

SACRED HEART COLLEGE (AUTONOMOUS)

DEPARTMENT OF ZOOLOGY

BACHELOR OF SCIENCE IN ZOOLOGY

Course plan

Academic Year 2018-19

Semester 5

COURSES OFFERED

COURSE CODE	TITLE OF THE COURSE	TOTAL HRS./SEM	CREDITS	NO. HRS./WEEK
15U5CRZO05	Cell Biology and Molecular Biology	54	3	3
15U5CRZO06	Environmental Biology, Toxicology and Disaster Management	54	3	3
15U5CRZO07	Evolution, Zoogeography and Ethology	54	3	3
15U5CRZO08	Biochemistry, Human Physiology and Endocrinology	54	3	3
15U5OCZO01	OPEN COURSE: Human Genetics, Nutrition, Community health and Sanitation	72	4	3

COURSE PLAN

PROGRAMME	BACHELOR OF ZOOLOGY	SEMESTER	5
COURSE CODE AND TITLE	15U5CRZOO05: CORE COURSE 5 CELL BIOLOGY AND MOLECULAR BIOLOGY	CREDIT	3
HOURS/WEEK	3	HOURS/SEM	54
FACULTY NAME	RAAGAM PM: 2 hr; VIDHU VIJAYAN: 1 hr		

Course Objectives
Comprehend the history and scope of cell and molecular biology, cell theory, prokaryotes, eukaryotes, Actinomycetes, Mycoplasmas, virus, virion and viroids and prions
Explain plasma membrane, the various models of plasma membrane and its modifications, cell permeability and functions
Describe the ultrastructure of the cytoplasm and the various cell organelles and their functions
Explain the structure and functions of the nucleus and a basic understanding of chromosomes and its structure
Explain and compare cell division both mitosis and meiosis and the various cell signalling mechanisms
Comprehend the basic nature of the genetic material, DNA structure, types, replication, modern concept of gene, prokaryotic and eukaryotic genome
Interpret the central dogma of molecular biology, genetic code and protein synthesis in prokaryotes and eukaryotes
Explain gene regulatory mechanisms, operon concept both lac operon and typtophan operon

Sessions	Topic	Method of Teaching	Value Addition	Remarks
	CELL BIOLOGY			
	Module I History of cell and molecular biology			
1	Cell theory, Prokaryotes, Eukaryotes	ICT Enabled (ppt& images, charts, video clippings)	Q & A SESSION	
2	Actinomycetes, Mycoplasmas, Virus, Virion and Viroids, Prions	ICT Enabled (ppt& images, charts, video clippings)		
	Module II Cell membrane & Permeability			
3	Molecular models of cell membrane (Sandwich model, Unit membrane model, Fluid mosaic model)	ICT Enabled (ppt& images, charts, video clippings)		
4	Modifications of plasma membrane. (Microvilli, tight junction, gap junction, desmosomes)	ICT Enabled (ppt& images, charts, video clippings)		
5	Cell permeability - Diffusion, Osmosis, Passive transport, Active transport, Cell coat and Cell recognition	ICT Enabled (ppt& images, charts, video clippings)	Q & A SESSION	
	Module III Ultrastructure of Cytoplasm			
6	Cytoskeleton - Microtubules, microfilaments, intermediate filaments	ICT Enabled (ppt& images, charts, video clippings)		
7	Endoplasmic reticulum - Structure and functions	ICT Enabled (ppt& images, charts, video clippings)		
8	Ribosomes (Prokaryotic and Eukaryotic)	ICT Enabled (ppt& images, charts, video clippings)		
9	Golgi complex - Structure and functions	ICT Enabled (ppt& images, charts, video		

		clippings)		
10	Lysosomes - Polymorphism - GERL concept, functions	ICT Enabled (ppt& images, charts, video clippings)		
11	Mitochondria - Structure and functions	ICT Enabled (ppt& images, charts, video clippings)		
12	Symbiont hypothesis	ICT Enabled (ppt& images, charts, video clippings)		
13	I CIA	Descriptive test 1 hr		
	Module IV Nucleus			
14	Structure and functions of interphase nucleus,	ICT Enabled (ppt& images, charts, video clippings)	Q & A SESSION	
15	Nuclear membrane, pore complex	ICT Enabled (ppt& images, charts, video clippings)		
16	Structure and functions of nucleolus	ICT Enabled (ppt& images, charts, video clippings)		
17	Chromosomes	ICT Enabled (ppt& images, charts, video clippings)		
18	Structure - Heterochromatin, Euchromatin, Nucleosomes	ICT Enabled (ppt& images, charts, video clippings)		
19	Polytene chromosomes-Balbiani rings, Endomitosis	ICT Enabled (ppt& images, charts, video clippings)		
20	Lamp brush chromosomes	ICT Enabled (ppt& images, charts, video clippings)		

	Module V Cell Division			
21	Cell cycle - G ₁ , S, G ₂ and M phases	ICT Enabled (ppt& images, charts, video clippings)		
22	Mitosis	ICT Enabled (ppt& images, charts, video clippings)		
23	Meiosis	ICT Enabled (ppt& images, charts, video clippings)		
24	Meiosis	ICT Enabled (ppt& images, charts, video clippings)	Quiz	
	Module VI Cell Communication			
25	Cell signalling - Signalling molecules	ICT Enabled (ppt& images, charts, video clippings)		
26	Neuro- transmitters, hormones, growth factors, cytokines, vitamin A and D derivatives	ICT Enabled (ppt& images, charts, video clippings)		
27	Role of cyclic AMP	ICT Enabled (ppt& images, charts, video clippings)		
	PART II - MOLECULAR BIOLOGY			
	Module VII Nature of Genetic Materials			
28	Discovery of DNA as genetic material – Griffith's transformation experiments.	ICT Enabled (ppt& images, charts, video clippings)		
29	Hershey Chase Experiment of Bacteriophage infection	ICT Enabled (ppt& images, charts, video clippings)	Quiz	
30	Structure and types of DNA & RNA .	ICT Enabled (ppt& images, video clippings)		

