			
Core II	**Chordata**		
Course Code: 21UZOC21	**Hrs/ Week : 6**	**Hrs/ Sem : 90**	**Credits : 6**

Unit I Chordata- Prochordata

Chordata introduction - General characters of chordates and classification up to classes with examples. General characters of prochordates, Type study: *Amphioxus*- external morphology - digestive and excretory system. External morphology and biological significance of the following – *Ascidian, Balanoglossus*. General characters of vertebrates, Agnatha - General characters -Type study: Petromyzon - External morphology, breeding and migration.

Unit II Pisces and Amphibia

Pisces: General characters and classification up to sub-classes with examples. Type study: *Scoliodon sorrakowah* - Fins and scales, digestive system, respiratory system, circulatory system, sense organs, reproductive system - General topic: Migration of fishes

Amphibia: General characteristics and classification up to orders with examples. Type study: *Rana hexadactyla* – External morphology, skin, digestive, respiratory, circulatory and nervous system, reproductive system, General topic: Parental care in Amphibia

Unit III Reptilia and Aves

Reptilia: General characters and classification up to order. Type study: *Calotes* - External morphology, digestive system and circulatory system only. General Topic: Identification of poisonous and non poisonous snakes.

Aves: General characteristics and classification up to subclasses. Type study: *Columba livia* - external morphology, flight muscle, digestive system, respiratory system, urinogenital system. General topic: Migration in birds and flight adaptations of birds.

Unit IV Mammalia

Mammalia: General characteristics and classification up to subclasses with examples. Type study: *Oryctolagus cuniculus* – dentition, digestive system, respiratory system, circulatory system, urinogenital system. General topics: Egg laying mammals and adaptations of aquatic mammals.

Unit V Comparative Anatomy

Comparative anatomy: Respiratory system- skin, gills, lungs, air sacs, air bladder and accessory respiratory organs in fishes. Circulatory system – Evolution of heart and aortic arches, venous system and lymphatic system.

Text Books

1. Kotpal R.L. *Modern Text Book of Zoology - Vertebrates.* Meerut: Rastogi Publications. 2019.
2. Jordan E.L and Verma P.S. *Chordate Zoology.* New Delhi: S. Chand & Co Ltd. 2006.
3. Thangamani. A, Prasanna Kumar. S. Narayanan. L.M, N. Arumugam. *Chordata.* Nagercoil: Saras Publication. 2006.

Books for Reference

1. Ekambaranatha Iyer M., Anantha Krishnan T.N. *Manual of Zoology Vol II* Chennai: S. Viswanathan Pvt Ltd. 1995.
2. Jordan E.L and Verma P.S. *Chordate Zoology.* New Delhi: S. Chand & Co. Ltd. 2006.
3. Newman. H.H. *The Phylum Chordata.* Motikala: Satish Book Enterprise.1987.
4. Prasad S.N. *Vertebrate Zoology.* Allahabad: Kitab Mahal Private Ltd. 2005.

Practicals

Course Code: 21UZOCR2

Hrs / Week – 2 **Credit-1**

1. Dissections and mountings:

Fish - Digestive system

Frog - Arterial system (virtual dissection)

Frog - Venous system (virtual dissection)

Scoliodon - Placoid scales

Teleost fish - Ctenoid and cycloid scales

Frog - Brain (virtual dissection)

Feathers - Observation of barbs and barbules

2. Museum specimens: slides/ models/ charts.

Prochordata - *Amphioxus, Balanoglossus,* Ascidian

Agnatha - *Petromyzon*

Pisces - *Scoliodon,* Eel, *Narcine, Hippocampus,*

Amphibia - *Rhacophorus,* Salamander, *Ichthyophis*

Reptilia - Draco, Typhlops, *Naja naja,* Krait, Dryophis, Chameleon

Aves –*Columba livia*, Quill feather, Kingfisher, *Archaeopteryx*

Mammalia - Bat, *Oryctolagus cuniculus*, Platypus

3. Collection of any five locally available fishes.

Books for Reference

1. Verma, P.S. *A Manual of Practical Zoology – Chordates.* New Delhi: S. Chand & Company Ltd. 2008.
2. Jeyasurya, L.M. Narayanan, Thangamani and Prasanna Kumar. *Practical Zoology - Vol-2 Chordata.* Nagercoil: Saras Publication. 2013.
3. Richard A. Boolootian/ Donald Heyneman. *An illustrated laboratory text in Zoology.* U.S.A: Holt, Rinehart and Winston. 1997.

SEMESTER II			
PROFESSIONAL ENGLISH FOR ZOOLOGY – II			
Course Code: 21UZOPE2	**Hrs/ Week : 2**	**Hrs/ Sem : 30**	**Credits : 2**

Objectives:

- To prepare the students of life sciences for exuberant science communication.
- To develop language and communication skills of the students by offering adequate practice in professional contexts.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	interpret scientific illustrations and develop paragraphs and essays	2,7	Un
CO-2	write passages by comparing and contrasting the salient features of living organisms	2,7,8	Re
CO-3	illustrate descriptive processes in the biological system	2,8	Un
CO-4	identify problems and suggest solutions for environmental sustainability by case studies	7	Re
CO-5	deliver lectures on various scientific topics by identifying the context	8	Re
CO-6	integrate the different methods of notes making for efficient annotation of lectures	6,8	Cr

SEMESTER II			
PROFESSIONAL ENGLISH FOR ZOOLOGY – II			
Course Code: 21UZOPE2	**Hrs/ Week : 2**	**Hrs/ Sem : 30**	**Credits : 2**

UNIT 1: COMMUNICATION

Listening: Listening to an audio text - Importance of water for the lives on earth.

Speaking: Group conversations - Informal discussion in a small group making plans for a get-together.

Reading: Passage reading - Vertebrates and invertebrates

Writing: Narration of story from pictures – Story of an elephant

Vocabulary: Unit specific - Incorporated into the LSRW tasks

UNIT 2: DESCRIPTION

Listening: Illustration of a descriptive process - Induced fertilization in fish

Speaking: Role play - Interview with a famous scientist

Reading: Descriptive reading - What Happened to the Reptiles? (Zai Whitaker)

Writing : Single sentence and extended definitions

Vocabulary: Unit specific - Incorporated into the LSRW tasks

UNIT 3: NEGOTIATION STRATEGIES

Listening : Listening to a passage - The Crescograph ("J.C.Bose" by Aldous Huxley)

Speaking: Small group discussion - Genetically modified crops.

Reading: Passage reading- Fashion Trends.

Writing: Developing essay from the passage -Healthy diet.

Vocabulary: Unit specific-Incorporated into the LSRW tasks.

UNIT 4: PRESENTATION SKILLS

Listening : Listening to lectures and notes taking-

(https://www.youtube.com/watch?v=Dh9ptiJj7TE)

Speaking: Organized speech – Frustrations of colour-blind people. (informative)

Reading: Comprehensive passage - Digestive System and answering questions.

Writing: Descriptive writing – Interpretation - Animals for ever (Gerald Durrell's)

Vocabulary: Unit specific - Incorporated into the LSRW tasks.

UNIT 5: CRITICAL THINKING SKILLS

Listening: Listening for information - Introduction to enzymes

Speaking: Preparation of Power Point presentation – Small group discussion on errors in power point presentation (History of Zoology)

Reading : Note making **–** Professional Competence and Professional Ethics

Writing: Summary writing - Human immune system.

Vocabulary: Unit specific-Incorporated into the LSRW tasks.

Books for Reference:

English for Life Sciences, Tamil Nadu State Council for Higher Education (TANSCHE)

SEMESTER II			
Allied II	**Genetics, Physiology and Developmental Zoology**		
Course Code: 21UZOA21	**Hrs/ Week:4**	**Hrs/ Sem:60**	**Credits:3**

Objectives:

- To highlight the importance of genetics, physiology and developmental zoology to the students
- To learn the developmental stages, structure and functions of various organ systems of human.

Course outcomes

CO. No	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	explain the importance of genetics and welfare of human society	2	Un
CO-2	list out the nutritive components in the food	2	Re
CO-3	describe the physiology of digestion, respiration and excretion	3	Re
CO-4	appraise the structure and function of human nervous system and the process of nervous conduction	1,2	An
CO-5	illustrate the anatomy, physiology of human reproductive system, fertilization and post fertilization events	3	Un
CO-6	categorize the types of contraceptive devices and suggest treatment for infertility.	3,8	An

SEMESTER II			
Allied II	**Genetics, Physiology and Developmental Zoology**		
Course Code: 21UZOA21	**Hrs/ Week:4**	**Hrs/ Sem:60**	**Credits:3**

Unit I Genetics

Simple Mendelian traits in man – multiple alleles – ABO blood group – Rh factor in man – erythroblastosis foetalis – sex determination in man- sex linked inheritance in man – haemophilia and colour blindness – nondisjunction - Down's and Klinefelter's syndrome.

Unit II Physiology - Digestion

Nutrition: Food constituents – carbohydrates, proteins and fats. Digestion: Role of enzymes in the digestion of carbohydrates, proteins and fats. Absorption: Absorption of digested food.

Unit III Respiration and Nervous Co-ordination

Respiration : Haemoglobin – transport and exchange of oxygen and carbon dioxide. Nervous co–ordination: Structure and types of neurons – conduction of nerve impulse through neuron and synapse.

Unit IV Excretion and Reproduction

Excretion: Structure of kidney and nephron - urine formation. Reproduction: Structure of human testis and ovary, Graafian follicle, menstrual cycle and its hormonal control, menopause.

Unit V Developmental Zoology

Man - structure of sperm and ovum – fertilization – cleavage, gastrulation – fate map. Placenta in mammals – types (diffuse, cotyledonary and discoidal) and functions – Birth control measures – contraceptive devices, infertility - ART, IVF, IUI, Twins.

Text Books:

1. Verma P.S., Tyagi B.S.& Agarwal V.K. *Animal Physiology.* 6thEdition. New Delhi: S. Chand & Company Ltd. 2000.
2. Verma P.S. and Agarwal V.K. *Chordate Embryology.* 10th Edition. New Delhi: S. Chand & Company Ltd. 2010.
3. Meyyan R.P. *Genetics.* Nagercoil: Saras Publication. 2007.

Books for Reference:

1. Verma P.S. and V.K. Agarwal. *Cell Biology*, Genetics, Molecular Biology, Evolution & Ecology. New Delhi: S. Chand & Company Ltd. 2013.
2. Arumugam N. *Developmental Zoology*. Nagercoil: Saras Publication. 2009.
3. Meyyan R. P. *Genetics.* Nagercoil: Saras Publication. 2007.
4. Verma P.S. Tyagi B.S. & Agarwal V.K. *Animal Physiology*, 6th Edition. New Delhi: S. Chand & Company Ltd. 2000.

PRACTICALS

Course Code : 21UZOAR1 **Hrs/ Week : 2** **Credit: 1**

1. Simple Mendelian traits in man
2. ABO blood grouping
3. Qualitative tests for glucose, protein and lipid
4. Examination of excretory products (ammonia, urea and uric acid crystals)
5. Museum specimens: Slides/ Charts/ Models
   Sex linked inheritance of colour blindness, haemophilia, Down syndrome. Frog - sperm and egg, diffuse placenta (pig), cotyledonary placenta (sheep). Villus, nephron, neuron, human sperm and human egg

Book for Reference:

1. Jeyasurya, Dulsy Fatima, Kumaresan and Selvaraj. *Practical Zoology* Volume -3. Nagercoil: Saras Publication. 2013.

Semester – II			
Environmental Studies			
Course Code : 21UAEV21	**Hrs/ Week : 2**	**Hrs/Sem:30**	**Credits : 2**

Course Outcomes:

Upon completion of this course, the students will be able to

1 Recognize the biotic and abiotic components of ecosystem and how they function.
2 Use natural resources more efficiently and know more sustainable ways of living.
3. Acquire an attitude of concern for the environment.
4. Participate in improvement and protection of environment.
5. Manage unpredictable disasters.
6 Create awareness about environmental issues to the public.

Unit I Environment and Ecosystem

Aim and need for Environmental Awareness - Components of Environment Ecosystem - Components of Ecosystem: Abiotic and biotic factors (Producer, Consumer and Decomposer) – Food Chain, Tropic Levels - Food Web, Energy flow and Ecological pyramids

Unit II Natural Resources:

Renewable and non-renewable resources – Water Resources: Uses and Conservation of Water – Rain Water Harvesting – Forest Resources: Importance of Forests - Major and Minor forest produces - Conservation of Forest Energy Resources: Solar Fossil Fuel – Wind – Role of individuals in the conservation of natural resources

Unit III Environmental Pollution

Pollutants – Types of pollution: Air, Water, Noise and Plastic Pollution – Causes, effects and Control measures – Global warming and Climate Change

Unit IV Human Population and Environment

Effect of human population on environment – Population Explosion problems related to population explosion – Involvement of population in conservation of environment – Measures adopted by the Government to control population growth – Environment and human health

Unit V Disaster Management

Floods–Drought–Earthquakes– Cyclones – Landslide–Tsunami–Control measures

SEMESTER – III			
Part-I பொதுத்தமிழ் - தாள் 3 காப்பிய இலக்கியங்களும் சிற்றிலக்கியங்களும் **(செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, புதினம்,)**			
Course Code: 21ULTA31	**Hrs / Week:6**	**Hrs / Semester: 90**	**Credits: 4**

Objectives:

- மாணவியர் இறை நம்பிக்கையிலும், நற்பண்புகளிலும் வளர்ந்து, இலக்கிய அறிவிலும் மொழித்திறனிலும் சிறந்து விளங்க வழிகாட்டல்.
- காப்பிய மாந்தரின் வாழ்க்கையின் மூலமாக கடவுள் நம்பிக்கை, நல்ல உறவுகள், இயற்கையை நேசித்தல், மொழிஅறிவு போன்றவற்றை வளரச் செய்தல்.

