GIRIJANANDA CHOWDHURY UNIVERSITY
Hathkhowapara, Azara, Guwahati 781017, Assam

Course Structure of Bachelor of Science in Zoology

Course Structure

SEM	Core (Major)	Core (Minor)	Multidisciplinary (MDC)*	AEC*	SEC*	VAC*	Internship/ Diss/ project	Credit	EXIT OPTION
I	4	4+4	3	2	3	2		22	Certificate**
II	4	4+4	3	2	3	2		22	
III	4	4+4	3	2	3	-		20	Diploma**
IV	16	-	-	2		2		20	
V	16	-	-		-		4	20	Degree (with Single Major and/or Minor /Double Major in Discipline(s)
VI	20	-	-	-	-	-		20	
Total								**124**	**End of 3rd Year**
VII	8	4+4	-	-	-	-	Research project I/ one paper of 4 credit (4)	20	Degree Honours with Research/Without Research (With Single Major and Minor(s) /Double Major) in Discipline(s)
VIII	12	-	-	-	-	-	Project (8)/Two papers of 4 credits each (4+4) ***	20	
						Total		**164**	**End of 4th Year**

YEAR – 1

First Semester				
Code	**Course**	**Category of Course**	**L-T-P**	**Total Credit**
	Biosystematics & Non-chordates	Core	3-0-2	4
	Minor	Minor	3-0-2	4
	Minor	Minor	3-0-2	4
	Multidisciplinary – I	MDC	3-0-0	3
	AEC-I	AEC	2-0-0	2
	SEC – I	SEC	3-0-0	3
	VAC – I	VAC	2-0-0	2
			TOTAL	22

Second Semester				
Code	**Course**	**Category of Course**	**L-T-P**	**Total Credit**
	Chordates	Core	3-0-2	4
	Minor	Minor	3-0-2	4
	Minor	Minor	3-0-2	4
	Multidisciplinary – II	MDC	3-0-0	3
	AEC-II	AEC	2-0-0	2
	SEC – II	SEC	3-0-0	3
	VAC – II	VAC	2-0-0	2
			TOTAL	22

EXIT OPTION WITH CERTIFICATION. However, such students who desire to exit after 1 year of study need to undertake a vocational course (4 credits).

YEAR – 2

Third Semester				
Code	**Course**	**Category of Course**	**L-T-P**	**Total Credit**
	Animal physiology	Core	3-0-2	4
	Minor	Minor	3-0-2	4
	Minor	Minor	3-0-2	4
	Multidisciplinary-III	MDC	3-0-0	3
	AEC-III	AEC	2-0-0	2
	SEC – III	SEC	3-0-0	3
			TOTAL	20

Fourth Semester				
Code	**Course**	**Category of Course**	**L-T-P**	**Total Credit**
	Principles of ecology	Major/core	3-0-2	4
	Cell biology	Major/core	3-0-2	4
	Principles of genetics	Major/core	3-0-2	4
	Parasitology/ Apiculture	Elective	3-0-2	4
	AEC-IV	AEC	2-0-0	2
	VAC-III	VAC	2-0-0	2
			TOTAL	20

EXIT OPTION WITH DIPLOMA. However, such students who desire to exit after 2 years of study need to undertake a vocational course (4 credits).

YEAR – 3

Fifth Semester				
Code	**Course**	**Category of Course**	**L-T-P**	**Total Credit**
	Developmental biology	Major/core	3-0-2	4
	Biochemistry in metabolic processes	Major/core	3-0-2	4
	Comparative anatomy of vertebrates	Major/core	3-0-2	4
	Computational biology/ Biostatistics	Elective	3-0-2	4
	Summer internship project	Internship/Dissertation	0-0-8	4
			TOTAL	20