31	DNA replication.	ICT Enabled (ppt& animations, images, video clippings)		
32	Modern concept of gene (Cistron, muton, recon, viral genes). Prokaryotic genome, Eukaryotic genome,	ICT Enabled (ppt& images, video clippings)		
33	Split genes (introns and exons), Junk genes, Pseudogenes, Overlapping genes, Transposons	ICT Enabled (ppt& images, video clippings)		
	Module VIII Gene Expressions			
34	Central Dogma of molecular biology,	ICT Enabled (ppt& images, video clippings)		
35	One gene-one enzyme hypothesis, One gene-one polypeptide hypothesis.	ICT Enabled (ppt& images, charts, video clippings)		
36	Characteristics of genetic code, Contributions of Hargobind Khorana.	ICT Enabled (ppt& images, charts, video clippings)		
37	Protein synthesis-Transcription (Prokaryotic& eukaryotic)	ICT Enabled (ppt& images, charts, video clippings)		
38	Protein synthesis-Transcription (Prokaryotic& eukaryotic)	ICT Enabled (ppt& images, charts, video clippings)		
39	Reverse transcription, post transcriptional modifications,	ICT Enabled (ppt & images, video clippings)		
40	Translation,	ICT Enabled (ppt, images, animations & video clippings)		
41	Translation contd...			
42	Post translational modifications.			
43	Revision and Evaluation of course			
	Module IX Gene regulations			
44	Prokaryotic (inducible, repressible systems)	ICT Enabled		

		(ppt& images, charts, video clippings)		
45	Operon concept -Lac operon	ICT Enabled (ppt& images, charts, video clippings)		
46	Tryptophan operon	ICT Enabled (ppt& images, charts, video clippings)		
47	Brief account of Eukaryotic gene regulation	ICT Enabled (ppt& images, charts, video clippings)		
48	Definitions- Global control – Stimulon and modulon	ICT Enabled (ppt& images, charts, video clippings)		
49	Catabolite repression (Glucose effect)	ICT Enabled (ppt& images, charts, video clippings)		
50	Class Test 1	Descriptive		
51	Class Test 2	Descriptive		
	II CIA			
52	Revision and Evaluation			
53	Revision and Evaluation			
54	Revision and Evaluation			

INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

S. No	Date of completion	Topic of Assignment & Nature of assignment (Individual – Written/Presentation – Graded or Non-graded etc)
		Assignment Topics
1	30-06-2018	Cell signalling mechanisms - Graded
2	15-07-2018	Mitosis
3	30-07-2018	Meiosis

TEXTBOOKS AND REFERENCES:

Basic Reference

1. Thomas AP (Editor) 2011 Cell & Molecular Biology, Zoological Society of Kerala Study material. 2002. *Cell Biology, Genetics and Biotechnology* Chapter – 1
2. Zoological Society of Kerala Study material. 2008. *Microbiology and Immunology* Chapter – 1
3. Powar C.B. (1983) Cell Biology (Himalaya Pub. Company)
4. Rastogi S. C. (1998) Cell Biology, Tata Mc.Graw Hill Publishing Co. New Delhi
5. Karp. G., 1996 *Cell and Molecular Biology, Concepts and Experiments*
6. John Wiley and Sons New York.
7. Veer Bala Rastogi. (2008). Fundamental of Molecular Biology, Ane's Books, India Chapter -12 pp. 282-292, Chapter 13, pp293-318.

Additional Reading

1. Ariel G Loewy Philip Sickevitz, John R. Menninger and Jonathan A.N. Gallants (1991) Cell structure and function. Saunder's College Publication
2. Arthur & Tania. (1991) DNA Replication. W.H. Freeman & Co. New York.
3. Arthur M Lesk. (1990) Introduction to Genomics. Oxford University Press
4. Carraway K.L. & C.A.C. Carraway. (2002) Cyto skeleton signalling, Oxford University Press
5. Charlotte J Avers. (1986) Molecular Cell Biology. The Benjamin / Cummings Publishing Company Inc.
6. Cohn N.S. 1979 Elements of Cytology (Freeman Book Company).
7. Daniel & Elizabeth. (1996) Genetics-Principle and Analysis. Jones & Bartlett Publishers
8. David A Micklos & Greg A Freyer. (2006) DNA Science. Cold Spring Harbor Laboratory Press
9. David Latchman. (2006) Gene Regulation. London Unwin Hyman
10. David M. J. Lilley. (2003) DNA-Protein Structural Interactions. Frontiers in Molecular Biology.
11. De- Robertis E.D. and De Robertis Jr.E.M.F (2002) Cell and Molecular Biology (Lea & Febiger/Info-Med)
12. Earl R Stadtman & P. Boon Chock. (2000) Current Topics in Cellular Regulation. Academic Press
13. Edwards & Hassall. Mc.Graw Hill Publishing Co.Ltd., U.K.
14. Finean & Michell. (1998) Membrane Structure. Holland Bio-Medical Press, Netherland.
15. Gardner E.J. and Snustand D.P. Principles of Genetics. John Wiley & Sons, New York.
16. Gupta M.L. & M.L. Gangir. (1998) Cell Biology. Agrobotanica
17. James Darnell. (1998) Molecular Biology. Scientific American Books Inc.
18. Karp G. (1996) Cell and Molecular Biology: Concepts and Experiments John Wiley and Sons m, New York
19. Kimball J.W. 1984 Cell Biology (Addison - Wesley Pub. Co.)
20. Kwang W Jeon. (1997) A Survey of Cell Biology. Academic Press
21. Malcolm N. Jones & Dennis Chapman. (1991) Micelles, Monolayers and Biomembranes. John Willey & Sons Inc. Publication
22. Michael T.A. Michael, E.R. and Toya S.K. (1975) Electron Microscopy and Cell Structure. Cambridge University Press
23. Mitchison J.M. (1991) The Biology of the Cell Cycle, Cambridge University Press
24. Powar C.B. (1983) Cell Biology (Himalaya Pub. Company)
25. Rastogi S. C. (1998) Cell Biology. Tata Mc.Graw Hill Publishing Co., New Delhi
26. Sinnot Dunn & Dobzhanasky. (1991) Principles of Genetics. T.M.H. New Delhi.