Course Outcome:

CO.No.	இப்பாடத்திட்டம் மாணவியருக்கு	அறிவுசார் மதிப்பீடு
CO-1	பெண்களின் சட்டங்கள் உரிமைகள், வேலைவாய்ப்பு பற்றிய விபரங்களை அறிந்து கொள்ள உதவுகிறது.	நடைமுறைப்படுத்தல்
CO-2	அரசியல் சூழ்ச்சி, இனம், சாதி குறித்த பாகுபாடு இவற்றிலிருந்து விடுதலை பெறும் வழிவகைகளைக் கற்றுக்கொடுக்கிறது.	நடைமுறைப்படுத்தல்
CO-3	இலக்கிய அறிவினை வளர்க்க, காப்பியச் சுவை உணர்ந்து சுவைக்க வாய்ப்பளிக்கிறது.	நடைமுறைப்படுத்தல்
CO-4	தனிமனித வாழ்க்கைச் சிக்கல்களை எதிர்கொள்ளும் நிலையை உருவாக்குகிறது	நடைமுறைப்படுத்தல்
CO-5	இப்பகுதியில் வாழும் அடித்தட்டு மக்களின் வாழ்வு நிலையை அறிந்து கொள்ள உதவுகிறது. பெண்கள் நீதிக்குப் போராடும் உணர்வை வளர்க்கிறது.	நடைமுறைப்படுத்தல், திறன் மேம்பாடு
CO-6	போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல்,திறன் மேம்பாடு

SEMESTER – III			
Part-I பொதுத்தமிழ் - தாள் 3 காப்பிய இலக்கியங்களும் சிற்றிலக்கியங்களும் **(செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, புதினம்,)**			
Course Code: 21ULTA31	**Hrs / Week:6**	**Hrs / Semester: 90**	**Credits: 4**

அலகு - 1 செய்யுள் - 2 மணி

காப்பியங்கள்

1. சிலப்பதிகாரம் - அடைக்கலக் காதை : 11 – 94 பாடலடிகள்
2. மணிமேகலை – ஆபுத்திரன் திறன் அறிவித்த காதை : 1 முதல் 56 பாடலடிகள்
3. பெரியபுராணம் - கண்ணப்ப நாயனார் புராணம். (பாடல்கள்: 757 - 762, 67, 74, 81, 84,85, 804, 05, 06, 12, 14, 18, 19, 825 – 832, 834.
4. கம்பராமாயணம் - நட்புக்கோட் படலம்.
5. சீறாப்புராணம் - கள்வரை நதி மறித்த படலம்.
6. தேம்பாவணி - வளன் சனித்த படலம்.- 9 முதல் 31 பாடல்கள்.

சிற்றிலக்கியம்

1. திருக்குற்றாலக் குறவஞ்சி. IV குறவஞ்சி நாடகம். 8. எங்கள் மலையே.

அலகு -2 இலக்கணம் - 1 மணி

பொருள் இலக்கணம்

1. அகப்பொருள் : எழுதிணை விளக்கம் - முதல், கரு, உரிப்பொருள்
2. புறப்பொருள் : வெட்சித்திணை முதல் பாடாண்திணை வரை விளக்கம் மட்டும்

யாப்பு இலக்கணம்

1. யாப்பு உறுப்புகள். (எழுத்து, அசை, சீர், தளை, அடி, தொடை)

அலகு - 3 இலக்கிய வரலாறு - 1 மணி

1. ஐம்பெருங்காப்பிங்கள்
2. ஐஞ்சிறுகாப்பியங்கள்
3. சிற்றிலக்கியத்தின் தோற்றமும் வளர்ச்சியும், பிள்ளைத்தமிழ், கலம்பகம், குறவஞ்சி, பரணி.
4. புதினம் தோற்றமும் வளர்ச்சியும்..

அலகு - 4 உரைநடை - 1மணி

இப்பொழுது இவள் - ப. திருமலை.

அலகு - 5 புதினம் - 1 மணி

தேரியாயணம் (சமூக நாவல்) - கண்ணகுமார விஸ்வரூபன்.

SEMESTER – III			
Course Title : PART – I French Paper – III Advanced French Language			
Course Code : 21ULFA31	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Objectives

To enhance the acquisition of all the four competencies of language learning.

To create the independent capability of the learner to respond and tackle the various situations of communication when the learner is in the native country of the target language

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	analyse and Interpret French realities	Un, Ap
2.	understand and analyse the various components of French life	Un, An
3.	evaluate French civilisation , appreciate the differences between eastern and western civilisation	Ev
4.	understand grammar and apply the acquired grammatical knowledge to do the grammar exercises	Re, Un, Ap
5.	create passages on her own civilisation in the target language	Un, Cr
6.	comprehend French literature	Un

SEMESTER – III			
Course Title : PART – I French Paper – III Advanced French Language			
Course Code : 21ULFA31	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Unit 1 – Pas de chance !

1.1 –Se plaindre / plaindre quelqu'un
1.2 – Donner une explication
1.3 – Exprimer une émotion négative
1.4 – Demander et dire le poids et la taille
1.5 – Chance et malchance

Unit 2 – Beau travail ?

2.1 – Comprendre un programme d'échange universitaire
2.2 – Exprimer le but, le souhait et un projet professionnel
2.3 – Exprimer une capacite, une compétence
2.4 – Comprendre des taches professionnelles
2.5 – Universités 2.0

Unit 3 – Au grand air

3.1 – Comprendre une BD sur un changement de vie
3.2 – Exprimer son insatisfaction
3.3 – Exprimer un choix de vie
3.4 – Décrire son mode de vie
3.5 – Je cultive mon jardin

Unit 4 – C'était bien ?

4.1 – Parler de ses difficultés
4.2 – Encourager, rassurer
4.3 – Parler d'un projet
4.4 – Exprimer son accord, son désaccord et intérêt
4.5 – Les Français en chanson

Unit 5 – Le texte littéraire

5.1 – Demain dès l'aube - Victor Hugo
5.2 – La Laitière Et Le Pot Au Lait - Jean De La Fontaine

Prescribed Textbook :

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1Méthode de français*. Paris : Didier, 2016.
Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob,Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Cahier d'exercises*. Paris : Didier, 2016.

Books, Journals and Learning Resources

- J.Girardet&J.Pécheur avec la collaboration de C.Gibble.*Echo A1*. Paris : CLE International, 2012.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I*. Paris : CLEInternational, 2003.
- Cocton Marie-Noëlle.*Génération 1 Niveau A1, Méthode de français et cahier d'exercices*.Paris : Didier, 2016.
- Dintilhac Anneline, De Oliveira Anouchka, Ripaud Delphine, DupleixDorothée, Cocton Marie-Noëlle.*Saison 1 Niveau 1, Méthode de français et cahier d'exercices*. Paris : Didier, 2015
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com
- https://www.frenchtoday.com/french-poetry-reading/

SEMESTER – III			
Part II English Poetry, Prose, Extensive Reading and Communicative English - III			
Course Code: 21UGEN31	**Hrs/ Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

Objectives:

- To acquaint students with literary art and writings of universal appeal.
- To strengthen the proficiency of communicative English through literary based study.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	understand the language and literary components of texts	1	Un
CO-2	develop interest and appreciate literary texts	2	Un, Ev
CO-3	comprehend aspects of grammar and its application	6	Un
CO-4	evaluate perspectives and human values for life	4, 5	Ev
CO-5	adopt appropriate technique to enhance communication and writing	3, 7	Ap, Cr
CO-6	enrich vocabulary and develop skills of formal writing and communication	7, 8	Ap, Cr

SEMESTER – III			
Part II General English Poetry, Prose, Extensive Reading and Communicative English - III			
Course Code: 21UGEN31	**Hrs/ Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

Unit I –Poetry

William Shakespeare – All the World's a Stage
Dylan Thomas – Do not go gentle into that good night
Sri Aurobindo Ghosh – The Divine Worker

Unit II – Prose

Bertrand Russell – How to Avoid Foolish Opinions
Virginia Woolf – Men and Women
M.K. Gandhi – At School

Unit III – Fiction

Charlotte Bronte -*Jane Eyre* (Abridged Version)

Unit IV – Grammar

Active and Passive Voice, Direct and Indirect Speech

Unit V –Communication Skills

Listening Comprehension, Close Reading, Conversational English, Formal Writing

Text Books:

Units I – III – Compiled by the Research Department of English.

Units IV – Joseph, K.V. *A Textbook of English Grammar and Usage*. Chennai: Vijay Nicole Imprints Private Limited, 2006.

Unit V – CLIL (Content & Language Integrated Learning) – Module IV by TANSCHE.

SEMESTER III			
Core III	**Developmental Zoology**		
Course Code: 21UZOC31	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Objective:

- To acquire a greater appreciation of life and its development.
- To understand the complexity of developmental processes and the underlying mechanism.
- To attain knowledge on reproductive technology and stem cells.

Course Outcome

CO. No.	**Upon completion of this course, students will be able to**	**PSO Addressed**	**CL**
CO-1	understand the concepts of developmental biology	2	Un
CO-2	describe the developmental process and embryogenesis	3	Re
CO-3	explain the sequential changes from cellular grade of organization to organ grade of organization	2	Un
CO-4	compare the types of extra embryonic membrane and the nature and physiology of placenta	3	An
CO-5	implement the new technologies in embryology	6	Ap
CO-6	recommended the advanced reproductive technologies for the welfare of man	6	Ev

SEMESTER III			
Core III	**Developmental Zoology**		
Course Code: 21UZOC31	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Unit I G**ametogenesis**

Basic concepts of developmental biology - gametogenesis – spermatogenesis, oogenesis - sperm and egg of chick and human.

Unit II **Development of Chick**

Fertilization : Pre and post fertilization events - cleavage, blastulation, gastrulation and fate map of Chick.

Unit III **Development of Human**

Cleavage – fate map of human – gastrulation in human – organogenesis - development of heart and brain in mammal.

Unit IV **Organizer & Foetal membrane**

Organizer - primary and secondary organizers, morphogenetic fields and gradient hypothesis, embryonic stem cells - culture & applications, placenta in mammals – types and physiology.

Unit V **Assisted Reproductive Technology**

Manipulation of reproduction in human - Infertility (Male & Female) - Poly Cystic Ovarian Disease (PCOD) - artificial insemination, IVF - test tube babies - amniocentesis - Birth control - contraceptive devices – surgical, hormonal methods, physical barriers – IUCD, termination of gestation.

Text Books

1. Berril. M.J. *Developmental Biology*. New Delhi: Tata Mc Graw- Hill Publishing Company Ltd. 1982

Books for Reference

1. Arumugam. N. 2006 *Developmental Zoology*, Nagercoil: Saras Publication. 2006.
2. Verma. P.S. and U.K. Agarwal. *Chordate Embryology*. New Delhi: S. Chand & Company Ltd, 10th Edition 2014.
3. Balinsky, B. I. and Bc. Fabian. *An Introduction to Embryology*. India: Cengage Learning 5th Edition 2012.

PRACTICALS

Course Code: 21UZOCR3

Hrs / Week – 2 **Credits: 2**

1. Types of eggs (alecithal, telolecithal and centrolecithal)
2. Temporary mounting of chick embryo
3. Chick – Blastula, Gastrula and Fate map
4. Observation of permanent slides of chick embryo 24, 48 ,72, and 96 hours.
5. Pregnancy test kit
6. Mounting of egg of fish
7. Museum specimens/ slides/ models and charts:
   a. Sperm and egg of mammal
   b. Contraceptive devices – condom, copper T, pills (Mala D).
   c. Placenta in mammals – diffuse, discoidal, zonary and cotyledenary placenta.

Books for Reference

1. Verma P. S, *A Manual of Practical Zoology Chordates.* New Delhi: S. Chand and Company Ltd.1992.
2. Balinsky B. *An Introduction to Embryology*. U.S.A and Japan:, B.W. Saunders Company Ltd. Fourth edition.1976.
3. Jeyasuriya, Arumugam , N , Dulcy Fatima , Narayanan. Nagercoil: *L.M. Practical Zoology* Saras Publications, Vol. 3. 2013.

SEMESTER III			
Skill Based Elective	**A. Fishery Products**		
Course Code: 21UZOS31	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credits: 2**

Objectives:

- To obtain knowledge on products of fisheries industry, their processing and preservation process.
- To encourage the students to follow hygiene in fish processing
- To develop entrepreneurial skills in the preparation of sea-food based convenience products in ready-to-eat or ready-to-cook forms

Course Outcome

CO. No.	Upon completion of this course, the graduates will be able to	PSO addressed	CL
CO- 1	describe the products and by-products of fisheries	1	Re
CO–2	utilize information on processing and develop lab techniques for the usage of fish byproducts for industrial and domestic purposes	6	Cr
CO–3	carryout study on seaweeds and analyze their usage as food for human consumption	5	An
CO–4	develop skills to produce a variety of value added fishery products	7	Cr
CO–5	discuss and implement sanitation and quality control techniques	8	Ap
CO–6	acquire the knowledge of preservation and processing techniques and recommend their use in day to day life	8	Ev

SEMESTER III			
Skill Based Elective	**A. Fishery Products**		
Course Code: 21UZOS31	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credits: 2**

Unit I Value Added Fishery Products

Fish pickles, fish sauce, fish cutlets, fish balls, fish soup powder and fish sausage. Battered and braided products-fish finger, fish wafer.

Unit II Fishery By Products

Fishery by products - fish oil – isinglass – chitosan – pearl essence – shark fins

Unit III Seaweed Products

Uses of agar, algin and carrageenan. Use of sea weeds as food for human consumption.

Unit IV Techniques of Preservation and Processing

Freezing - quick, slow freezing; freezer - horizontal plate freezer, tunnel air blast freezer - cryogenic freezing; canning; smoking - hot, cold, electrostatic smoking; pickling; drying – natural, artificial; salting - dry, wet and mixed salting.

Unit V Quality Control and Sanitation

Sanitation in processing – environmental hygiene and personal hygiene in processing. Fishery guidelines for HACCP and FSSAI on fish and fish products.

Text Book

1. Dr. Surekha Gupta. *Textbook of Fishery*. New Delhi: Ane Books Pvt. Ltd. 2010

Books for Reference

1. Gopakumar, K. *A Textbook of Fish Processing Technology*. New Delhi: ICAR. 2002.
2. Gupta, S.K. and P.C Gupta. *General and Applied Ichthyology* [*Fish and fisheries*]. Ramnagar New Delhi: Chand and Company Ltd. 2006
3. K.R. Ravindranathan. *A Text book of Economic Zoology*. New Delhi*:* Wisdom Press. 2013.
4. Ayyapar, S. *Handbook of Fisheries and Aquaculture*. New Delhi: 2010
5. Srivastava, C.B.L. *A Text book of Fishery Science – Indian Fisheries.* New Delhi: Kitab Mahal. 2006.

SEMESTER III			
Skill Based Elective	**B. Aquarium Management**		
Course Code: 21UZOS32	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credits: 2**

Objectives

- To provide information on setting up and maintenance of an aquarium.
- To promote the self-employment opportunities.
- To foster the importance of peaceful, educational and stress-free hobby.