Sixth Semester				
Code	**Course**	**Category of Course**	**L-T-P**	**Total Credit**
	Molecular biology	Major/core	3-0-2	4
	Animal behaviour and chronobiology	Major/core	3-0-2	4
	Evolutionary biology	Major/core	3-0-2	4
	Immunology	Major/core	3-0-2	4
	Wildlife conservation and management/ Non-mulberry sericulture	Elective	3-0-2	4
			TOTAL	20

YEAR – 4

Seventh Semester				
Code	**Course**	**Category of Course**	**L-T-P**	**Total Credit**
	Research Methodology	Major/core	4-0-0	4
	Endocrinology	Major/core	3-0-2	4
	Elective minor	Elective	3-0-2	4
	Elective minor	Elective	3-0-2	4
	Research Project Part I (with research)		0-0-8	4
	OR			
	Controlling and coordinating systems (Without research)	Major/core	3-0-2	4
			TOTAL	20

Eight Semester				
Code	**Course**	**Category of Course**	**L-T-P**	**Total Credit**
	Aquatic biology	Major	3-0-2	4
	Entomology	Major	3-0-2	4
	Instrumentation and biological techniques	Major	3-0-2	4
	Research project II (with research)		0-0-16	8
	OR			
	Reproductive biology (without research)	Major	3-0-2	4
	Bioinformatics (without research)	Major	3-0-2	4
			TOTAL	20

SUMMARY OF ALL THE PAPERS								
SEMESTER	**MAJOR**	**MINOR**	**MULTIDISCIPLINARY**	**AEC**	**VAC**	**Summer Internship**	**Research Project/ Dissertation**	**TOTAL CREDIT**
1st	Biosystematics & Non-chordates	Ornamental Fishes and Fisheries	Lifestyle disorders					22
2nd	Chordates	Pearl Culture	Biomimicry in Architecture					22
Certificate after 1 year								
3rd	Animal Physiology	Lac Culture	-------					20
4th	• Principles of Ecology • Cell Biology • Principles of genetics • Parasitology/ Apiculture (E)	_____	_____					20
Diploma after 2 years								
5th	• Developmental Biology • Biochemistry in metabolic processes • Comparative anatomy of vertebrates	_____	_____					20

	• Computational biology/ Biostatistics (E)							
6th	• Molecular Biology • Animal behaviour and chronobiology • Evolutionary Biology • Immunology • Wildlife conservation and management/ Non-mulberry sericulture (E)	_____	_____					20
Degree after 3 years (with Major/ Minor)								
7th	• Research Methodology • Endocrinology • Research Project Part I (with research) OR Controlling and coordinating systems (Without research)	Minor	_____					20
8th	• Aquatic Biology • Entomology	_____	_____					20

	• Instrumentation and Biological Techniques • Research project II (with research) OR Reproductive biology (without research) Bioinformatics (without research)							

	BIOSYSTEMATICS & NON-CHORDATES	L	T	P	C
		3	0	2	4

Pre-requisite: Knowledge of biology at (10+2) level

Course Objectives:

- The course will introduce the learners to the fascinating world of animal diversity.
- They will have a basic idea about the non-chordates and their structural, functional relationships along with their systematic organization.
- The students will also understand the economic, ecological and medical significance of various animals in human life.
- Exposure to biosystematics will introduce the students to the biological world of classification, identification and cataloguing samples.

Course Outcome:

Upon completion of the course, students should be able to
1: Understand the evolutionary history and relationships of different non-chordates through functional and structural affinities.
2: Critically analyse the organization, complexity and characteristic features of non- chordates.
3: Would understand the process of animal identification and preservation
4: Appreciate the various features of the non-chordate life through assignments and projects.

Module 1: **9 hours**

- Definition, basic concept and importance of Systematics and Taxonomy, Newer trends in taxonomy,
- International Code of Zoological Nomenclature (ICZN), Taxonomic procedures- taxonomic collections, preservation, method of identification

Module 2: **18 hours**

- Protista: General characteristics and Classification up to classes, Life cycle of *Plasmodium vivax.*
- Porifera: General characteristics and Classification up to classes. Canal system in sponges.
- Cnidaria: General characteristics and Classification up to classes, Polymorphism in Cnidaria, Coral and coral reefs. General characteristics of Ctenophora and evolutionary significance.
- Helminthes: General characteristics and Classification of Platyhelminthes and Nemathelminthes up to classes, Parasitic adaptations in helminthes.