27. Sobti R.C. & G. Obe. (2000) Eukaryotic Chromosomes. Narosa Publishing House.
28. Stanley G. Schultz. (2002) Basic Principles of Membrane Transport. Cambridge University Press
29. Stephen L Wolfe. (1981) Biology of the Cell. Wadsworth Publishing Co. Inc.
30. Swanson Metz and Young (1983) Cytology and Cytogenetics (Macmillan and Co. Ltd.)
31. Samuel J M, Lilly Chacko, Abraham Samuel and Punnen Kurian 2011 Cell and Molecular Biology The Fundamentals -Green leaf publications TIES Kottayam
32. Varma P.S. and Agarwal V.K. (1988) Cytology (S.Chand & Co., New Delhi)
33. Varma P.S. and Agerwal V.K. (2008) Genetics (S.Chand & Co., New Delhi)

PROGRAMME	BACHELOR OF ZOOLOGY	SEMESTER	5
COURSE CODE AND TITLE	15U5CRZOO06: CORE COURSE 6 ENVIRONMENTAL BIOLOGY, TOXICOLOGY AND DISASTER MANAGEMENT	CREDIT	3
HOURS/WEEK	3	HOURS/SEM	54
FACULTY NAME	MONCEY VINCENT AND DR. GISHA SIVAN		

COURSE OBJECTIVES OF 15U5CRZOO06

COURSE OBJECTIVES
Illustrate the history, development, branches and scopes of Environmental Biology, Toxicology and Disaster Management
Explain the structure, functions and classification of ecosystems.
Appraise the conservation programs for the ecosystems and global environment
Evaluate the importance of natural resources for the survival of humankind and evaluate the environmental issues caused by the misuse or overexploitation of these resources
Summarise the harmful effects of waste materials, toxic materials, chemicals and minerals to the organisms and human health
Distinguish natural and anthropogenic disasters and outline hazard preparedness and mitigation measures

SESSION	TOPIC	LEARNING RESOURCES	VALUE ADDITIONS	REMARKS
PART I: ENVIRONMENTAL BIOLOGY				
MODULE I – INTRODUCTION				
1	History and development of Environmental Biology	PPT/Lecture	Video	
2	Scope and branches of Environmental Biology	PPT/Lecture		
MODULE II – ECOSYSTEMS				
3	Concept and classification of Ecosystem Terrestrial ecosystem Abiotic and biotic components	PPT/Lecture	Video- From Pole to Pole	
4	Interactions between different types of ecosystems Classification (Types)	PPT/Lecture		
5	Forest Biome Desert Biome	PPT/Lecture		
6	Grassland Biome	PPT/Lecture	Video	
7	Causes of land degradation with special reference to Kerala	PPT/Lecture	Video	
8	Freshwater ecosystem Physico chemical nature of water Types of freshwater ecosystems	PPT/Lecture	Video	
9	Lentic Ecosystem- Adaptations Lotic Ecosystems- Adaptations	PPT/Lecture		
10	Ground water Dependent Ecosystems	PPT/Lecture		
11	Threat to freshwater resources of Kerala	PPT/Lecture		
12	Watershed management	PPT/Lecture		
13	Marine ecosystem Physico-chemical nature Intertidal zone Rocky shore Adaptations	PPT/Lecture		
14	Muddy shore- Adaptations Sandy shore	PPT/Lecture		
15	Coral reefs and their conservation	PPT/Lecture		
16	Open sea- Pelagic realm	PPT/Lecture		
17	Benthic realm	PPT/Lecture	Video	
18	Wetland and mangroves	PPT/Lecture		
19	Estuaries	PPT/Lecture		
20	Convention on wetlands (Ramsar, 1971)	PPT/Lecture		
21	Ramsar sites in Kerala	Lecture		
22	Threats and conservation aspects of wetlands	PPT/Lecture	Video	
CIA 1				