Course Outcome

CO. No	**Upon completion of this course, the students will be able to**	**PSO addressed**	**CL**
CO-1	acquire knowledge on the common aquarium fishes	1, 2	Un
CO-2	identify the different kinds of equipment and accessories used in setting up an aquarium	6	Re
CO-3	critically analyze the different kinds of fish feed and aquarium plants	6	An
CO-4	plot the common diseases, symptoms and management of aquarium fishes	7	Ap
CO-5	demonstrate skills in maintenance of water quality parameters	3,6	Ap
CO-6	produce self-employment opportunities	8	Ap

SEMESTER III			
Skill Based Elective	**B. Aquarium Management**		
Course Code: 21UZOS32	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credits: 2**

Unit I **Construction of Home Aquarium**

Construction of home aquarium - materials needed - wooden and metal frames - frameless tanks, sealants and gums

Unit II **Setting up of an Aquarium**

Setting up aquarium – gravel/ pebbles – plants – ornamental objects and fishes – popular ornamental fishes – gold fish, molly, angel fish, zebra fish, cichlids - aquarium accessories – aerators, filters

Unit III **Maintenance of Aquarium**

Maintenance of aquarium - water quality management – pH, temperature, lighting, hardness, salinity, oxygen, carbon dioxide – optimum conditions for the growth of aquarium plants

Unit IV **Feed Formulation**

Nutritional requirements of aquarium fishes - Different kinds of feed - live feed – artemia and chironomous larva – feeding formula, feeding methods and devices.

Unit V **Fish Diseases and Management**

Symptoms - treatment, prevention and control of common diseases of aquarium fishes - tail rot, fin rot, white spot, velvet disease – scoliosis.

Text Book:

1. Jameson J.D. and Santhanam R. *Manual of Ornamental Fishes and Farming Technologies.* Tuticorin: Fisheries College and Research Institute, Tamil Nadu Veterinary and Animal Science University, 1996.

Books for Reference

1. Yadav B.N. *Fish and Fisheries*. New Delhi: Daya Publishing House, 2002.
2. Thara Devi C.S and Jeyashree K.V. *Home Aquarium*, Nagercoil: Saras Publications, 2009.
3. Gupta S.K. and Gupta P.C. *General and Applied Ichthyology* (Fish and Fisheries). New Delhi: S. Chand and Company Ltd., 2006.
4. Sebastian J. *The aquarium Handbook*. Cochin, Kerala: Amity Aquatech Pvt. Ltd., 2002.
5. Amita Saxena. *Aquarium Management.* Delhi: Daya Publishing House, 2003.

SEMESTER III			
NME I	**Basic Biotechnology**		
Course Code: 21UZON31	**Hrs/ Week : 2**	**Hrs/ Sem: 30**	**Credit: 2**

Objectives

- To impart basic knowledge on biotechnology
- To develop skills in biology using various biotechniques
- To motivate the students to take up career in biotechnology related fields in their future

Course Outcome

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	appraise the scope and importance of biotechnology by understanding the basic structure and functions of cells	1,2	An
CO-2	outline the structure of DNA, and use various techniques to visualize, manipulate and separate the DNA molecules	2	An
CO-3	summarize the basics of restriction enzymes and cloning vectors and apply the various gene manipulation techniques to generate genetically modified organisms	1,6	Un
CO-4	evaluate techniques of gene delivery and cloning to adapt in generation of genetically modified organisms	1,6,8	Ev
CO-5	discuss the preparation and characterization of nano materials in the field of nanotechnology	6,7	Un
CO-6	develop proficiency in aseptic laboratory techniques and standard procedures for cell culture.	6	Cr

SEMESTER III			
NME I	**Basic Biotechnology**		
Course Code: 21UZON31	**Hrs/ Week : 2**	**Hrs/ Sem: 30**	**Credit: 2**

Unit I Introduction to Basic Biotechnology

Definition, history of Biotechnology - scope of Biotechnology; structure of cell -eukaryotic and prokaryotic cells.

Unit II Basics of Gene Manipulation

Structure of DNA - gene concept - central dogma of life - concept of genetic engineering - Type II Restriction enzymes and DNA ligases in genetic engineering - cloning vectors – definition - general characters - plasmid cloning vector – pBR322 - construction of recombinant DNA - basic steps in cloning.

Unit III Techniques in Biotechnology

Agarose gel electrophoresis, SDS PAGE, PCR - Gene delivery methods – transformation, transfection, methods, biolistic method (gene gun).

Unit IV Genetic Modification of Organisms

Transgenic animals and plants - methods of production of transgenic organisms -outline of microinjection mediated gene transfer to animals - outline of Agrobacterium mediated gene transfer to plants – GMOs – Super mouse, Gold fish, Golden rice, Bt Cotton.

Unit V Demonstrations/ Model/ Chart

DNA isolation, restriction digestion, agarose gel electrophoresis, SDS PAGE, PCR, Structure - DNA, tRNA (Model/ Chart).

Text Book:

Kumaresan, V. *Biotechnology*. Nagercoil: Saras Publication, 6th edition, 2012.

Books for Reference:

1. Dubey, R.C. *A Textbook of Biotechnology*. New Delhi: S. Chand and Company Ltd., 2009.
2. Rastogi, S.C. *Biotechnology Principles and Applications*. Chennai: Reprint, Narosa. Publishing House, 2020.
3. Singh, B.D. *Biotechnology*. New Delhi: Kalyani Publishers. 2015.
4. Sathyanarayana, V. *Biotechnology*. Kolkatta:. Books and Allied (P) Ltd. 15th Edition. 2020.
5. Harisha S. *Biotechnology Procedures and Experiments Hand Book*. New Delhi: Lakshmi Publications. First Edition. 2008.
6. Asish Verma, Surajit Das, Anchal Singh. *Laboratory Manual for Biotechnology*. New Delhi: S. Chand and Company, Ltd., 2008.

Semester – III			
Women's Synergy			
Code : 21UAWS31	**Hrs/ Week : 2**	**Hrs/Sem:30**	**Credits : 2**

Unit I - Physical Health

Woman's Structural Organisation – Levels of organisation – Body image - Reproductive health – Hormonal Cycle and its Psycho-somatic implications – Child birth – lactation – Nutritional status of women.

Unit II – Psychological Health

Examining factors determining psychological conditions of women – Depression, anxiety, stress, hysteria – Socio – cultural and familial conditioning of women's minds – Self Image, Discrimination against women.

Unit III – Women and Legal Awareness

Women specific – centered legislations – legal issues – laws to prevent gender based violence National / State Pro-women schemes – educational and Employment schemes. Laws for protection of Women – Women's rights to property – Women's Rights in the Indian Constitution – Maternity benefit act.

Unit IV – Women and Finance

Manager of domestic finance – Budgeting basics – Create a family budget - Set financial goals – Plan for financial emergencies – Budget for travel – Saving strategies – Investment options

Unit V – Women's Empowerment in Various Domain

Introduction - Women created history in sports and music – P. T. Usha, M. S. Subbulakshmi - Women who crossed hurdles in Social Service – Mother Theresa, Muthulakshmi Reddy, Medha Patkar - Role of Women in Indian independence movement and Politics – Indira Gandhi, Aruna Asaf Ali.

SEMESTER III	
Self Study (Compulsory) **Wildlife Conservation**	
Course Code : 21UZOSS1	**Credits: 2**

Objectives:

- To recognize the importance of wildlife conservation.
- To study the techniques of wildlife census.
- To learn the role of Sanctuaries and National Parks in wildlife conservation.

Course outcome

CO. No	**upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	explain about the wildlife wealth of India, the threatened species and conservation of endangered species	1	Un
CO- 2	apply principles of wildlife management in protecting the threatened species	2	Ap
CO-3	analyse the values, benefits of wildlife and cause for wildlife depletion	3	An
CO- 4	understand the Wildlife Conservation Policies and develop conservation strategies.	5	Cr
CO- 5	describe the role of Wildlife Sanctuaries and National Parks in wildlife conservation	5	Re
CO-6	estimate wildlife population by learning the various census techniques	4	Ev

SEMESTER III	
Self Study (Compulsory) **Wildlife Conservation**	
Course Code : 21UZOSS1	**Credits: 2**

Unit I Wildlife Census Techniques

Wildlife census techniques - direct method - line transect method –block count method- indirect method - pellet analysis method - pugmark techniques.

Unit II Need for Conservation

Wildlife values and benefits - causes of wildlife depletion – need for conservation - endangered species of reptiles, birds and mammals in
India.

Unit III Wildlife and their Management

Principles of wildlife management - wildlife wealth of India - threatened wildlife, threats to survival and management of Red Panda, Musk deer, Great Indian Bustard, Olive Ridley turtle, Nilgiritahr, Nilgiri langur.

Unit IV Sanctuaries and National Parks

Definition – importance – Vedanthangal, Koonthankulam Bird Sanctuary – Mudumalai Sanctuary- Anamalai Sanctuary - National Parks - Guindy Deer Park – Gulf of Mannar Biosphere Reserve.

Unit V Wildlife Conservation Policies

The World Conservation Union (IUCN), Red Data Book. World Wildlife Fund (WWF), Indian Board of Wildlife (IBWL) – National Board for Wildlife (NBWL), Man and Biosphere Programme (MAB), Project Tiger. Wildlife Protection Act 1972, Significance of NGO's in wildlife conservation.

Books for Reference

1. Anubha Kaushik and Kaushik C.P. *Environmental Science & Engineering*. New Delhi: New Age International (p) Publishers. 2020.
2. Hosetti B.B. *Concepts in Wildlife Management*. New Delhi: Daya Publishing house, A division of Astral International Pvt. Ltd. 2017.
3. Dr. Reena Mathur. *Wildlife Conservation and Management*. Meerut: Rastogi Publications; 1st Edition. 2018
4. Seshadri, B. *India's Wildlife Reserves*. New Delhi: Sterling Publishers 1990.
5. Saharia, V.B. *Wildlife in India*. Dehradun: Nataraj Publication.1998.
6. Verma, P.S. and Agarwal V.K. *Cell Biology, Genetics, Molecular Biology, Evolution and Ecology*. New Delhi: S. Chand & Company Pvt. Ltd, Ram Nagar. 2009.
7. Brain Groombridge. *Global Biodiversity*. London SE1 8 HN: Chapman & Hall, 2-6 Boundary Row. 1992.

SEMESTER – IV			
Part-1 பொதுத்தமிழ் - தாள் 4 சங்க இலக்கியம் **(செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, நாடகம்)**			
Course Code: 21ULTA41	**Hrs / Week:6**	**Hrs / Semester: 90**	**Credits: 4**

Objectives:

- மாணவியருக்கு நல்ல மதிப்பீடுகளைக் கற்பித்து, வாழ்வில் அவற்றைப் பின்பற்றவழிவகுத்தல்.
- இலக்கியமாந்தரின் மூலம் நல்லவாழ்க்கை அனுபவங்களைப் பெறச் செய்து தன்னம்பிக்கை, ஆளுமைத் திறம், மொழி அறிவு இவற்றை உருவாக்குதல்.

Course Outcome:

CO.No.	இப்பாடத்திட்டம் மாணவியருக்கு	அறிவுசார் மதிப்பீடு
CO-1	அனுபவ அறிவை வளர்க்கிறது.	நடைமுறைப்படுத்தல்
CO-2	பழந்தமிழர் வாழ்வியல் முறைகளை கற்று பயனடைய உதவுகிறது.	நடைமுறைப்படுத்தல்
CO-3	மனிதநேயம், இறைநம்பிக்கை இவற்றை உருவாக்குகிறது.	உருவாக்கம்
CO-4	தனிமனித வாழ்க்கைச் சிக்கல்களை எதிர்கொள்ளும் நிலையை உருவாக்குகிறது	நடைமுறைப்படுத்தல், உருவாக்கம்
CO-5	சமுதாய பிரச்சினைகளை எதிர்கொள்ளும் திறம் கிடைக்கிறது.	நடைமுறைப்படுத்தல், திறன் மேம்பாடு
CO-6	போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல், திறன் மேம்பாடு

SEMESTER – IV			
Part-1 பொதுத்தமிழ் - தாள் 4 சங்க இலக்கியம் **(செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, நாடகம்)**			
Course Code: 21ULTA41	**Hrs / Week:6**	**Hrs / Semester: 90**	**Credits: 4**

அலகு - 1 செய்யுள் - 2 மணி
எட்டுத்தொகை

1. நற்றிணை - பாடல்கள் : 64, 318
2. குறுந்தொகை - பாடல்கள் : 3, 20, 75
3. ஐங்குநுறூறு - செலவு அழுங்குவித்தப் பத்து - பாடல்கள் : 304, 307, 308, 309
4. பதிற்றுப்பத்து - பாடல் : 25
5. பரிபாடல் - பாடல் 6 (1-10 அடிகள்)
5. கலித்தொகை - பாடல் : 51
6. அகநானூறு - பாடல்கள் : 20, 194
7. புறநானூறு - பாடல்கள் : 191, 204

பத்துப்பாட்டு
மதுரைக்காஞ்சி - 63 வரிகள்

அலகு -2 இலக்கணம் - 1 மணி
1. **பாவகைகள்** - வெண்பா,ஆசிரியப்பா பொது இலக்கணம்
2. **அணி இலக்கணம்** -
   உவமை,உருவகம், வேற்றுமை, வஞ்சப்புகழ்ச்சி, சிலேடை, தற்குறிப்பேற்றம்
3. வாக்கிய வகைகள்
4. பிறமொழிச் சொற்களைநீக்கிஎழுதுதல்

   அ. ஆங்கிலச் சொற்கள்

   ஆ. வடமொழிச் சொற்கள்

   இ. தெலுங்குச் சொற்கள்

அலகு 3 இலக்கியவரலாறு - 1 மணி
1. எட்டுத்தொகை நூல்கள்
2. பத்துப்பாட்டு நூல்கள்
3. சங்க இலக்கியத்தின் தனிச்சிறப்புகள்
4. நாடகம் - தோற்றமும் வளர்ச்சியும்

அலகு - 4 உரைநடை - 1மணி
இலக்கியத் தென்றல் - தமிழ்த்துறை - கட்டுரைத் தொகுப்பு,
தூய மரியன்னைகல்லூரி (தன்னாட்சி), தூத்துக்குடி

அலகு -5 நாடகம் - 1 மணி
ஆயிரம் பூக்கள் மலரட்டும் - கீழ்க்குளம் வில்லவன

SEMESTER – IV			
Course Title : PART – I French Paper – IV French Course and Literature			
Course Code : 21ULFA41	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Objectives

To create and develop the taste for literary readings in the target language.