Module 3: **18 hours**

- Annelida: General characteristics and Classification upto classes, Coelomoducts and Nephridia in Annelids
- Arthropoda: General characteristics and Classification up to classes, Social life in bees and termites.
- Mollusca: General characteristics and Classification upto classes, Torsion and detorsion in Gastropoda, Pearl formation in bivalves.
- Echinodermata: General characteristics and Classification upto classes. Water vascular system in Asteroidea. Affinities of Echinodermata with Chordates.

Total Lecture hours **45 hours**

Practical component

- Study of whole mount of *Euglena, Amoeba, Noctiluca, Paramecium*, Binary fission in Paramecium and Conjugation in Paramecium.
- Examination of pond water collected from different places to observe diversity in Protista.
- Study of *Sycon, Hyalonema, Euplectella, Spongilla,* T.S. of *Sycon*, L.S. of *Sycon*.

- Study of *Obelia, Physalia, Aurelia, Corallium, Alcyonium, Gorgonia, Metridium/Adamsia, Pennatula,*.
- Specimen/slide of any one Ctenophore.
- Study of adult *Fasciola hepatica, Taenia solium* and their life stages (Slides/microphotographs).
- Study of adult *Ascaris lumbricoides* and its life stages (Slides/microphotographs).
- Study of *Aphrodite, Nereis, Pheretima, Hirudinaria, Heteronereis*
- Mount of mouth parts and dissection of digestive system of *Periplaneta.*
- Study of *Pila, Chiton, Pinctada, Dentalium, Doris*, Octopus
- Study of *Asterius, Echinus, Antedon, Cucumaria.*

Note: Classification to be followed from Ruppert, Fox and Barnes (2004). Invertebrate Zoology. VII Edition, Cengage Learning, India.

Text Book(s)

1.	Ruppert, Fox and Barnes (2004). Invertebrate Zoology. VII Edition, Cengage Learning, India.
2.	Pechenik, J. A. (2015). Biology of the Invertebrates. VII Edition, McGraw-Hill Education.

Reference Books

1.	Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). The Invertebrates: A New Synthesis. III Edition, Blackwell Science.
2.	Barrington, E.J.W (1979). Invertebrate structure and function. II edition, ELBS

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	CHORDATES	L	T	P	C
		3	0	2	4

Pre-requisite: Knowledge of biology at (10+2) level

Course Objectives:

The course objective is to introduce the students to the enormous diversity of the higher animals. The general features and species specific life functions of the various groups of chordates will expose the students to the evolutionary relationships, structural and functional affinities among various groups

Course Outcome:

Upon completion of the course, students should be able to

CO1 : Understand the diversified features of various groups of chordates.

CO2: Appreciate the diversity of morphological and physiological variations among the chordates according to their adaptive variability.

CO3: Have an insight into the chordate world through specimen study, dissection etc.

Module 1: **9 hours**

- Chordata: General characteristics and classification of Chordata,
- General characteristics and classification of Protochordata. (Hemichordata, Urochordata and Cephalochordata); Retrogressive metamorphosis in Urochordata,

Module 2: **18 hours**

- Agnatha: General characteristics and classification of Cyclostomes up to class
- Pisces: General characteristics of Chondrichthyes and Osteichthyes, classification upto order. Migration, Parental care in fishes.
- Amphibia: Origin of Tetrapoda, General characteristics and classification upto order; Parental care in Amphibians

Module 3: **18 hours**

- Reptilia: General characteristics and classification up to order; Poison apparatus and biting mechanism in snakes
- Aves: General characteristics and classification up to order, Archaeopteryx- a connecting link; flight mechanism, Perching mechanism, flight adaptations and air sacs in birds.
- Mammals: General characters and classification up to order; affinities of Prototheria, Adaptive radiation with reference to locomotory appendages.