MODULE III – MAN AND ENVIRONMENT				
23	Natural resources Introduction	Lecture		
24	Biological and Abiotic resources	PPT/Lecture		
25	Energy resources Conventional- Biomass energy	PPT/Lecture		
26	Fossil Fuels- Coal- Uses Advantages and disadvantages	PPT/Lecture		
27	Hydrocarbons- Petroleum products, Hydel Power	PPT/Lecture		
28	Non conventional Inexhaustible- Wind Energy, Solar Energy	PPT/Lecture		
29	Wave Energy and Tidal Power, Nuclear Energy	PPT/Lecture		
30	Energy conservation measures	PPT/Lecture		
MODULE IV – GLOBAL ENVIRONMENTAL CHANGES				
31	Global warming	PPT/Lecture		
32	Green house effect	PPT/Lecture		
33	Ozone depletion	PPT/Lecture		
34	Climate change Definition- recent developments	Lecture		
35	Kyoto protocol	Lecture		
36	IPCC/UNFCC	PPT/Lecture		
37	Carbon credit	PPT/Lecture		
38	Carbon trading	PPT/Lecture		
39	Carbon sequestration	Lecture		
MODULE V – MUNICIPAL SOLID WASTE				
40	Plastic pollution Types of plastics Problems of plastics Management strategies	PPT/Lecture		
41	Biowastes and their management. –aerobic and anaerobic systems. e-waste Major types and sources	PPT/Lecture		
42	Toxic ingredients Effects on environment and human health Management strategies	Lecture		
MODULE VI – LOCAL ENVIRONMENTAL ISSUES				
43	Impact of tourism on ecology	PPT/Lecture		
44	Landscape changes	PPT/Lecture		
PART II. DISASTER MANAGEMENT AND TOXICOLOGY				
MODULE VII – DISASTER MANAGEMENT				
45	Definition-Classification Natural-Anthropogenic-Hybrid	PPT/Lecture		
46	Earthquake, Landslide	Lecture		
47	Flood , Drought	PPT/Lecture		
48	Cyclone, Tsunami	PPT/Lecture		

49	Mitigation measures			
	MODULE VIII: TOXICOLOGY			
50	Definition, History of toxicology Classification – occurrence/ source Role of toxicology	Lecture		
51	Toxicants of biological origin Aflatoxin	Lecture		
52	Botulinum toxin	Lecture		
53	Heavy metal toxicants	Lecture		
54	Food additives	Lecture		

INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual – Written/Presentation – Graded or Non-graded etc)
1	20/8/2018	Climate Change
2	23/9/2018	Ozone Depletion

REFERENCES

- Stiling Peter, 2002. Ecology: Theories and applications. Prentice Hall of India Pvt. Ltd. New Delhi
- Pandey Kamleshwar, J.P.Shukla and S.P.Trivedi.2005. *Fundamentals of Toxicology*. New Central Book Agency (P) Ltd. Kolkata, India
- Rajagopalan,R. 2005.*Environmental Studies from Crisis to Cure*. Oxford University Press, New Delhi.
- Ahuwalie V.K., Sunita Malhotra, 2009 Environmental science, Ane Books Pvt. Ltd.
- Alan Beeby, 2006 Anne – Maria Brennan First Ecology, Ecological principles and Environmental issues . International students edition Sec. edition Oxford University Press.
- Andrew S. Pullin 2002 *Conservation Biology*. Cambridge University Press, Cambridge, UK
- Banerjee, L.K., Sastry, A.R.K. and Nayar, M.P. 1989. Mangroves in India: Identification manual. Botanical Survey of India.
- Bharucha, E. 2005. *Textbook of Environmental Studies for Undergraduate Courses*. University Grants commission
- Kaufman G. Donald and Cecilia M. Franz. 2000. *Biosphere 2000 Protecting Our Global Environment*. Kendall/Hunt Publishing Company. Iowa, US
- Miller, Tyler. G. (Jr) 2005. Essentials of Ecology. Thomson Brooks/cole.
- Misra S.P., Pandey S.N. 2009 Essential Environmental Studies , Ane books Pvt. Ltd.
- Nambiar, K.R. 2008.*Textbook of Environmental Studies (For Undergraduate Courses as per the UGC Model Syllabus*. Scitech Publications (India) Pvt. Ltd. Chennai, India.
- Odum, E.P. 1971.Fundamentals of Ecology.W.B. Saunders College Publishing, Philadelphia.
- Rajagopalan,R. 2005.*Environmental Studies from Crisis to Cure*. Oxford University Press, New Delhi.
- Sharma, P.D. 2007. Ecology and Environment. Rastogi Publishers

Stern, Nicholas. 2006. *The Economics of Climate Change: The Stern Review*, Cambridge University Press, Cambridge, UK.

PROGRAMME	Bachelor of Zoology	SEMESTER	5
COURSE CODE AND TITLE	15U5CRZOO07: EVOLUTION, ZOOGEOGRAPHY AND ETHOLOGY	CREDIT	3
HOURS/WEEK	3	HOURS/SEM	54
FACULTY NAME	Dr. Mathew M.J. and Dr. Joby Malamel		

Course Objectives
Understand origin of life on earth - origin of universe, chemical evolution, Miller- Urey experiment & Haldane and Oparin theory
Differentiate various theories of organic evolution – Lamarckism, Weisman’s germplasm theory, Mutation theory, Modern Synthetic theory(Neo Darwinism) and Neutral theory of molecular evolution
Understand the concepts of population genetics and evolution - Genetic basis of variation, Hardy Weinberg equilibrium and gene frequencies
Examine the basics of evolution above species level including adaptive radiation, microevolution, macroevolution, evolution of horse, mega evolution, punctuated equilibrium, speciation and evolution of horse& geological time scale
Analyze the basic concepts of oorigin of oceans and continents, zoogeographical realms, insular fauna, biogeography of India with special reference to Western Ghats and the types, means and barriers of animal distribution
Evaluate the definition, history and scope of Ethology
Compare different types of learning
Understand the basic concepts of sociobiology and evolution of human behavior, primates and human socio groups& human pheromones