To motivate students to appreciate the French literature.

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	reflect upon the author's ideas and transform their own personality	Un
2.	explore a literary text, with the perspective of analyzing the content and manner of writing	Un, An
3.	create critical appreciations	Ev
4.	evaluate the literary piece in comparison with any other of another language	An, Ap
5.	identify grammar rules in literary text and apply the grammatical knowledge to do grammar exercises	Re, Un, Ap
6.	discover, interrogate and reflect on the humanistic value	An

SEMESTER – IV			
Course Title : PART – I French Paper – IV		**French Course and Literature**	
Course Code : 21ULFA41	**Hrs/week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Unit 1 – XVII^{e}siècle

1.1 – Le Corbeau et le Renard - Jean de la Fontaine
1.2 – Le Petit Chaperon Rouge - Charles Perrault
1.3 – Le Passe Composé

Unit 2 – XVIII^{e}siècle

2.1 – Zadig : La danse - Voltaire
2.2 – La Révolution française
2.3 – L'imparfait

Unit 3 – IX^{e}siècle

3.1 – Chansons d'automne - Paul Verlaine
3.2 – Le Père Goriot *(extrait)* - Honoré de Balzac
3.3 – Les Pronoms relatifs

Unit 4 – XX^{e}siècle

4.1 – Le Pont Mirabeau - Guillaume Apollinaire
4.2 – L'Etranger *(extrait)* - Albert Camus
4.3 – Les Indicateurs temporels

Unit 5 – La littérature francophone

5.1 – Le Grand Cahier*(extrait)* - Agota Kristof
5.2 – Le fils à la recherche de sa mère- Pape Faye
5.3 – Le Futur proche et le futur simple

Books, Journals and Learning Resources

- K. Madanagobalane, N.C.Mirakamal.*Le Francais par les Textes*. Chennai :Samhita Publications, 2019.
- Blondeau Nicole, Allouache Ferroud jà, Ne Marie-Françoise.*Littérature Progressive du Français*.Paris : CLE International,2004.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I*. Paris : CLE International, 2003.
- Akyuz Anne,Bazelle-Shahmaei Bernadette, Bonenfant Joelle, GliemannMarie-Francoise.*Les 500 exercices de grammaire*. Paris : Hachette livre,2005
- Grégoire Maria.*Grammaire Progressive du français*. Paris :CLE International,2002.
- Sirejols Evelyne, TempestaGiovanna,Grammaire. *Le Nouvel Entrainez-vous avec 450 Nouveaux Exercices.* Paris : CLE International, 2002
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com
- https://www.conte-moi.net/node/120

SEMESTER – IV			
Part II English Poetry, Prose, Extensive Reading and Communicative English - IV			
Course Code 21UGEN41	**Hrs/ Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

Objectives:

- To advance students' understanding of literary art and writings of universal appeal.
- To further the proficiency of communicative English through literary studies.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	comprehend better the language and literary components of texts	1	Un
CO-2	gain deeper insight into literary experience and expressions of writers	2	Un
CO-3	be competent in conversational and functional English	3	Ap
CO-4	employ nuances of verbal and non-verbal techniques in communication	5, 6	Ap
CO-5	adopt right perspectives of human values for life	4, 5	Ap
CO-6	face interviews and competitive exams with confidence	7	Ap

SEMESTER - IV			
Part II English Poetry, Prose, Extensive Reading and Communicative English - IV			
Course Code :21UGEN41	**Hrs/ Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

Unit I –Poetry

John Keats – Bright star, would I were steadfast

E.E. Cummings – I carry your heart with me

Jayanta Mahapatra – Relationship

Unit II – Prose

Helen Keller – Three Days to See

Jerzy Kosinski – TV as a Baby Sitter

Bhabani Bhattacharya – Names are not Labels

Unit III – Fiction

Thomas Hardy – *Tess of the d' Urbervilles* (Abridged Version)

Unit IV – Grammar

Types of Sentences, Transformation of Sentences

Unit V – Communication Skills

Verbal and Non-Verbal Communication, Interview, CV- Resume, Presentation Skills

Text Books:

Units I – III – Compiled by the Research Department of English.

Units IV – Joseph, K.V. *A Textbookof English Grammar and Usage*. Chennai: Vijay Nicole Imprints Private Limited, 2006.

Unit V – CLIL (Content& Language Integrated Learning) – Module IV by TANSCHE.

SEMESTER IV			
Core I	**Biochemistry and Bioinstrumentation**		
Course Code: 21UZOC41	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Objectives

- To gain in-depth knowledge of molecular processes in Biology from chemical approach to understand the complexity of life.
- To impart fundamental chemical and biological principles to advance their understanding of living world, nutrition, better medical care, biotechniques to enhance the quality of life.

Course Outcome

CO.No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	understand the structure and significance of biomolecules in life processes	2	Un
CO-2	understand the principle, working mechanism and application of standard laboratory equipments and modern instruments	6	Un
CO-3	analyze enzymes as biocatalysts, the mechanism of their action and develop the ability to comprehend life processes	4	An
CO-4	demonstrate the beneficial effects of vitamins, their sources for the healthy functioning of the body	5	Ap
CO-5	relate and deploy knowledge in identifying deficiency diseases of vitamins from symptoms and find the remedy	8	An
CO-6	apply appropriate biochemical techniques to plan and carryout experiments, test hypotheses and draw conclusions to conduct project works in near future	6	Ap

SEMESTER IV			
Core I	**Biochemistry and Bioinstrumentation**		
Course Code: 21UZOC41	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Unit I Carbohydrates

Carbohydrates – outline classification, properties, and biological significance - monosaccharides (glucose and fructose), glycoside linkage, disaccharides (sucrose, lactose) and polysaccharides(cellulose and glycogen).

Unit II Protein

Classification of amino acids based on the structure of side chain; Protein - classification based on shape and structure, primary, secondary, tertiary and quaternary structure, properties, biological significance.

Unit III Lipids

Fatty acids - t y p e s - saturated, unsaturated fatty acids, essential, non-essential fatty acids; Lipids - classification, simple lipids (triglycerides and waxes), compound lipids (phospholipids, cerebrosides), derived lipids (steroids), properties, biological significance.

Unit IV Enzymes and Vitamins

Enzymes - classification and nomenclature, properties, mechanism of enzyme action, factors affecting enzyme activity, enzyme inhibition, co-enzymes – functions of coenzyme. Vitamins: fat soluble and water soluble, properties, sources, dietary requirements and deficiency symptoms.

Unit V Instrumentation

Principle, technique and applications of pHmeter, colorimeter, spectrophotometer, centrifuge, agarose gel electrophorosis and chromatography (Paper, TLC).

Text Book

1.Dulsy Fatima, L., Narayanan, R.P., Meyyan Pillai, K., Nallasivam, S., Prasanna Kumar and A. Arumugam. *Biochemistry*. Nagercoil: Saras Publication. 2013.

Books for Reference

1. Satyanarayana,V. and U. Chakrapani. *Biochemistry* – Elsivier – Division of Reed Elsivier India PVT. Ltd. and Books and Allied Pvt.Ltd.2013.

2. Ambika Shanmugam. *Fundamentals of Biochemistry for Medical student.* Chennai: Navabharat Offset Works. 2000.

3. David L. Nelson and Michael M. Cox, *Lehninger Principles of Biochemistry* USA :W.H. Freeman & Co Ltd; 8th edition. 2021

4. Denise R. Ferrier. *Biochemistry*. Philadelphia – Baltimore – Newyork–London: Wolters Kluwer/ Lippincott Williams and Wilkins. 2011

5.Srivastava, H.S. *Elements of Biochemistry*. Meerut: Rastogi Publications. 2006.

PRACTICALS

Course Code: 21UZOCR4

Hrs/ Week: 2 **Credit: 2**

1. Qualitative test for carbohydrate.
2. Qualitative test for proteins.
3. Qualitative test for lipid.
4. Determination of iodine number of dietary fat
5. Determination of saponification number of dietary fat.
6. Determination of acid value of dietary fat.
7. Separation of amino acid by paper chromatography / Iodine method.
8. Measurement of pH in different water samples.
9. Model/ chart – Structure of amino acid, glucose, fructose, sucrose and cholesterol, colorimeter, pH meter, centrifuge, agarose gel electrophoresis

Books for Reference

1. David T. Plummer. *An Introduction to Practical Biochemistry*. New Delhi: Fifth Reprint. Tata Mc Graw – Hill Publishing Company Limited, Third Edition. 1992.

2. Jayaraman J. *Laboratory Manual in Biochemistry*. New Delhi: New Age International (P) Ltd. Publishers, 2000.

SEMESTER IV			
Skill Based Elective	**A. Clinical Laboratory Technology**		
Course Code: 21UZOS41	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credits: 2**

Objectives

- To become skilled persons for employment.
- To learn the utility and the applications of the instruments.
- To study the etiology of various diseases affecting human beings.

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the laboratory practices and to develop skills in various lab techniques	6,7	Un
CO-2	analyze and distinguish various types of blood cells	2,6	An
CO-3	understand the pathological diseases and explain the test for hepatitis,AIDS and intestinal parasite	5,6	Un
CO-4	demonstrate the proficiency in basic methods of instrumentation and quantitative analytical skills used to conduct biological research	6,7	Ap
CO-5	acquire knowledge to handle clinical equipments	6	Ap
CO-6	design,carryout and interpret scientific experiments	6,7	Ap

SEMESTER IV			
Skill Based Elective	**A. Clinical Laboratory Technology**		
Course Code: 21UZOS41	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credits: 2**

Unit I Best Laboratory Practices and Instrumentation

Best laboratory practices - norms to be followed in a clinical lab - sterilization - dry heat (hot air oven), moist heat (autoclave) and UV radiation (laminar flow chamber) – X- Ray - CT scan and MRI scan.

Unit II Haematology

Collection and storage of blood, preparation and use of blood components - blood groupings (A,B,O & Rh factor). Estimation of haemoglobin.

Unit III Clinical Pathology

Dialysis - hepatitis test – hemolytic jaundice - analysis of sputum - AIDS (ELISA Western blot test) Diagnosis of dengue and COVID-19.

Unit IV Clinical Biochemistry

Estimation of cholesterol, urea, uric acid, creatinine of blood - assay of enzyme alkaline phosphatase.

Unit V Demonstration/ Charts/ Models/ Hands-on Training/ Hospital Visit

Stethoscope, sphygmomanometer, electrocardiogram, EEG and echo cardiogram - analysis of urine - routine physical examination.

Text Book:

1. Ramnik Sood. *Medical Laboratory Technology*, Methods and Interpretations New Delhi: Jaypee Brothers Medical Publishers (P) Ltd.2005.
2. Jyoti Saxena, Mamta Banuthiyal and Indu Ravi Laboratory. *Manual of Microbiology, Biochemistry, and Molecular Biology*. New Delhi: Scientific Publishers (India). 2015.

Books for Reference:

1. Biswajit Mohanty and Sharbari Basu. *Fundamentals of Practical Clinical Biochemistry.* New Delhi: B.I Publications Pvt. Ltd. 2006.
2. Estridge, B.H., Reynolds, A.P. and N.J. Walters. *Basic Medical Laboratory Techniques.* Banglore: Thomson Delmar Learing Fastern press (Bangalore) Pvt. Ltd. 4th edition 2000.
3. Kannai, L. Mukherjee. *Medical Laboratory Technology.* Chennai: Tata Mc Graw Hill Publishing Company Limited, Vol-I, Vol-II and Vol-III. 1997.

SEMESTER IV			
Skill Based Elective	**B. Nutrition and Health**		
Course Code : 21UZOS42	**Hrs /Week : 2**	**Hrs /Sem : 30**	**Credits : 2**

Objectives

- To familiarize the students with fundamentals of food, nutrients and their relationship to health.
- To create an awareness on nutrition related disorders.

Course Outcomes

CO. No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO- 1	describe basic concepts of nutrients and their functions	2	Re
CO -2	discuss the sources of micro and macro nutrients	2	Un
CO – 3	analyse nutritional requirements during different stages of life	2	An
CO – 4	compare the recommended dietary allowances of micro and macro nutrients	5	An
CO – 5	analyse the role of various minerals important in maintaining health	5	An
CO – 6	recommend dietary management for nutrition related disorders	6	Ev

SEMESTER IV			
Skill Based Elective	**B. Nutrition and Health**		
Course Code : 21UZOS42	**Hrs /Week : 2**	**Hrs /Sem : 30**	**Credits : 2**

Unit I Introduction

Definition - food, nutrition and health. Role of nutrition. Energy requirement. Nutritional guidelines for health and fitness.

Unit II Micronutrients

Definition - sources, functions and recommended dietary allowance.

` Vitamins and minerals (calcium, phosphorus and magnesium).

Unit III Macronutrients

Definition- sources, functions and recommended dietary allowance.
protein – carbohydrate – lipid.

Unit IV Balanced diet

Nutritional requirements of different age groups – infants – children – adolescents – pregnant and lactating women – calorific value of food.

Unit V Life style related diseases

Weight imbalances – overweight and obesity, underweight.
Eating disorders – anorexia nervosa and Bulimia.
Hypertension and coronary heart disease.
Food allergy – Etiology, clinical features and nutritional management.

Text Book

1. Sri Lakshmi B. *Dietetics*. New Delhi: 6th Edition New Age International Ltd. Publications 2011.

Books for Reference

1. Sherman. *Chemistry of Food and Nutrition*. Jodhpur: Agrobios Publications 2010.
2. Blank F.C. *A Text Book of Foods and Nutrition*. Jodhpur : Agrobios Publications 2013.
3. Sumathi R. Mudambi and M.V. Rajagopal. *Fundamentals of Nutrition and Diet Therapy*. New Delhi : 5th Edition. New Age International Ltd. Publ 2020.
4. Swaminathan M. *Principles of Nutrition and Dietetics.* Bangalore: Vol. II BAPPCO Ltd. Publ1988.
5. Lily Premila C., Chandral S. & Retna Latha Sinazer *Public Health and Hygiene.* Nagercoil: C.S.I. Diocessan Press 2009.
6. Mathur J.S. *Introduction to Social and Preventive Medicine*. Vol. I to V Oxford & I BH Publishing Co1971.
6. Dubey R.C. & Maheswari D.K. *A Text book of Microbiology*. New Delhi: S. Chand & Company Ltd 2010.
8. Vijaya Ramesh K. *Food Microbiology*. Chennai: MJP. Publishers2021.
9. Purohit S.S *Microbiology Fundamentals and Applications.* India: Fourth Revised & Enlarged Edition Agro Botonical Publisher 2006.
10. Subramanian V. *A Text Book in Environmental Science*. New Delhi: 1stEdn. Narosa Publishing House 2002.