Total Lecture hours **45 hours**

Practical component

Study of following specimens:

- **Protochordata:** *Balanoglossus*, *Herdmania*, *Branchiostoma*, Colonial Urochordata
- Sections of *Balanoglossus*, *Amphioxus*

- **Agnatha:** *Petromyzon, Myxine*
- **Fishes:** *Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echeneis, Anguilla, Hippocampus, Tetrodon, Anabas*, Flatfish
- **Dissection***:* Mount of weberian ossicles of fish
- **Amphibia:** *Ichthyophis/Ureotyphlus, Necturus, Bufo, Hyla, Alytes, Salamandra*
- **Reptilia:** *Chelone, Trionyx, Hemidactylus, Varanus, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis.*
- **Aves:** Study of six common birds from different orders.
- **Mammalia:** *Sorex*, Bat (Insectivorous and Frugivorous), *Funambulus, Loris, Herpestes, Erinaceous.*
- Field visit to Zoological museum/park and preparation of report.

Note: Classification to be followed from Young, J.Z.(2004).The Life of Vertebrates. III Edition. Oxford university press.

Text Book(s)	
1.	Young, J.Z.(2004).The Life of Vertebrates. III Edition. Oxford university press.
2.	Pough H. Vertebrate life, VIII Edition, Pearson International.
Reference Books	
1.	Darlington P.J. The Geographical Distribution of Animals, R.E. Krieger Pub Co.
2.	Hall, B.K and Hall Grimson B. (2008). Strickberger's evolution. IV Edition.

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	ANIMAL PHYSIOLOGY	L	T	P	C
		3	0	2	4

Pre-requisite: Knowledge of biology at (10+2) level

Course Objectives:

The course offers an overview of the normal functioning of the human body. The organization, structure and function of different organ systems of the body and their interrelations leading to homeostasis will be explained through this course.

Course Outcome:

Upon completion of the course, students should be able to

CO1 : Understand the principles of normal biological functions in the body.

CO2 : Understand body homeostasis mechanism.

Module 1: **13 hours**

- **Physiology of Digestion:** Structure and function of the digestive system, process of digestion and absorption of different components of food; Hormonal regulation of the digestive process.
- **Renal Physiology:** Structure of kidney and its functional unit; Mechanism of urine formation; Regulation of water balance; Regulation of acid-base balance

Module 2: **16 hours**

- **Physiology of Respiration:** Structure and function of the respiratory system.
  External and internal respiration.
  Respiratory volumes and capacities; Transport of oxygen and carbon dioxide in blood.
  Dissociation curves and the factors influencing it; Control of respiration.

Module 3: **16 hours**

- **Blood:** Components of blood and their functions; Structure and functions of haemoglobin. Homeostasis. Blood clotting system. Blood groups: Rh factor, ABO and MN
- **Physiology of Heart:** Structure of mammalian heart. Origin and conduction of cardiac impulses. Cardiac cycle; Cardiac output and its regulation. Nervous and chemical regulation of heart rate. Electrocardiogram, Blood pressure and its regulation.

Total Lecture hours **45 hours**

Practical component

- Determination of ABO Blood group
- Enumeration of red blood cells and white blood cells using haemocytometer
- Estimation of haemoglobin using Sahli's haemoglobinometer
- Preparation of haemin crystals.
- Recording of blood pressure using a sphygmomanometer
- Examination and detailed study of permanent histological sections of mammalian stomach, duodenum, liver, lung, cardiac tissue, kidney and pancreas
- Estimation of urea in urine and Blood serum.