Session	Topic	Learning Resources	Value Additions	Remarks
Module I: Origin of life				
1	Module I – Origin of life - Introduction	ICT Enabled (ppt & images)	Life on the post Covid time?	
2	Origin of universe Chemical evolution	ICT Enabled (ppt, images & interaction)		
3	Miller-Urey experiment Haldane and theory	Oparin	ICT Enabled (ppt, images and interaction)	
Module II: Theories of organic evolution				
4	Lamarckism	ICT Enabled (ppt images & interaction)	Significance of Evolution in this Covidian context	
5	Critical analysis of Lamarck's propositions, Weisman's germplasm theory	ICT Enabled (ppt images & interaction)		
6	Mutation theory.	ICT Enabled (ppt images & interaction)		
7	Darwinism	ICT Enabled (ppt images & interaction)		
8	Critical analysis of Darwinism	ICT Enabled (ppt images & interaction)		
9	Modern Synthetic theory(Neo Darwinism)	ICT Enabled (ppt images & Interaction)		
10	Neutral theory of molecular evolution	ICT Enabled (ppt images & interaction)		
	CIA- 1	1 hour		
Module III: Population genetics and evolution				
11	Genetic basis of variation	ICT Enabled (ppt images & Interaction)	Influence of evolution in population genetics	
12	Genetic basis of variation contnd.....	ICT Enabled (ppt images & interaction), video clippings)		
13	Hardy Weinberg equilibrium	ICT Enabled (ppt images & nteraction)		

14	Hardy Weinberg equilibrium contnd...	ICT Enabled (ppt images &interaction)		
15	Change in gene frequencies Factors affecting gene frequencies (brief account only)	ICT Enabled (ppt images &interaction)		
16	Change in gene frequencies Factors affecting gene frequencies (brief account only) contnd..	ICT Enabled (ppt images & Interaction)		
Module IV: Evolution above species level				
17	Adaptive radiation	ICT Enabled (ppt images &interaction)	Significance of speciation	
18	Microevolution	ICT Enabled (ppt images &Interaction)		
19	Macroevolution	ICT Enabled (ppt images &interaction)		
20	Evolution of horse	ICT Enabled (ppt images &Interaction)		
21	Evolution of horse Contnd....	ICT Enabled (ppt images &Interaction)		
22	Mega evolution	ICT Enabled (ppt images &interaction)		
23	Punctuated equilibrium	ICT Enabled (ppt images &Interaction)		
24	Speciation -Phyletic and True-Sympatric and Allopatric	ICT Enabled (ppt images &interaction)		
	CIA - 2	2 hours		
Module V: Geological time scale				
25	Geological dating with radioactive elements Continue	ICT Enabled (ppt images & Interaction)	Significance of GTS in life	
26	Geological dating with radioactive elements Contind.....	ICT Enabled (ppt images & interaction)		
27	Mass extinction	ICT Enabled (ppt images &		

		interaction)		
28	Mass extinction contd.	ICT Enabled (ppt images & Interaction)		
Module VI : Animal distribution				
29	Types and means of animal distribution	ICT Enabled (ppt images & interaction	Impact of Anthropogenic activities in animal distribution	
30	Types and means of animal distribution Continued...	ICT Enabled (ppt images & interaction		
31	Barriers in animal distribution.	ICT Enabled (ppt images & interaction		
Module VIII: Zoogeography				
32	Zoogeography: Introduction;	ICT Enabled (ppt & animations, video clippings)	What the continents will look like in future?	
33	Origin of oceans and continents;	ICT Enabled (ppt & animations, video clippings)	What the continents will look like in future?	
34	Plate tectonics – continental drift	ICT Enabled (ppt & animations, video clippings)	What the continents will look like in future?	
35	Zoogeographical realms	ICT Enabled (ppt, maps, images & video clippings)		
36	Zoogeographical realms contd...	ICT Enabled (ppt, maps, images & video clippings)		
37	Insular fauna-Continental Islands & Oceanic Islands	ICT Enabled (ppt, maps, images & video clippings)		
38	Biogeography of India – with special reference to Western Ghats	ICT Enabled (ppt, maps, images & video clippings)		
Module VIII: Ethology				
39	Ethology: Definition; History and	ICT Enabled (ppt & video clippings)		
40	Scope of ethology	ICT Enabled (ppt		

		& video clippings)		
Module VIII: Learning & Imprinting				
41	Types of learning: Habituation, sensitization	ICT Enabled (ppt, animations & video clippings)		
42	Types of learning: Classical conditioning	ICT Enabled (ppt, animations & video clippings)		
43	Types of learning: Operant conditioning	ICT Enabled (ppt, animations & video clippings)		
44	Types of learning: Taste aversion; Latent learning	ICT Enabled (ppt, animations & video clippings)		
45	Types of learning: Insight Learning; Learning set learning	ICT Enabled (ppt, animations & video clippings)		
46	Imprinting; experiments by K. Lorenz	ICT Enabled (ppt, animations & video clip		
Module VIII: Ethology of Man				
47	Ethology of man - Sociobiology and evolution of human behaviour	ICT Enabled (ppt, images & video clippings)		
48	Evolution of human behaviour	ICT Enabled (ppt, images & video clippings)		
49	Primates and human socio groups	ICT Enabled (ppt & images, video clippings)		
50	Human pheromones; Revision	ICT Enabled (ppt & images, video clippings)		
51	Revision & Evaluation of the course			
52	Revision & Evaluation of the course			
53	Revision & Evaluation of the course			
54	Revision & Evaluation of the course			

INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	4/7/2018	Neutral theory of molecular evolution
2	21/7/2018	Barriers in animal distribution.