SEMESTER IV			
NME II	**Applied Biotechnology**		
Course Coe: 21UZON41	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credit: 2**

Objectives

- To impart comprehensive knowledge on various aspects of modern biotechnology.
- To understand the applications of biotechnological innovations for environmental protection and human welfare.

Course Outcomes

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the production of different bio-products	2	Un
CO-2	apply the techniques to clean up the environment through various treatment methods	5	Ap
CO-3	implement gene therapy methodology for treatment of cancer	8	Ap
CO-4	interpret the importance of bio safety and IPR	6	Un
CO-5	evaluate the synthesis and applications of bio-products	6	Ev
CO-6	adopt appropriate tools and technique in biotechnological manipulation	8	Ap

SEMESTER IV			
NME II	**Applied Biotechnology**		
Course Coe: 21UZON41	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credit: 2**

Unit I Food and Beverage Biotechnology

Fermented food – yoghurt, bread – microbial biomass – nutritive value of Single Cell Protein and mushroom cultivation (White button mushroom) - wine and beer. (Demo – Mushroom cultivation & Microbial production of wine).

Unit II Fuel Biotechnology

Biogas – substrates- process of production – applications; biodiesel – manufacture - advantages.

Unit III Environmental Biotechnology

Sewage treatment – primary, secondary and tertiary treatments. Bioremediation – types, bio remediation of ground water - In-situ and Ex-situ bioremediation.

Unit IV Health Care Biotechnology

Gene therapy methods – germ line and somatic cell line – gene therapy for cancer.

Unit V Regulations in Biotechnology

Biosafety – guidelines, Intellectual Property Right – copy right and trade mark – patent.

Text Book

1. Kumaresan, V. *Biotechnology*. Kottar, Nagercoil: Saras Publication: - 6th edition. 2012.

Books for Reference

1. Dubey, R.C. *A textbook of Biotechnology*. New Delhi: S. Chand and Company Ltd. 2009
2. Rastogi, S.C. *Biotechnology, Principles and Applications*. Chennai: Narosa Publishing House. 2012.
3. Singh, B.D. *Biotechnology*. New Delhi: Revised edition. Kalyani Publishers. 2015
4. Sathyanarayana, V. *Biotechnology*. Kolkatta: Books and Allied(P) Ltd.15th edition 2020
5. Harisha S. *Biotechnology Procedures and Experiments Hand Book.* New Delhi, India: Infinity Science Press, LIC, Hinghum, Massachusett. 2007.
6. Asish Verma, Surajit Das, Anchal Singh. *Laboratory Manual for Biotechnology*. New Delhi: S. Chand and Company. 2008.

SEMESTER- IV			
Ability Enhancement Course: Yoga and Meditation			
Code: 21UAYM41	**Hrs/Week : 2**	**Hrs/Semester : 30**	**Credits: 2**

Course Outcome:

- To learn and practice various meditation, yoga methods to transform the ordinary life into a healthy, harmonious life leading to holistic wellbeing,
- To create an eco-friendly, loving and compassionate world.
- Acquire knowledge and skill in yoga for youth empowerment.
- Increase their power of concentration
- Learn the causes and ways to overcome fear and sadness.
- Create a ecofriendly, loving and compassionate world.

Unit I: Meditation (6 Hrs)

Meditation – Purposes of meditation– Major types of meditations: Zazen, Mindfulness, Vipasana, Yoga, Self-inquiry, Listening, Qi Gong, Taoist, Tantra– Health benefits of meditation: physical, psychological, spiritual–Meditation and Silence:Silence of the body, mind, heart,and beyond – General methodology of meditation – Tips for better meditation **Exercises**: Practicing Zazen meditation – Self-enquiry meditation exercises

Unit II: Self-Awareness (6 Hrs)

Awareness – Self-awareness – Importance of self-awareness – Shades of self-awareness – Difference between Awareness and Concentration – Power of concentration – Levels of concentration – How to increase concentration? – Beauty of living here and now – Ways to develop your presence – Self-awareness and Ecology: interconnectedness **Exercises**: Body Scan exercise – Self-Witnessing exercise – Eating Raisin with full awareness

Unit III: Yoga (6 Hrs)

Meaning and importance of yoga – Yoga and human physical system – Principles of Yoga – Different types of yoga – Yoga and balanced diet – Yoga and energy balance – Pranayama – Surya namaskaram– Basic asanas for healthy life – Therapeutic benefits of simple yogasanas – Naturopathy for common ailments.

Exercises:Practicing basic Asanas – Doing Sun Salutation

Unit IV: Mindfulness (6 Hrs)

Definition of mindfulness – Three components of mindfulness– Benefits of mindfulness – Mindfulness and Brainwave patterns – Myths about mindfulness – Scientific Facts about mindfulness – Formal method to practice mindfulness – Qualities of Mindfulness – Obstacles for mindfulness – informal ways of practicing mindfulness – Mindfulness to get rid of addictions

Exercises: Practice Mindful Walking –Practice Mindful Talking

Unit V: Heartfulness (6 Hrs)

Attitude to life – Power of positive attitude – Techniques to develop positive attitude – Positive vs negative people – Forms of negative attitude – Heartfulness – Managing fear: Basic 5 fears, Ways to overcome fear– Handling anger: Anger styles, Tips to tame anger – Coping with sadness: Causes and ways to overcome sadness, dealing with depression – Ultimacy of compassion: Compassion to oneself, towards others: Forgiveness, to nature: Seeing God in all

Exercises: Practice Loving-Kindness meditation– Doing compassionate actions

Text Book:

1) Thamburaj Francis. *Meditation and Yoga for Holistic Wellbeing*. Trichy:Grace Publication. 2019.

Books References:

1) Osho. *Meditation the Only Way*. New Delhi: Full Circle Publication, 2009.
2) Thamburaj Francis. *Journey from Excellence to Godliness: Zen Meditation for Transformation.* Grace Publication, Trichy, 2017.
3) Osho. *Awareness: The Key to Living in Balance.* New York: St.Martin's Griffin Publication, 2001.
4) Tolle Eckart.*The Power of Now: A Guide to Spiritual enlightenment*. New World Library, 2004.
5) Swami Gnaneswarananda. *Yoga for Beginners*. Calcutta: Sri Ramakrishna Math, 2010.
6) HanhThichNhat. *The Miracle of Mindfulness: An Introduction to the Practice of Meditation.* Beacon Press, 2016.
7) Kamlesh D. Patel and Joshua Pollock. *The Heartfulness Way: Heart-Based Meditations for Spiritual Transformation.* Westland Publications, 2018.

Assessment

Internal Assessment :

Class Exercises (Unit wise exercises as given in syllabus)	5x10	50
Homework (Assignment, Charts, Aids, creative works, etc)	5x 5	25

External Assessment

Objective Type Questions	5x10	25
Total		100

SEMESTER IV	
Self Study (Optional) **Animal Care and Services**	
Course Code: 21UZOSS2	**Credit: +2**

Objectives

- To acquire skills on domestic animal care
- To understand the physiology of domestic animals and their health care
- To gain knowledge on the legal rights that govern animal welfare in India.

Course Outcome

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	apply their skills to take care of common domestic animals	7,8	Ap
CO-2	recommend common pet care solutions and formulate healthy pet feeds and outline a dietary schedule for lactating and new born animals	3,5	Ev
CO-3	explain procedures of prenatal, antenatal and postnatal care of pet animals and diagnose common diseases of pet animals and control spread of infectious diseases of pets	3,5	Un
CO-4	compose methodology for proper hygiene of pet animals	7	Cr
CO-5	understand various legislatures that govern animal welfare in India	8	Un
CO-6	appraise the responsibilities of animal welfare organizations	8	An

SEMESTER IV	
Self Study (Optional) **Animal Care and Services**	
Course Code: 21UZOSS2	**Credit: +2**

Unit I Basic Principles of Animal Care

Care for common breeds of cattle - cow, goat; Pet animals - dogs, love birds; Laboratory animals - mice, rabbits.

Unit II Nutrition

Feeding schedule - feed additives – diet formulation for newborn, pregnant, lactating and sick animals (cattle) - silage making.

Unit III Reproductive Care of Farm Animals

Pregnancy diagnosis – gestation - functional infertility - repeat breeding in farm animals-care and management of new born.

Unit IV Epidemiology and Health

Common zoonoses and their management - disposal of cadaver and clinical waste - guidelines for control of contagious and infectious disease.

Unit V Animals and Animal Welfare

Salient features of the Prevention of Cruelty to Animals Act (India), 1960 - Animal Welfare Organizations in India - Statutory Bodies - Animal Welfare Board of India, Committee for the purpose of control and supervision of experiments on animals, Society for the Prevention of Cruelty to Animals (SPCA), National Institute of Animal Welfare - Non-Governmental Animal Welfare Organizations in India - Blue Cross of India, PETA.

Books for Reference :

1. Rajeshwari Y.B. *Handbook on Care and Management of Laboratory and Pet Animals*. New Delhi: New India Publishing Agency. 2009.
2. Karen L. Campbell John R. Campbell, M. Douglas Kenealy. *Animal Sciences: The Biology, Care and Production of Domestic Animals.* New Delhi: Medtech, Scientific International Pvt. Ltd. 2013.
3. Banerjee G.C. *A Textbook of Animal Husbandry* 8th Ed. Oxford University Press, Chennai. 2019.
4. Reddy D.V. *Principles of Animal Nutrition and Feed Technology*. New Delhi: Oxford & IBH Publishing. Third Edition. 2018.

SEMESTER -V			
Core V	**Common Core - Biotechnology**		
Course Code: 21UBCC51	**Hrs/Week:4**	**Hrs/Sem: 60**	**Credit: 3**

Objectives:

- To provide broad scope of biotechnology in various fields including agriculture, medicine, environment and forensic studies through effective teaching modules
- To attain competence in handling biotechnological experiments that enable them to carryout research projects and lifelong profession accomplishment
- Create awareness in applying modern tools for biotechnological innovation and priorities the ethical implementation of potential biotechnology

Course Outcomes:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	discuss different types of animal and plant cloning vectors and scan the role of restriction enzyme in genetic modification	1,2	Un
CO-2	clarify the human genome sequences and its application in human welfare	4,7	Un, An
CO-3	apply various gene transfer techniques to generate genetically modified organisms	2,7	Ap
CO-4	perform cell culture, organ culture and stem cell culture to realize the positive impact in health care	6	Un, Ap
CO-5	encapsulate the characteristic features of microbes and their role in production of industrial products and environmental reacalamtation	5,6	An
CO-6	get hands on experience to conduct experiments, analyze and interpret data for investigating problems in biotechnology and allied fields	7,8	Ap

SEMESTER V			
Core V (Common Core)	**Biotechnology**		
Course Code: 21UBCC51	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credit: 2**

Unit I **Cloning Vectors**

Introduction – Scope and importance of biotechnology – Gene cloning techniques - cloning vehicles – bacterial plasmid vectors – pBR322 and Ti plasmid – bacteriophage vectors – lambda – M13 – Plant viral vector – CaMV- Gemini virus and tobamo virus – animal viral vector – SV40- Role of restriction and modification enzymes.

Unit II **Gene Cloning and Screening**

Gene cloning – methods of introduction of cloned genes into host cells – transformation – liposome mediated transfer – electroporation – particle bombardment gun – viral vector method – DNA library – PCR – hybridization technique – Southern, Northern and Western.

Unit III **Animal Cell Culture and Genome Project**

Culture media – cell culture techniques – monolayer culture and immobilized culture of cell lines – techniques and applications of human embryonic stem cell culture – tissue engineering of artificial skin and cartilage. Human Genome Project – types – DNA sequencing methods - Maxam and Gilbert method, Sanger method – potential benefits to mankind.

Unit IV **Environmental and Bioprocess Technology**

Biotechnological methods for sewage and waste water treatment – bioremediation – degradation of xenobiotic (hydrocarbons and pesticides) – role of genetically engineered microbes – biomining – bioleaching – industrial production of penicillin and ethanol – Biodiesel – Biofertilizer – mass cultivation and application of Azolla.

Unit V **Plant Tissue Culture and Health Care Biotechnology**

Plant tissue culture – media - callus culture – plant embryo culture- in vitro pollination – organ culture – suspension culture and anther culture. Edible vaccines- Bt cotton – Golden rice- DNA probes and diagnosis of genetic disorders – DNA fingerprinting technique – gene therapy and treatment of genetic diseases.

Text Books

1. Dubey R.C. S. *A text book of Biotechnology*. New Delhi, Chand and Comp. Ltd, 2004.
2. Kumaresan, V. *Biotechnology* Nagercoil, Saras Publication, 2010.

Books for Reference

1. Clark and J. Pazdernik. *Biotechnology*, California, USA. 2009.
2. Elsevier Academic Press, Dubey, R.C. *Text Book of Biotechnlogy*, New Delhi. 4th edition, S. Chand and Co Ltd, 2006.
3. Ramadass, P. *Animal Biotechnology – Recent Concepts and Development*. Chennai. MJP Publishers. 2009.
4. Rema, L.P. *Applied Biotechnology*, Chennai. MJP Publishers, 2009.
5. Shailendra Singh, *Applied Biotechnology*, 1st edition, New Delhi. Campus Books International, 2007.
6. Singh, B.D. *Biotechnology,* Chennai. *Revised edition*, Kalyani Publishers. 2005.

Practical

Course Code: 21UBCCR1 **Hours/ Week : 2**

1. Isolation of Blue Green Algae
2. Isolation of protoplast
3. Plant tissue culture – anther culture, embryo culture and nodal culture
4. Preparation of synthetic seed
5. Estimation of dissolved oxygen and BOD
6. Separation of protein by column chromatography
7. Isolation of Plasmid
8. DNA Estimation by UV-Visible Spectrophotometric method
9. Preparation of animal tissue culture media
10. Preparation of SDS – PAGE (Gel mould only)

Book for Reference:

1. Aneja, K.R., *Experiments in Microbiology, Plant Pathology and Tissue Culture*, New Delhi. Wishwa Prakashan, (A Division of Wiley Eastern Ltd).
2. Asish Verma, Surajit Das, Anchal Singh. Laboratory Manual for Biotechnology. New Delhi: S. Chand and Company Ltd., 2008.
3. Joseph Sam Brook and David S. Russel. Molecular Cloning – A Laboratory Manual, New York, Cold Spring Harbor: Cold Spring Harbor Laboratory Press. 2001.