Text Book(s)

1. Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. X IEdition. Hercourt Asia PTE Ltd. W.B. Saunders Company.
2. Tortora, G.J. & Grabowski, S.(2006). Principles of Anatomy&Physiology. XI Edition John Wiley & sons,

3.	Khurana I, Khurana A. (2021). Textbook of Medical Physiology. III Edition. Elsevier.
Reference Books	
1.	Sebulingam, K and Sebulingam, P. (2012). Essentials of Medical Physiology. XI. Edition. Jaypee Brothers medical Publishers (P) LTD.
2.	Widmaier E, Raff H and Strang K. (2013). Vander's Human Physiology. XII Edition, Harcourt Asia Pvt Ltd/W.B. Saunders Company.
3.	Victor P. Eroschenko. (2008). diFiore's Atlas of Histology with Functional correlations XII Edition. Lippincott W. &Wilkins.

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ORNAMENTAL FISH AND FISHERIES	L	T	P	C
	3	0	2	4

Pre-requisite: Knowledge of biology at (10+2) level

Course Objectives:

- To introduce the students to the concept of ornamental use of fishes
- To explore taxonomy management and biology of ornamental fishes
- To make the students aware of the diversity of fish species that can be used for aesthetic purposes.

Course Outcome:

Upon completion of the course, students should be able to

CO1 : Identify and recognise the value of the fishes of the region for ornamental purposes

CO2 : Explore entrepreneurship avenues with ornamental fishes

CO3 : Generate income from aquarium construction and fish food culture

Module 1:	**15 hours**

- Ornamental fish trade- Important trends.
- Ornamental fish diversity of North-east India
- Aquarium plant diversity in the wetland of Assam
- Nutritional requirements of ornamental fishes.

Module 2:	**18 hours**

- Aquarium fabrication and management of fresh water ornamental fishes.
- Breeding protocol in aquarium- Natural breeding of *Trichogaster* species.
- The strategies for maintenance of natural colour of ornamental fish.
- Health management of ornamental fishes- disease and pest management, Nutrition and feeding.

Module 3:	**12 hours**

- Development of biological filtration in Aquarium.
- Pure culture of planktons.
- Economics of breeding and rearing units.
- Ornamental fish culture and entrepreneurship development

Total Lecture hours	**45 hours**

Practical component

- Identification of Ornamental fishes
- Culture of Indigenous ornamental fish in Aquarium
- Estimation of Physico- chemical characteristics of Aquarium water- pH, alkalinity, DO etc.
- Biological filter for removal of Ammonia from aquarium
- Culture of Planktons

Text Book(s)

1. Ornamental Aquarium Fish of India by Kishori Tekriwal, Andrew Arunava Rao, John Dawes, Kingdom books.

2.	A textbook of Fish Biology And Fisheries, S.S. Khanna and H.R.Singh, Narendra Publishing House.
3	Fish and Fisheries of India, V.g. Jhingran, Hindustan pub. Corp.
Reference Books	
1.	Freshwater Ornamental Fish culture and management, ICAR, Government of India.
2.	A Handbook of Fish Biology and Indian Fisheries, R.P. Parihaar, Central Publishing House
3	Handbook of Fisheries and Aquaculture, ICAR, New Delhi
4	Economic Zoology by Sagarika Choudhuri, NCBA

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PEARL CULTURE	L	T	P	C
	3	0	2	4

Pre-requisite: Knowledge of biology at (10+2) level

Course Objectives:

- To introduce the students to the practice of pearl culture
- To explore the anatomy and biology of pearl forming Molluscs.
- To apprise the students of the process of pearl formation and the economics of pearl forming
- Farm management techniques and introduction to pest, parasite and diseases of pearl oysters.

Course Outcome:

Upon completion of the course, students should be able to

CO1: Learn the whole process of commercial pearl oyster cultivation

CO2: Appreciate the different farming techniques for pearl culture

CO3: Learn the management techniques related to viable culture of pearls.

CO4: Understand the economic importance of pearl cultivation.

CO5: Generate ideas about startups regarding pearl and pearl products.