GROUP ASSIGNMENTS/ACTIVITES – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	2/9/2018	Punctuated equilibrium
2	9/9/2018	Mass extinction

References

- Andrews. M.I and Joy, K.P. 2003. Environmental biology, evolution, ethology and Zoogeography. St.Mary's press and book dept
- Mani, M.S. 1974.Ecology and Biogeography of India. Dr. W. Junk b..v. Publishers , The Hague.
- Nair, C.S.1991. The Southern Western Ghats : A Biodiversity Conservation Plan. INTACH, New Delhi.
- Ramesh,B.R and Rajan Gurukkal., 2007.Forest Landscapes of the Southern Western Ghats, India Biodiversity, Human Ecology and management Strategies. French Institute of Pondicherry, India.
- Tiwari, S. 1985. Readings in Indian Zoogeography

PROGRAMME	BACHELOR OF Zoology	SEMESTER	5
COURSE CODE AND TITLE	15U5RZOO08: Biochemistry, human physiology and endocrinology	CREDIT	3
HOURS/WEEK	3	HOURS/SEM	54
FACULTY NAME	Jobin C Tharian		

COURSE OBJECTIVES

Understand the structure, biological importance and metabolism of important carbohydrates, protein and lipids
Understand the mechanism of enzyme action and role of enzymes in metabolism.
Understand the importance of balanced diet, role of vitamins and minerals in diet and nutritional disorders
Understand the functional aspects of respiration and respiratory disorders
Understand the functional aspects of cardiovascular circulation, disorders related to it and the clinical aspects
Understand the structure and function of human nitrogenous excretory organs and renal disorders
.Understand structure and functional facets of neuro muscular system and physiological features of sports and exercise
Understand the functional aspects of endocrine glands and the disorders associated with it

SESSION	TOPIC	LEARNING RESOURCES	VALUE ADDITIONS	REMARKS
Module - GENERAL BIOCHEMISTRY, BIOELEMENTS AND BIOMOLECULES				
1	Carbohydrates	PPT/Lecture	Video/e-resource	
2	Proteins	PPT/Lecture	Video/e-resource	
3	Lipids	PPT/Lecture	Video/e-resource	
4	Classification and biological importance	PPT/Lecture	Video/e-resource	
Module : METABOLISM				
5	Carbohydrate metabolism	PPT/Lecture	Video/e-resource	
6	Glycolysis	PPT/Lecture	Video/e-resource	
7	Glycogenolysis	PPT/Lecture	Video/e-resource	
8	Gluconeogenesis	PPT/Lecture	Video/e-resource	
9	Citric acid cycle	PPT/Lecture	Video/e-resource	
10	ATP synthesis	PPT/Lecture	Video/e-resource	
11	Lipid metabolism	PPT/Lecture	Video/e-resource	
12	Protein metabolism	PPT/Lecture	Video/e-resource	
13	Deamination, transamination	PPT/Lecture	Video/e-resource	
Module - ENZYMES				
14	Chemical nature of enzymes	PPT/Lecture	Video/e-resource	
15	Mechanism of enzyme action	PPT/Lecture	Video/e-resource	
16	Factors influencing enzyme action	PPT/Lecture	Video/e-resource	
17	Isoenzymes	PPT/Lecture	Video/e-resource	
Part II. HUMAN PHYSIOLOGY				
Module - NUTRITION				
18	Nutrients and classification	PPT/Lecture	Video/e-resource	
19	Antioxidants, minerals and function	PPT/Lecture	Video/e-resource	

20	Food adulteration	PPT/Lecture	Video/e-resource	
21	Malfunctions	PPT/Lecture	Video/e-resource	
Module -RESPIRATION				
22	Gas transport and factors affecting it	PPT/Lecture	Video/e-resource	
23	Bohr and reverse Bohr effect	PPT/Lecture	Video/e-resource	
24	Neural and chemical control	PPT/Lecture	Video/e-resource	
25	Nitrogen narcosis, Dysbarism	PPT/Lecture	Video/e-resource	
26	CIA-1			
27	Oxygen therapy, artificial respiration	PPT/Lecture	Video/e-resource	
Module -CIRCULATION				
28	Cerebral circulation, blood brain barrier	PPT/Lecture	Video/e-resource	
29	Blood composition	PPT/Lecture	Video/e-resource	
30	Blood clotting	PPT/Lecture	Video/e-resource	
31	Disorders	PPT/Lecture	Video/e-resource	
Module -EXCRETION				
32	Urea cycle	PPT/Lecture	Video/e-resource	
33	Kidney structure	PPT/Lecture	Video/e-resource	
34	Urine formation	PPT/Lecture	Video/e-resource	
35	Disorders	PPT/Lecture	Video/e-resource	
Module -MUSCLE PHYSIOLOGY				
36	Structure of muscle	PPT/Lecture	Video/e-resource	
37	Functioning of muscle	PPT/Lecture	Video/e-resource	
38	Muscle effects	PPT/Lecture	Video/e-resource	
39	Disorders	PPT/Lecture	Video/e-resource	
Module - NERVE PHYSIOLOGY				
40	Synaptic transmission	PPT/Lecture	Video/e-resource	