SEMESTER V			
Core VI	**Animal Physiology**		
Course Code : 21UZOC51	**Hrs / Week : 4**	**Hrs /Sem : 60**	**Credits : 4**

Objectives

- To gain deep understanding of structure, functions and coordination of physiological systems and processes.
- To provide insights on connections between structure – function relationship

Course Outcome

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO– 1	identify the structure and functions and co-ordination of organs and organ systems	1	Re
CO -2	indicate the causes, diagnosis, prevention and treatment of illnesses	3	Un
CO – 3	investigate and report on experiments and observations clearly and effectively	6	An
CO – 4	apply explanatory skills to unravel the complexities of life processes and behaviour	5	Ap
CO – 5	criticize physiological challenges and processes under fluctuating environmental conditions	6	Ev
CO – 6	integrate the physiological issues to promote health and welfare of society	8	Cr

SEMESTER V			
Core VI	**Animal Physiology**		
Course Code : 21UZOC51	**Hrs / Week : 4**	**Hrs /Sem : 60**	**Credits : 4**

Unit I Digestion and Nutrition

Intracellular and extracellular digestion – digestive system of man - role of enzymes in digestion of carbohydrates, proteins and lipids – absorption of digested food materials – malnutrition – marasmus - kwashiorkor.

Unit II Respiration and Circulation

Types of respiratory pigments – transport of respiratory gases – oxygen and carbon dioxide - Respiratory quotient. Composition of blood – blood coagulation – structure of human heart – origin and conduction of heart beat – cardiac cycle.

Unit III Excretion and Homeostasis

Structure and function of nephron – mechanism of urine formation in man – nitrogenous waste products – ammonotelism, ureotelism, uricotelism – homeostasis: Osmoregulation in crustaceans and fishes – thermoregulation – mechanisms – ectotherms – endotherms – heterotherms.

Unit IV Muscular and Nervous System

Structure of skeletal muscle and myofibril – mechanism and chemistry of muscle contraction. Structure of neuron – generation and conduction of nerve impulse - synaptic transmission – neuromuscular junction. Receptors – structure of eye and photochemistry of vision.

Unit V Reproduction and Endocrinology

Anatomy of reproductive organs in human – ovary – testis – hormonal control of menstrual cycle, pregnancy, parturition and lactation. Endocrine glands: structure and functions of pituitary, thyroid, adrenal and pancreas.

Text Book

1. Verma P, Tyagi S. and Agarwal V.K. *Animal Physiology*. New Delhi: S. Chand & Company Ltd, 2002.

Books for Reference

1. Goyal and Sastry. *Animal Physiology*. Meerut: Rastogi Publications, 7th Edition 2017.
2. Rastogi S.C. *Essentials of Animal Physiology*. Chennai: New Age International Private Limited 4th Edition 2019.
3. Sembulingam K. and Prema Sembulingam. *Essentials of Medical Physiology*. New Delhi:8 th Edition Jaypee Brothers Medical Publishers. 2019.
4. Maria Kuttikan A and Arumugam N. *Animal Physiology*. Nagercoil Kottar: Saras Publication 2014.
5. Nagabhushanam R. Kodarkar M.S. and Sarojini R. *Text Book of Animal Physiology.* New Delhi: Second Edition, Oxford and IBH Publishing Co, Pvt. Ltd. 2002.

PRACTICALS

Course Code: 21UZOCR5

Hrs/ Week: 2 **Credit -1**

1. Human salivary amylase activity in relation to temperature.
2. Effect of temperature on the opercular movement in fish and calculation of Q10.
3. Examination of excretory products (ammonia, urea and uric acid crystals)
4. Rate of oxygen consumption in fish
5. Study of osmosis in red blood cells
6. Haemocytometer – Demonstration of RBC and WBC counting
7. Kymograph / simple muscle twitch – model
8. Human blood smear (Preparation and observation of different blood cells)
9. Hormonal control of menstrual cycle (chart)
10. Slides – sections of skeletal, cardiac, smooth muscle and endocrine glands (pituitary, thyroid, adrenal and pancreas).

Books for Reference

1. Nigam S .C. and Omkar. 2006. *Experimental Animal Physiology and Biochemistry*. New Age International (P) Limited New Delhi.

SEMESTER V			
Core VII	**Cell Biology and Genetics**		
Course Code: 21UZOC52	**Hrs/week : 4**	**Hrs/sem: 60**	**Credit: 4**

Objectives

- To give an insight on basic organization and functions of the cellular components and the principles of inheritance at the cellular level in organisms.
- To impart and explore the intricate relationship between cells and genes.

Course Outcome

CO.No	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	understand the organization of the cell and to differentiate between prokaryotic and eukaryotic cell.	2	Un
CO-2	describe the structure and functioning of cell organelles as a system to carry out cellular processes	1,2	Re
CO-3	interpret the structure and types of chromosome and composition, structure, and replication of DNA	2,3	Re
CO-4	analyze the genetic basis of Mendelian and non-Mendelian inheritanceand use the information gained to solve problems related to genetics	2,5	An
CO-5	evaluate hereditary patterns for genetic disorders and solutions for health and related issues.	3,8	Ev
CO-6	apply the practical and conceptual knowledge of Cell biology and Genetics in other fields of biology	6	Ap

SEMESTER V			
Core VII	**Cell Biology and Genetics**		
Course Code: 21UZOC52	**Hrs/week : 4**	**Hrs/sem: 60**	**Credit: 4**

Unit I Cell and Plasma membrane

Protoplasm theory - Cell theory. Prokaryotic and Eukaryotic cells. Plasma membrane – Structure- Membrane models - Fluid mosaic model - bimolecular leaflet model, chemical composition, specialized structures and functions.

Unit II Cell Organelles

Ultrastructure and functions of mitochondria, Golgi apparatus, endoplasmic reticulum, lysosome, ribosome.

Unit III Nucleus

Ultrastructure and functions - nucleus, nuclear membrane, nucleolus. Chromosome – structure – types, giant chromosomes - polytene chromosome. DNA – chemistry-structure -Watson and Crick model. RNA- structure and types

Unit IV Mendelian Genetics

Mendelian laws – monohybrid and dihybrid cross – back cross – test cross – incomplete dominance – inheritance of combs in fowls – multiple alleles – ABO and Rh blood groups in man – multiple genes – skin colour in man.

Unit V Sex linked Inheritance and Genetic Disorders

Sex determination in man – sex linked inheritance in man – haemophilia – colour blindness. Inborn errors of metabolism – phenylketonuria, alkaptonuria, albinism. Mutant haemoglobins – sickle cell anaemia. Syndromes – autosomal – Down's syndrome – sex chromosomal – Turner's and Klinefelter's syndrome.

Text books

1. Verma P.S. and V.K Agarwal. *Cytology* . New Delhi: S. Chand and Co Ltd. 8th edition. 2008.
2. Meyyan, R.P. *Genetics*. Nagercoil: Saras Publications. 2007

Books for Reference

1. Powar, C.B. *Cell Biology*. Mumbai: Himalaya Publishing House. 8th Edition. 2015.
2. De Robertis, E.D.P. and De Robertis, E.M.F *Cell and Molecular Biology* Mumbai: K.M. Varghese Company, 8th Edition. 2017.
3. Gardner, Simmons and Snustad. *Principles of Genetics*. New York: John Wiley and Sons. Inc. 8th Edition.2011.
4. Arumugam, N. *Cell Biology*. Nagercoil: Saras Publications. 2017.
5. Rastogi V.B. *A Textbook of Cell Biology and Genetics*. Meerut: Kedarnath Ramnath. First Edition. 2020

PRACTICALS

Course Code: 21UZOCR5

Hrs / Week : 2 **Credit - 1**

1. Preparation of squamous epithelium.
2. Onion root tip squash: Observation of different stages of mitosis.
3. Chironomous larva: Mounting of polytene chromosomes.
4. Observation of cells through phase contrast microscope.
5. Micrometry and measurement of cell dimensions.
6. DNA – Watson & Crick model, Golgi complex, endoplasmic reticulum, mitochondria, ribosome (models/ charts)
7. Verification of Mendel's monohybrid cross using beads.
8. Verification of Mendel's dihybrid cross using beads.
9. Sex-linked inheritance of colour blindness and haemophilia (chart).
10. Genetic basis and clinical manifestations of Down's, Klinefelter's and Turner's syndrome (chart).

Books for Reference:

1. Verma P.S. *A Manual of Practical Zoology - Chordates*. New Delhi: S. Chand & Company Ltd. 2018.
2. Jayasurya, Dulsy Fatima, R.P. Meyyan N. Arumugam and V. Kumaresan. *Practical Zoology* (*Cell Biology – Embryolgy- Animal Physiology - Immunology- EcolGenetics - Evolution - Microbiology - Biochemistry - Biophysics*). Nagercoil: Saras Publication. 2013.
3. Emmanuel C., Rev. Fr. S. Ignacimuthu S.J. and S. Vincent. *Applied Genetics - Recent Trends and Techniques*. Chennai : MJP Publishers. 2006.

SEMESTER V			
Core VIII	**Ecology**		
Course Code: 21UZOC53	**Hrs / Week : 4**	**Hrs / Sem: 60**	**Credits:4**

Objectives

- To study the interaction and interdependence among environmental factors and living organisms
- To develop knowledge and critical understanding of ecology
- To create an awareness and concern towards environment and its conservation.

Course Outcomes:

CO. No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO -1	recall variety of ways that organisms interact with both physical and the biological environment	1,2	Re
CO – 2	explain the structure and impact of biogeochemical cycles	1,2	Un
CO – 3	classify major habitats found on land and water	3	Ap
CO – 4	evaluate the global scale of environmental issues	5	Ev
CO – 5	select government policies and green economy for sustainable development	5	Ev
CO – 6	design field and laboratory experiments in a systematic way	6	Cr

SEMESTER V			
Core VIII	**Ecology**		
Course Code: 21UZOC53	**Hrs / Week : 4**	**Hrs / Sem: 60**	**Credits:4**

Unit I Introduction

Scope and importance of ecology. Biotic (producers, consumers and decomposers)and abiotic factors (light and temperature) – food chain, food web, energy flow. Intra and interspecific relationship – mutualism, commensalism and parasitism.

Unit II Population & Community Ecology

Population: Definition – density and estimation, natality – mortality – age distribution – age pyramids – population growth patterns – population fluctuations - population equilibrium — biotic potential – regulation of population density – dispersal – dispersion – population interaction Community: concepts and characteristics – diversity – structure – community dominance – community stratification – periodicity – community interdependence – Ecotone – Edge effect – ecological niche – ecological succession

Unit III Biogeochemical cycles

Definition - types – gaseous cycle (oxygen, carbon, nitrogen) - sedimentary cycle (phosphorous and sulphur).

Unit IV Habitat Ecology

Lentic habitat – pond – characteristic fauna and adaptation Lotic habitat – river – characteristic fauna and adaptation Deep sea characteristic fauna and adaptation Terrestrial habitat – desert characteristics, fauna and adaptations.

Unit V Global Environmental Issues and Policies

Deforestation - urbanization – climate change and global warming – ozone layer depletion and acid rain. Introduction of government policies and green economy: Swatch Bharat Abhiyan – Initiatives, responsibilities and future aspects.

Text Books

1. Saha, T.K. *Ecology and Environmental Biology*. Kolkata: Books and Allied (P) Ltd 2013.

Books for Reference

1. Kumaraswamy. K. Alagappa Moses A. and Vasanthy M. *Environmental Studies.* Publication Division 2018.

2. Santra S.C. *Fundamentals of Ecology and Environmental Biology*. Kolkata: New Central Book Agency (p) Ltd 2015.
3. Prabhakar, V.K. *Environmental Education*. New Delhi: Anmol publications (P) Ltd 2004.
4. Agarwal, K.C. *Environmental Biology*. Agro Botanica1999.
5. Verma, P.S. and Agarwal V.K. *Cell Biology, Genetics, Molecular Biology, Evolution and Ecology.* New Delhi: S. Chand& Company 2013.
6. Arumugam, N and KumaresanV. *Environmental Studies*. Nagercoil: Saras Publication 2014.
7. Verma and Agarwal. *Principles of Ecology*. New Delhi: S. Chand& Company Ltd 2000.
8. Krisnamoorthy, K.V. *An Advanced Text Book of Biodiversity*. New Delhi: Oxford and IBH 2004.
9. Arumugam, N. *Concepts of Ecology*. Nagercoil: Saras Publication Kottar 2010.

PRACTICALS

Course Code: 21UZOCR5

Hrs/ Week – 2 **Credit - 1**

1. Estimation of dissolved O_2 in water sample (pond and sea water)
2. Determination of dissolved CO_2 in water sample (pond and sea water)
3. Estimation of alkalinity in water sample (pond and sea water)
4. Detection of transparency of water by Secchi disc
5. Analysis of plankton – fresh water / marine
6. Analysis of food chain and food web (Pond or Grass land)
7. Mutualism (Hermit crab & Sea anemone), Commensalism (Echeneis & Shark), Parasitism (Sacculina on crab)
8. Field visit to understand basic ecological concepts (Report on one day trip to sea shore or any place of ecological interest). Coastal/ Estuary/ Bird Sanctuary/ Wildlife Sanctuary.

Books for Reference

1. Jeyasuriya, Arumugam N. and Dulcy Fatima. *Practical Zoology.* Nagercoil: Vol.3 Saras Publications, Kottar2013.
2. Krisnamoorthy K.V. *An Advanced Text Book of Biodiversity*, New Delhi: Oxford and IBH 2004.

SEMESTER V			
Core Elective	**A. Introduction to Research**		
Course Code: 21UZOE51	**Hrs / Week: 4**	**Hrs / Sem: 60**	**Credits: 4**

Objectives:

- To inculcate research aptitude in students.
- To prepare the students to use the scientific writing in their research work.
- To strengthen research by assisting students using scientific techniques in the most optimal way.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain the scientific ideas, tools, methods and techniques in research	4	Un
CO-2	identify appropriate research topics and parameters	8	Re
CO-3	apply the information regarding literature collection and citing the references	5	Ap
CO-4	analyze the components of scholarly writing in a thesis and research report	6	An
CO-5	evaluate critical thinking and scientific approach in the essentials of research	6	Ev
CO-6	develop new scientific tools, concepts and theories to understand and solve scientific problems	4	Cr

SEMESTER V			
Core Elective	**A. Introduction to Research**		
Course Code: 21UZOE51	**Hrs / Week: 4**	**Hrs / Sem: 60**	**Credits: 4**

Unit I Essentials of Research

Research – Definition – Objectives – Types of Research – Qualitative and Quantitative Research – Descriptive and Analytical Research – Basic and Applied Research – Importance of Research - Qualifications of a Researcher.

Unit II Designing of Research

Categories of Research Design – Designing of Experiments – Bias – Randomization – Blinding – Replication – Sample Selection – Sample Size –Minimization – Observational Studies – Data Collection – Techniques and Tools.

Unit III Methods of Research

Research Methods in Biological Sciences – Types of Data – Data Collection - Survey – Types of Surveys – Survey Methodology and Design – Sampling – Types of Sampling – Random and Non-Random Sampling – Case Study – Questionnaire Design.

Unit IV Scientific Writing

Introduction – Selection of Title – Literature Collection – Source of Literature – Journals, Encyclopaedia, Year Book, Periodicals, Computer Aided Searches – Search Engines – Reference Styles – Citing the References – Different Systems of Citing References.

Unit V Research Report

Introduction – Components of a Report –Title – Authors and Addresses – Abstract – Keywords – Introduction – Materials and Methods – Results – Discussion – Summary – Conclusion – Bibliography - Acknowledgement – Conflict of Interest – Authors Contribution – Plagiarism.

Text Book

Ramadoss. P and A. Wilson Aruni. *Research and Writing: Across the Disciplines.* Chennai: MJP Publishers, Triplicane.2009.

Books for Reference

1. Palanichamy S. and M. Shanmugavelu. *Research Methods in Biological Sciences*. Palani: Paramount Publication.1997.
2. Arumugam.N. *Research Methodology for Life Sciences*. Nagercoil: Saras Publication, Kottar Post. 2015.
3. Gurumani. *Research Methodology for Biological Sciences*. Chennai: M.J.P. Publishers. 2011.
4. Debbie Holmes Peter Moody and Diana Dine. *Research Methods for the Biosciences*. United Kingdom : OUP Oxford Publisher. 2006.
5. C.R. Kothari and Gaurav Garg. *Research Methodology: Methods and Techniques*. India: New Age International Publishers, Fourth edition. 2019.
6. Bipin Asthana, Vijaya Srivastava, Nidhi Asthana. K. *Research Methodology*. India: Rastogi Publications, Shivaji Road Meerut - 250002. 2019.
7. Kulkarni. A.P. *Basics of Research Methodology*. Karnataka: Paras Medical Books Pvt. Ltd. 2015.
8. Elizabeth De Poy, Laura Gitlin. United States of America*: Introduction to Research: Understanding and Applying Multiple Strategies*. Elsevier. 2019.

SEMESTER V			
Core Elective	**B. Evolutionary Biology**		
Course Code: 21UZOE52	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Objectives

- To comprehend the scientific concepts of animal evolution through the process and theories in evolutionary biology.
- To provide a deeper knowledge related to human evolution.

Course Outcomes

CO. No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	explain the theories and processes of evolution	1	Un
CO-2	recall the processes driving variation, natural selection and speciation	2	Re
CO-3	appraise the evolutionary significance of mimicry and protective colouration	6	An
CO-4	examine the evidences for evolution	5	An
CO-5	evaluate the various processes concerned with the evolution of man	6	Ev
CO-6	discuss the biological and cultural evolution of man	4	Un

SEMESTER V			
Core Elective	**B. Evolutionary Biology**		
Course Code: 21UZOE52	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Unit I Theories of Evolution

Origin of life – chemical origin of life – experimental evidences – concept of Urey and Miller - theories of evolution and their modern concepts – Lamark, Darwin, De Veries and modern synthetic theory.

Unit II Evidences of Evolution

Evidences in favour of evolution –homologous and analogous organs –morphological, embryological, biochemical and paleontological evidences – fossils and fossilization – geological time scale - chart.

Unit III Forces of Evolution

Variation – sources of variation - natural selection – types, mechanism and evolutionary significance. Speciation - allopatric, sympatric and parapatric.Isolating mechanisms – prezygotic and postzygotic.

Unit IV Mimicry and Colouration

Mimicry – Batesian and Mullerian mimicry, Camoflauge – evolutionary significance. Colouration – protective, aggressive and warning colouration and evolutionary significance.

Unit V Evolution of Man: Biological and cultural

Evolution of man – ancestry of man – salient features of old age and new age man – trends in human evolution. Causes for human evolution – evolution of man as seen in the fossil record. Milestones in cultural evolution of man.

Text Book

1. Mohan P. Arora. *Organic Evolution*. Karnataka: Himalaya Publishing House. 1991.

Books for Reference

1. Arumugam, N. *Evolution*. Nagercoil: Saras Publication, Kottar. 2001.
2. William D. Stansfield. *The Science of Evolution*. New York: MacMillan Publishing Co. 1977.
3. Ledyard Stebbins. *Processes of Organic Evolution*. Delhi: Prentice Hall of India. 1970.
4. Ernst Mayr. *Populations, Species and Evolution. An Abridgment of Animal Species and Evolution.* USA: The Belknap Press of Harvard University. 1970.
5. Dobzshansky, Francis J. Ayala, G. Ledyard Stebbins James W. Valentine. *Evolution*. Delhi: Surjeet Publications. 1973.
6. Jay M Savage. *Evolution*. New Delhi: Amerind Publishing House Co. 1998.
7. Paul Amos Moody. *An Introduction to Evolution*. Ludhiyana: Kalyani Publishers. 1997.

Semester - V			
Common Skill Based Core	**Computer for Digital Era and Soft Skills**		
Code : 21UCSB51	**Hrs / Week : 2**	**Hrs / Sem : 30**	**Credits : 2**

Course Outcome

- Identify different types of computer systems.
- Classify various types of software being used.
- Compare various digital payments and use them in day to day life.
- Recognise the innovative technologies IoT and integrate it in various fields.
- Analyze various social networking platforms and use them efficiently.
- Distinguish various cyber attacks and apply preventive measures.
- Understand the various soft skills needed to become successful.
- Analyze self and adapt oneself to work in a team.

Unit I: Fundamentals of Computers:

Introduction to computers- Components of computers-Working principle-Types of computers-Tablet-Notebook-Smart phone-PDA-Impact of computers on society-Types of software.

Unit II: Recent Trends in Computer Science and e-Governance:

IoT - applications- Mobile applications - E-Learning- E-Commerce - digital payments

Unit III: Social Media:

Face book-Twitter-Linked In-Instagram-Advantages of Social Networking-Issues/Risks of Social Networking-Protecting ourselves from social Networking problems-Cybercrimes-Hacking-Phishing- Cyber Security

Unit IV: Introduction to Soft Skills:

Learning objectives – What are soft skills?-Categories of Soft Skills-Integral Parts of Soft Skills.

Unit V: Understanding Self and Team Building:

Transactional Analysis (TA) - Structural analysis of Ego states- The functional model of Ego states - Egogram-Storkes - Life Position - Egogram and Life Positions Questionnaire-Team and Team Building- Features of effective creative teams

Books for Reference:

1. Peter Norton, Introduction to Computers 6th Edition
2. Charles P Pfleeger, Shari Lawrence Pfleeger, Security in Computing, I Edition, Pearson Education, 2003.
3. E.Balagurusamy, Fundamentals of Computers, McGraw Hill
4. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang , E-Commerce fundamentals and applications, Wiley Student edition
5. Benita Bhatia Dua, DeepaJeyaraman, Profit with Social Media, CNBC
6. Dr.K.Alex, Soft Skills, S.Chand & Co
7. http://www.digitalindia.gov.in/content/social-media-analytics
8. https://www.researchgate.net/publication/307878962_Introduction_to_E-Governance
9. http://www.ijqr.net/journal/v10
10. https://www.researchgate.net/publication/258339295_FUNDAMENTALS_OF_COMPUTER _ STUDIES

SEMESTER V	
Self Study (Optional) **Animal Behavior**	
Course Code: 21UZOSS3	**Credit: +2**

Objectives

- To acquire comprehensive knowledge on the fundamental concepts of animal behavior.
- To understand the biological rhythms that control animal behavior.

Course Outcomes

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	categorise the types of animal behavior correlate the role of animal's environment in the development of behavior.	2,3	An
CO-2	summarize the types of social behavior of animals	3,5	Un
CO-3	explain the modes of communication in animals	2,3,5	Un
CO-4	relate the role of hormones on the sexual behavior	2	Ap
CO-5	understand the various type of biological rhythms	3	Un
CO-6	appraise the role of circadian rhythm on human behavior	2,3	An

SEMESTER V	
Self Study (Optional)	**Animal Behavior**
Course Code: 21UZOSS3	**Credit: +2**

Unit I Introduction to Animal Behavior

Behavior: Definition - origin and history of ethology - classification of behavior - innate behaviour, learning, reasoning, motivation - migration and homing with special reference to birds.

Unit II Ecological Aspects of Behavior

Habitat selection- food selection and optimal foraging theory - anti-predator defense mechanism - aggression, territoriality and dispersal.

Unit III Social Behavior

Schooling in fishes, flocking in birds, herding in mammals, group selection, kin selection, altruism.

Unit IV Reproductive Behavior

Evolution of sex, reproductive strategies, mating systems, courtship, sperm competition, sexual selection and parental care.

Unit V Biological Rhythms

Circadian, circannual, tidal/ lunar, ultradian, infradian rhythms - synchronization of biological rhythms, phase shift - photoperiodism with reference to birds and mammals.

Books for Reference

1. Dustin R. Rubenstein, Johb Alcock. *Animal Behaviour*. New York: Oxford University Press. 2019.
2. Mandal Fatik Barar. *Textbook of Animal Behaviour*. India: PHI Learning Pvt Ltd; 3rd Edition. 2015.
3. Agarwal V.K. *Animal Behaviour* (*Ethology*). New Delhi: S Chand & Company, First Edition. 2010.
4. Shukla J.P. *Fundamentals of Animal Behaviour.* India: Atlantic, First Edition. 2021.
5. Reena Mathur. *Concepts of Animal Behaviour* (*Z-80*). India: Rastogi Publications; 1st Edition. 2018.

SEMESTER VI			
Core IX	**Immunology and Microbiology**		
Course Code: 21UZOC61	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Objectives

- To highlight the importance of immunity, immune system, and lymphoid organs
- To elucidate the nature of microorganisms and the culture techniques of bacteria
- To learn the role of microbes in agriculture, food and in medical field.

Course outcome

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	identify the basis of immune responsiveness and associated organs	2	Re
CO-2	compare the mechanism of B and T cell activation	5	An
CO-3	acquire knowledge on structure and functions of immunoglobulins and classify them.	2	Ap
CO-4	explain the basic structure of microbes, symptoms of microbial diseases and preventive measures	1	Un
CO-5	analyse the causes and prevention of food poisoning and food spoilage.	2	An
CO-6	develop skills in fundamental techniques in immunology and microbiology including identification of lymphocytes, sterilization, isolation and culture of bacteria	6	Cr

SEMESTER VI			
Core IX	**Immunology and Microbiology**		
Course Code: 21UZOC61	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Unit I Immunity Types and Lymphoid Organs

Immunity – types – innate immunity – factors controlling innate immunity – acquired immunity –types – active and passive immunity, Lymphoid organs – thymus, bone marrow, spleen and lymph nodes.

Unit II Immune Response

Cells of the immune system – development and fate of stem cells - Lymphocytes, B Lymphocytes, T Lymphocytes - types of T cells and macrophages –Immune response – humoral - primary and secondary – B cell activation - cell mediated immune response – Tcell activation – biological functions of cell mediated immunity.

Unit III Antigens and Antibodies

Antigens – definition – epitopes – cross reactive antigen - heterophile antigen – Frossman antigen – haptens. Antibodies (Immunoglobulins) - definition –structure and functions of immunoglobulin – Ig classes - IgG, IgA, IgM, IgD and IgE.

Unit IV Structure, Shape and Culture of Microbes

Importance and scope of Microbiology – classification of bacteria - general structure of bacteria, fungus and virus. Culture media, continuous and batch culture techniques – bacterial growth curve.

Unit V Food, Agricultural and Medical Microbiology

Food Microbiology: Food poisoning - botulism, salmonellosis; food spoilage and preservation methods. Agricultural Microbiology: Rhizosphere - microorganisms - symbiotic and asymbiotic nitrogen fixation. Medical Microbiology: Causative agent, symptoms, prevention and control of tuberculosis, gonorrhea, candidiasis, dermatophytosis, dengue and COVID-19.

Textbook

1. Kannan, I. *Immunology*. Chennai: MJP Publishers 2007
2. Chakraborty, P.A. *Text Book of Microbiology*. Kolkata: New Central Book Agency (P) Limited. 1995.

Books for Reference

1. Arumugam, N., Mani, A., Narayanan, L.M., Dulsy Fatima and A.M.Selvaraj. *Immunology and Microbiology*. Nagercoil : Saras Publication. 2015.
2. Rao, C.V. *An Introduction to Immunology*. New Delhi: Narosa Publishing House. 2005.
3. Joshi K.R and Osamo N.O. *Immunology.* India: Agro Botanical Publishers, 4th Edition, 1994.
4. Surendra Naha. *Fundamentals of Immunology*. New Delhi: Dominant Publishers & Distributors Pvt. Ltd. 2012.
5. Pelczar, M.J, Chan, E.C.S. and N.R. Krieg. *Microbiology* New Delhi: Mc Graw–Hill Book Company. 1986.
6. Arti Kapil. *Text Book of Microbiology.* India: Universities Press (India) Pvt. Ltd. 9th Edition, 2013.

PRACTICALS

Course Code: 21UZOCR6

Hours/ Week: 2 **Credit: 1**

1. Lymphoid organs– chart/ slides of histology
2. Single Radial Immuno diffusion (Demonstration)
3. Double Immuno diffusion (Demonstration)
4. Microscopic observation of different types of lymphocytes
5. Sterilization techniques
6. Preparation of culture media
7. Serial dilution technique
8. Simple staining of bacteria
9. Gram staining of bacteria
10. Hanging drop technique.
11. Study of distribution of microorganisms in nature – soil, water and air.
12. Culture and counting of bacterial colonies using colony counter.
13. Spotters – autoclave, hot air oven, laminar flow hood, inoculation needle, agar plate.