41	Role of neural transmitters	PPT/Lecture	Video/e-resource	
42	Long term and short-term memory	PPT/Lecture	Video/e-resource	
43	Neural disorders	PPT/Lecture	Video/e-resource	
Part III ENDOCRINOLOGY				
Module - HORMONES				
44	Hormones as messengers, classification and types of hormones	PPT/Lecture	Video/e-resource	
45	General principles of hormone action,	PPT/Lecture	Video/e-resource	
46	Concept of hormone receptors,	PPT/Lecture	Video/e-resource	
47	hormonal control of homeostasis	PPT/Lecture	Video/e-resource	
48	CIA- II			
Module – Endocrine Organs				
49	Secretion, Regulation, Functions and Disorders of hormones of Hypothalamus, Hypophysis,	PPT/Lecture	Video/e-resource	
50	Secretion, Regulation, Functions and Disorders of hormones of Pineal, Thyroid, Parathyroid,	PPT/Lecture	Video/e-resource	
51	Secretion, Regulation, Functions and Disorders of hormones of Thymus, Islets of Langerhans, Adrenal, Gonads, Placenta, Gastro intestinal hormones.	PPT/Lecture	Video/e-resource	
52	Hormones as messengers, classification and types of hormones	PPT/Lecture	Video/e-resource	
53	Evaluation and revision			
54	Evaluation and revision			

INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	10/08/18	Sleep and responsiveness

References

Human Physiology

Best and Taylor: Physiological basis of Medical practice
 Chakrabarti, Ghosh &: Human Physiology, the New Book StallSchana.
 Chatterjee C.C.: Human Physiology, Vol I & II Medical Allied Agency
 Eckert & Randall : Animal Physiology, Mechanism & Adaptations , CBS pub, N. Delhi.
 Ganong W F : Review of Medical Physiology, Mc Graw Hill, New Delhi.

Guyton : Text Book of Medical Physiology Saunders
Joshi : Nutrition and Dietetics , Tata Mc. Graw Hill
Knut Schmidt Nilesen 2007 Animal Physiology – Adaptation and environment. Cambridge University press 5 th ed.
Mackenna &Callander : Illustrated Physiology, Churchill Livingstone
Powar Human Physiology
Prosser &Brown : Comparative Animal Physiology
Sarada Subramanyam & K. Madhavankutty : Textbook of human physiology, S. Chand & Co Ltd, New Delhi.

Endocrinology

Barrington, E.J.W. General and Comparative Endocrinology, Oxford, Clarendon Press.
Bentley, P.J. Comparative Vertebrate Endocrinology, Cambridge University Press.
David O. Norris Vertebrate Endocrinology 3th Edition,
Gorbman ,*Aet. al.* Comparative endocrinology, John Wiley & Sons.
Hadley, M.E. 2000. Endocrinology, 5th ed. Prentice Hall, Upper Saddle River, NJ. Martin, C.R. Endocrine Physiology, Oxford University Press
Norris, D.O. 1997. Vertebrate Endocrinology, 3rd ed. Academic Press, Sand Diego, CA.
Williams, R.H. Textbook of Endocrinology, W.B. Saunders

Biochemistry

Ackerman E, Biophysical Science, Prentice Hall Inc.
Awapara J, Introduction to Biological chemistry, Prentice-Hall of India
Cohn E E and Stumpf P K, outlines of Biochemistry, Wiley Eastern
Foster, R.L. Nature of Enzymology
Garett and Grisham. Biochemistry.
Harper's Illustrated Biochemistry, 27th Ed, Mc Graw Hill
Lehninger, Biochemistry , Kalyani Publications
Lodish et. al. Molecular Cell Biology
Rangnatha Rao K, Text Book of Biochemistry, Prentice-Hall of India
Roy K N, A Text Book of Biophysics, New Central Book Agency
Stryer, Biochemistry, W.H Freeman and Co., Newyork
Voet, D. and J.G. Voet. Biochemistry. J. Wiley & Sons

PROGRAMME	OPEN COURSE FOR OTHER STREAMS	SEMESTER	2
COURSE CODE AND TITLE	15U50CZOO1: HUMAN GENETICS, NUTRITION, COMMUNITY HEALTH AND SANITATION	CREDIT	4
HOURS/WEEK	4	HOURS/SEM	72
FACULTY NAME	DR.VIDHU , DR.SMITHA , DR.JOBY M.J		

COURSE OBJECTIVES
Identify the basic principles of human genetics, the disorders associated with it and awareness on pre natal diagnosis
Analyze the genetic principle of blood group inheritance, importance of blood donation, causes of infertility, DNA fingerprinting and its applications
Evaluate the psychoneuroimmunology of physical activity, exercise, yoga and programmers' related to community health promotion
Discuss the importance of balanced diet, and awareness on nutritional disorders
Examine the principles of accident prevention and first aid
Describe the microbiology of food borne diseases and their prevention Understand the pathology and control measures of emerging diseases, vector borne and life style diseases

SESSION	TOPIC	LEARNING RESOURCES	VALUE ADDITIONS	REMARKS
	Part- I HUMAN GENETICS			
Module I				
1	Human normal chromosome complement	Lecture and ppt	Video	
2	Chromosomal anomalies	Lecture	E-resource	
3	Down Syndrome and Cridu chat syndrome	Lecture and ppt		
4	Sex chromosomal anomalies-Syndromes- Klinefelters Syndrome and Turners Syndrome	Lecture and ppt		
5	Genetic disorders in man. Single gene mutation disorders- Eg. Sickle Cell anaemia	Lecture and ppt		
6	Polygenic disorders – Cleft lip and palate	Lecture and ppt		