Books for Reference

1.Jayasurya, Dulsy Fatima, Meyyan, R.P., Arumugam, N. and V. Kumaresan. *Practical Zoology*. (*Cell Biology- Embryology - Animal Physiology - Immunology- Ecology-Genetics-Evolution - Microbiology - Biochemistry - Biophysics*). Nagercoil: Saras Publication, Kottar P.O.2013.

2.James Cappuccino and Natalie Sherman. *Microbiology A Laboratory Manual*. Tokyo: Addison - Wesly- Hyman Inc.1990.

SEMESTER VI			
Core X	**Biostatistics and Bioinformatics**		
Course Code: 21UZOC62	**Hrs/ Week : 4**	**Hrs/ Sem: 60**	**Credits: 4**

Objectives

- To explore the integration and application of statistics and bioinformatics in biology
- To acquire the skills and perspectives on statistics and bioinformatic tools in analysis and interpretation of data

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	attain an insight on statistical methods for analysis of biological data using appropriate softwares	4	Un
CO-2	apply the knowledge on the usage of bioinformatics tools for sequence alignment, data base searches, genome analysis and protein structure studies	4	Ap
CO-3	undertake statistical operations in biological data analysis	4,8	Ap
CO-4	operate commonly used bioinformatic tools and statistical methods and understand their limitation	4	An
CO-5	apply bioinformatics in life science research	4,5	Ap
CO-6	critically evaluate the data analysis procedures in publications of molecular biology research	6	Ev

SEMESTER VI			
Core X	**Biostatistics and Bioinformatics**		
Course Code: 21UZOC62	**Hrs/ Week : 4**	**Hrs/ Sem: 60**	**Credits: 4**

Unit I Biostatistics–Collection and Display of Data

Introduction–populations and samples–types of variables–classification of data – frequency distribution – presentation of data –tables - parts - types – diagrams – bar diagram – pie diagram – graphs –histogram – frequency polygon – frequency curve - ogives.

Unit II Measures of Location and Dispersion

Concept – computation for grouped and ungrouped data – relative merits and limitations of measures of central tendency mean, median and mode – emprical relationship between mean, median and mode – measures of dispersion – range, variance, standard deviation, standard error and coefficient of variation.

Unit III Statistical Inference and Correlation Analysis

Probability theory – terminology – types - theorems of probability - chi-square test and goodness of fit – correlation – definition – types – uses of correlation analysis - scatter diagram – Karl Pearson's correlation coefficient–calculation of r value and interpretation – testing the significance of relationship using student's t-test.

Unit IV Bioinformatics– An Overview

Definition – scope – applications of bioinformatics – properties of biological databases – hard link relationships between databases - databases retrieval tools – PubMed – Medline – Locuslink

Unit V Protein and Nucleotide Sequence Databases

Protein sequence databases – NCBI – SWISSPROT–PDB – nucleotide sequence databases – EMBL – GENBANK – homology search tools – BLAST – FASTA – applications of bioinformatics tools in research.

Text Books

1. Gurumani N. *An Introduction to Biostatistics.* 2nd edition, Chennai: MJP Publishers, 2005.
2. Prakash Lohar. *Bioinformatics*. 1st edition Chennai: MJP Publishers, 2019.

Books for Reference

1. Palanisamy S. and Manoharan M. *Statistical Methods for Biologists.* Palani: Palani Paramount Publications, 1990.
2. Arumugam N. *Biostatistics, Computer Applications, Bioinformatics and Instrumentation.* Nagercoil: Saras Publication, 2010.
3. Agarwal S.K. *Biostatistics*.New Delhi: APH Publishing Corporation, 2008.
4. Arunima Mukherjee. *Bioinformatics.* Jaipur, India: Oxford Book Company, 2008.
5. Thiagarajan B. and Rajalakshmi Pa. *Computational Biology.* Chennai: MJP Publishers, 2009.
6. Claverie J M. and Notredame C. *Biinformatics for Dummies.* 2nd edition, Hoboken: Wiley Publishing Inc, NJ07030-5774, 2007.

PRACTICALS

Course Code: 21UZOCR6

Hours/ Week: 2 **Credit: 1**

1. Preparation of a questionnaire and collection of data by survey method.
2. Demonstration of simple random sampling by simulation using students (lottery and table of random number method)
3. Construction of continuous frequency table for the weight/height of students.
4. Diagrammatic presentation of data - simple bar diagram and pie diagram
5. Graphical presentation of data – histogram, frequency polygon, frequency curve and ogives
6. Calculation of mean, median, mode, variance, standard deviation, standard error and coefficient of variation using neem leaves
7. Study of probability and chi – square test with two coins tossing experiment
8. Calculation of correlation coefficient and testing its significance
9. FASTA format conversion and sequence alignment using BLAST
10. Retrieving data from EMBL database - Print out

Books for Reference

1. Rajadurai M. *Bioinformatics – A Practical Manual*. Chennai: PSB Book Enterprises, 2010.
2. Gurumani N. *An Introduction to Biostatistics.* 2nd edition. Chennai: MJP Publishers, 2005.

SEMESTER VI			
Core XI	**Marine Biology**		
Course Code : 21UZOC63	**Hrs / week : 4**	**Hrs / sem : 60**	**Credits : 4**

Objectives

- To provide quality education and training in the field of marine biology and marine environment.
- To raise awareness about marine environment for the welfare of the community and society.
- To develop necessary skills to manage and preserve the resources of sea.

Course Outcomes

CO. No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO- 1	discuss the different ecological zones of marine environment, diversity of marine organisms and their adaptations	1	Un
CO -2	explain the physical and chemical properties of seawater and their significance to marine life	2	Un
CO - 3	appraise the ocean production, characteristics andtypes of coral reefs, mangroves and estuaries	3	An
CO - 4	examine the formation, types and properties of thedynamics of ocean	3	An
CO - 5	analyse various types of marine resources and assessthe various environmental concerns related to the useand abuse of marine resources	5	An
CO - 6	design and implement effective solutions toproblems in marine environment	8	Cr

SEMESTER VI			
Core XI	**Marine Biology**		
Course Code : 21UZOC63	**Hrs / week : 4**	**Hrs / sem : 60**	**Credits : 4**

Unit I Marine Habitat

Classification of marine habitat. Characteristics of pelagic and benthic divisions – Intertidal rocky, sandy and muddy shores – the features of flora and fauna and their adaptations.

Unit II Physical and Chemical Characteristics of Sea Water

Physical parameters – light, temperature, density. Chemical parameters - Nutrients (major, minor and trace elements) dissolved gases and salinity.

Unit III Biological Characteristics of the sea

Plankton – classification, adaptations and methods of collection. Primary and secondary production. Coral reef, mangroves, estuaries - characteristics types and their adaptations.

Unit IV Dynamics of Ocean

Tides - generating forces, types, effects of tides in coastal areas; Waves - formation, properties, types – tsunami, currents – equatorial and western boundary currents.

Unit V Resources of the Sea

Chemical resources - manganese nodules, phospharite, petroleum. Biological resources – natural products from sponges, mollusks, star fish and ascidians. Sargassum and calurpa.

Text Book

1. Nybakken J.W. *Marine Biology – An Ecological Approach*. California: Addison Weslay Longman, Inc. 1997.

Books for Reference

1. Gross G. *Oceanography: A view of the Earth.* New Jersey: Sixth edition. Prentice Hall Inc 2008.
2. Mc Cormick J.M. and Thiruvathaakal J.V. *Elements of Oceanography*. Philadelphia: W.B. Saunders Company1981.
3. Olivia J. Fernando. *Sea water - Properties and dynamics*. Ponnagam, Thanjavur: Dhanesh Publications 1999.
4. Girish Chopra. *Coastal and Marine Geography*. Delhi: Common Wealth Publisher 2012.
5. Veena. *Understanding Marine Biology - Discovery.* New Delhi: Publishing House PVT. LTD 2012.
6. Russel. *Marine Ecology*. London: Academic Press.1970.

PRACTICALS

Course Code: 21UZOCR7

Hrs/ Week: 2 **Credits: 2**

1. Collection and identification of marine plankton (any two zooplankton)
2. Estimation of primary productivity
3. Determination of salinity in sea water
4. Estimation of chloride in sea water
5. Determination of acidity in sea water
6. Estimation of nitrite in sea water
7. Determination of phosphorus in sea water
8. Museum Specimen/ Charts
   Barnacles, Sea anemone, Uca, Cerithidea, Oyster, Ascidian, Rhizophora, Chiton, Arenicola, Nereis, sargassum and calurpa.
9. Visit to Rocky/ Sandy shore/ Mangroves/ Estuary.

Books for Reference

1. Michael P. *Ecological methods for field and laboratory investigations.* New Delhi: Second Reprint. Tata Mc Grew - Hill Publishing Company Limited 1990.

SEMESTER VI			
Core XII	**Economic Zoology**		
Course Code: 21UZOC64	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Objectives

- To impart basic knowledge on solid waste management using vermicomposting technology.
- To provide information and technical skills in various aspects of sericulture, apiculture, aquaculture and dairy management to equip the students for self employment.
- To inculcate knowledge on profitable animals and encourage young learners to take up the small- scale livestock farming.

Course Outcomes

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	discuss vermicomposting methods and the suitable species of earthworm for vermiculture	1	Un
CO-2	demonstrate skills on moriculture, silkworm rearing processes and harvesting of cocoons	7	Ap
CO-3	select the suitable species of bees for apiary and make use of bee keeping equipment	1	Ev
CO-4	describe cultivable organisms, nutritional requirements and formulate feed for aquaculture organisms and manage culture ponds	7	Re
CO-5	analyse the types of milk products, their nutritive value and outline the general management of dairy animals	8	An
CO-6	develop skills for self-employment and promote rural development	7	Cr

SEMESTER VI			
Core XII	**Economic Zoology**		
Course Code: 21UZOC64	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Unit I Vermitechnology

Need for vermi culture - selection of suitable species of earthworm, preparation and maintenance of vermicomposting bed, harvesting the worms; Vermicompost - Vermicomposting methods - Pit method - bin method - windrow method; vermiwash - preparation - applications.

Unit II Sericulture

Mulberry cultivation – common Indian varieties of mulberry - methods of propagation; Silk worm rearing – rearing house – rearing appliances – chawkirearing – application of sampoorna; Mountage - Chandrike - harvesting of cocoons.

Unit III Apiculture

Choice of species in apiculture- Indian bee, European bee. Bee keeping equipment - Langstroth hive and Newton's hive- Appliances used in apiaries. Swarming – prevention and control. Extraction and uses of honey- bee wax- bee venom.

Unit IV Aquaculture

Importance of aquaculture - Cultivable organisms and their qualities. Management of culture ponds - control of water quality parameters – fertilization. Fish feed – artificial feed - feed formulation and composition of formulated feed, live feed organisms.

Unit V Dairy Management

Calf raising, heifer management, management of pregnant, parturition and lactating cows. Balanced food ratio for dairy animals. Dairy products - milk, butter, cheese, ghee - nutritive value of milk - pasteurization of milk.

Text Books

1. Mary Violet Christy A. *Vermitechnology*. Chennai: MJP Publishers, First edition. 2020.
2. Ganga G. and J. *Sulochana Chetty*. New Delhi: An Introduction to Sericulture. Oxford & IBH Publishing Co Pvt. Ltd. 2019.
3. Johnson, J. and I. Jeya Chandra. *Apiculture*. Marthandam: Olympic offset Printers. 2005.
4. Santhana Kumar and Selvaraj, A.M *Concepts of Aquaculture*. Nagercoil: Mac ram Publications.2006.
5. Prasad Jayadish, *Principle and Practices of Dairy Farm*. NewDelhi: Kalyani Publisher. 2016.

Books for Reference

1. Prakash Malhotra, *Economic Zoology*. New Delhi: First edition. Adhyayan Publishers and Distributers. 2008.
2. Gupta P. K. *Vermicomposting for Sustainable Agriculture*. India: Agrobios, 2nd Revised Edition.2012.
3. Talashilkar S. C. and Dosani *Earthworm in Agriculture.* Jodhpur: Agrobios Publications, First edition.2005.
4. Krishnaswami S. *New Technology of Silkworm Rearing*. Bangalore: Published by Central Silk Board.1990.
5. Kamal Jaiswal, Sunil P. Trivedi, B.V. Pandey and P.N. Pandey. *Indian Sericulture*. New Delhi: ALFA Publication.2009.
6. Mishra. R.C. *Perspectives in Indian Apiculture*. New Delhi: Agro Botanica, 1997.
7. Raja Justus. E. *Economics of Bee Keeping Industry*. Jaipur and. New Delhi: Rawat Publications. 2009.
8. Dinabandhu Sahoo, S.Z. Qasim. *Sustainable Aquaculture*. New Delhi: A.P.H Publishing Co. 2009
9. Sailendra Ghosh. *Fisheries and Aquaculture Management*. New Delhi: Adhyayan Publisher& Distributors.2009.
10. Banerjee, G.C. *Textbook of Animal Husbandry*.New Delhi: Oxford and IBH Publishing Co. Pvt.Ltd,Eighth edition. 2011.
11. Danjyaganj. *Handbook of Animal Husbandry*.New Delhi:Sangam Book Depot.ICAR edition. 2015.

PRACTICALS

Course Code : 21UZOCR7

Hrs/Week: 2 **Credit: 1**

1. Identification of earthworm species (*Lumbricus terrestris, Eisenia fetida, Lampito mauritii*)
2. Preparation and maintenance of vermicomposting bed
3. Common Indian varieties of Mulberry
4. Rearing appliances in Sericulture (chopping knives, chopping board, foam rubber stripes)
5. Identification of Indian bee, European bee
6. Mounting of mouth parts, legs, sting of bee
7. Bee keeping equipment (Newton Hive, smoker, extractor)
8. Cultivable organisms and their qualities – Indian major carps
9. Fish feed formulation and preparation
10. Balanced food ratio for dairy animals
11. Visit to sericulture unit / apiary/ dairy/ aquaculture farm.

Books for Reference

1. Alka Prakash. *Laboratory Manual of Entomology*. New Delhi: New Age International (P) Ltd. 2001.
2. Tammanna N. Son walker. *Hand Book of Silk Technology*. Chennai: Wiley Eastern Ltd. 1993.
3. Agarwal, S.C. *A Hand book of Fish Farming*. Delhi: Narendra Publishing House.1994.