7	Sex linked inheritance – Haemophilia and Colour blindness	Lecture and ppt		
8	CIA I	1 hr		
9	Pre – natal Diagnosis -Significance	Lecture and ppt		
10	Amniocentesis, Chorionic Villus Sampling, Ultra sound scanning and Fetoscopy	Lecture and ppt		
11	Genetic Counselling. Eugenics and Euthenics	Lecture and ppt		
MODULE II				
12	Human blood groups and their inheritance pattern	Poster		
13	Concept of Process	PPT/Lecture		
14	Blood transfusion – Universal Donor, Universal recipient – Importance of Blood donation	Lecture		
15	DNA finger printing and applications – Probing for criminals – Method to resolve paternity and maternity disputes	Lecture		
16	Human Reproductive system	Lecture		
17	Causes of human infertility – a brief account	Lecture		
18	Human genome project – a brief account	PPT/Lecture		
PART – II NUTRITION AND COMMUNITY HEALTH				
MODULE III				
19	Definition and meaning of health. Dimensions of health, physical activity and health benefits	PPT/Lecture		
20	Effect of exercise on body systems – Circulatory and Respiratory	PPT/Lecture		
21	Effect of exercise on body systems – Endocrine and Skeletal	Lecture		
22	Effect of exercise on body systems – muscular	Lecture		
23	Programmers on Community health promotion – individual and family	PPT /Lecture		
24	Programmers on Community health promotion – Society	PPT /Lecture		
25	Dangers of alcoholic and drug abuse, medico legal implications.	Lecture		
MODULE IV				

26	Introduction to concept of food and nutrition.	PPT/Lecture		
27	Balanced diet.	PPT/Lecture		
28	Vitamins and malnutrition	PPT/Lecture		
29	Deficiency diseases	PPT/Lecture		
30	Determining of caloric intake and expenditure	PPT/Lecture	Quiz	
31	Obesity causes and preventive measures	Lecture	Q & Ans	
32	Role of diet and exercise. BMI	Lecture		
MODULE V				
33	Introduction to safety education	PPT/Lecture		
34	Principles of accident prevention	PPT/Lecture		
35	Health and safety in daily life and at work	PPT/Lecture		
36	First aid and emergency care	PPT/Lecture		
37	Modern lifestyle and hypokinetic diseases- Prevention and Management	Lecture		
MODULE VI				
38	Introduction to life skill education	PPT/Lecture		
39	Physical activity, emotional adjustment and well being	PPT/Lecture		
40	Yoga, meditation and relaxation	PPT/Lecture		
41	Psychoneuroimmunology	PPT/Lecture		
PART III. COMMUNITY HEALTH AND SANITATION				
MODULE VII				
42	Potable water quality monitoring and waste water management.	PPT/Lecture		
43	Determination of sanitary quality of drinking water	PPT/Lecture		
44	Water purification techniques.	PPT/Lecture		
45	Water purification techniques.Contd...	PPT/Lecture		
46	Faecal bacteria and pathogenic microorganisms	PPT/Lecture	Video	
47	Cholera and Typhoid	PPT/Lecture		
48	Vermicomposting a method of solid waste management	Lecture		
49	CIA			
MODULE VIII				
50	Public Health and Food borne diseases	PPT/Lecture	Debate	

51	Food Poisoning causes and prevention	PPT/Lecture	Demo video	
52	Food poisoning caused by toxins produced by microbes	PPT/Lecture		
53	Botulism, Salmonellosis	PPT/Lecture		
54	Botulism, Salmonellosis contd...	PPT/Lecture		
55	Food infection caused by growth of microorganisms in the human body	Lecture		
56	Food Infection hepatitis (hepatitis A)	Lecture		
57	Food Infection hepatitis (hepatitis A). Contd...	Lecture		
58	Revision		Group discussion	
MODULE IX				
59	Emerging pathogens and diseases – introduction	PPT/Lecture		
60	Swine flu (H1N1),	PPT/Lecture		
61	Bird flu (H5N1)	PPT/Lecture		
62	Emerging pathogens-SARS, Anthrax	PPT/Lecture		
63	Reemerging pathogens and diseases – TB	PPT/Lecture		
64	Vector borne diseases and their control measure	PPT/Lecture		
65	Vector borne diseases mosquito- Chikungunya ,	PPT/Lecture		
66	Malaria	PPT/Lecture		
67	Mosquito eradication	Lecture		
68	Vector borne diseases mosquito- Filariasis and Dengue fever	Lecture		
69	Leptospirosis and preventive measures – Rodent control measures	Lecture		
68	Cancer different types	PPT/Lecture		
69	Causes of cancer, carcinogens, diet & cancer	PPT/Lecture		
70	HIV, AIDS – causes & preventive measures	PPT/Lecture		
71	Revision			

72	Revision			
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INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	2/8/2018	Submission of exercise video
2	28/8/2018	Preparation of salad which contains essential vitamins

GROUP ASSIGNMENTS/ACTIVITES – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	5/9/2018	Discussion regarding mosquito eradication in Kochi

References

1. Pelczar M.J. Jr. E.C.S. Chane & N.R. Krieg, Microbiology (Concept & Applications). 5th edition. Tata McGraw Publishing Company Ltd.
2. Panicker S, Franis G And Abraham g. (2008) Microbiology & Immunology. Zoological Society Study Material Series. Published by Zoological Society of Kerala.
3. Norman Bezzaant HELP First Aid for everyday emergencies. Jaico Publishing House, Bombay, Delhi
4. Fashey , Tomas D, Insel , Paul M and Roth Walt (2005) Fit and Well. New York; Mc Graw Hill Inc
5. Rai. B.C. Health Education and Hygiene. Published by Prakashan Kendra, Lucknow