Module 1: **15 hours**

- Introduction to pearl culture- Definition, history, present status in India.
- Diversity study of pearl producing Molluscs.
- Biology of pearl oysters- anatomy, morphology, lifecycle, formation and nature of pearl.

Module 2: **18 hours**

- Processes of pearl culture- technical requirements for pearl culture, farm preparation, collection of oysters, seeding (graft preparation, implantation), caring, harvesting, environmental conditions required.
- General farm management- protection from predators, parasites, diseases and other causes of death.

Module 3: **12 hours**

- Measures for improvement of pearl quality
- Budgetary requirement of pearl and pearl culture
- Commercial utilisation of pearl and pearl products.
- Prospects of pearl culture and entrepreneurship development

Total Lecture hours **45 hours**

Practical component

- Diversity study of different pearl forming oysters (using bottle specimen/ photograph)
- Study of internal anatomy (through dissection or videos)
- Estimation of physico-chemical characteristics of water where cultures are carried
- Visit to a pearl culture centre for hands on training in pearl culture.

Text Book(s)

1. Programming pearls- John Bently, Pearson
2. Economic Zoology- Sagarika Choudhury, NCBA

3	The Book of the Pearl, George F Kune
Reference Books	
1.	Pearls in Oysters, Tanya Ghosh
2.	Pearl Culturing Industry, Farzana Perveen, Anzela Khan, Lambert Academic Publishing

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LAC CULTURE	L	T	P	C
	3	0	2	4

Pre-requisite: Knowledge of biology at (10+2) level

Course Objectives:

- To introduce the students to the concept of lac culture
- To apprise the students of the cultivable varieties of lac insects
- Host plant varieties, their cultivation and propagation techniques.
- Rearing, harvesting and purification methods of lac
- Economic importance of lac and lac products

Course Outcome:

Upon completion of the course, students should be able to

- CO1: Understand the whole process of lac culture
- CO2: Know the commercial importance and utility of lac
- CO3: Appreciate it as an entrepreneurship avenue
- CO4: Develop startup ideas involving insect products

Module 1: **15 hours**

- Lac culture- Definition, history, etymology, distribution.
- Strains of lac insect
- Host plant diversity
- Life cycle of lac insects
- Cultivation and propagation of host plants (site selection, pruning etc.)

Module 2: **18 hours**

- Commercial cultivation of lac insects- inoculation, swarming, harvesting.
- Processing and production of commercially usable lac- scraping, crushing, sieving, winnowing and grading.
- Factors influencing productivity of lac- management of predators, parasite and pests, weather conditions.

Module 3: **12 hours**

- Lac and lac derived products- composition of lac derived raw materials, by products of lac industry.
- Commercial importance of lac products and their uses.
- Scope of lac industry in employment and income generation.

Total Lecture hours **45 hours**

Practical component

- Study of different strains of lac insects (through prepared slides or photographs).
- Study of predators and parasites of lac (photographs or slides)
- Study of morphological parameters of different host plants (herbarium study).
- Study of pest of lac host plants
- Assignments

Text Book(s)

1. Lac culture in India, N Ghorai, International Books & Periodicals supply Service
2. Economic Zoology- Sagarika Choudhury, NCBA

3.	Textbook of Applied Zoology, Pradip V. Jabde, Discovery Publishing Pvt.ltd
Reference Books	
1.	Modern Entomology, D.B. Tembhare, Himalayan Publishing House
2.	The insects: beneficial and harmful aspects, Dunston P. Ambrose, Kalyani Publishers
3.	Lac cultivation in India, Patrick Moore Glover, Lac Research Institute

LIFESTYLE DISORDERS	L	T	P	C
	3	0	0	3

Pre-requisite: Knowledge of biology at (10+2) level

Course objectives:

The objectives of the course are:

- To apprise the students of the various lifestyle disorders
- To make the students aware towards various risk factors responsible for lifestyle disorders
- Introduce the students to the preventive and controlling measures so that they can lead a healthy life.

Course outcome:

Students will be able to:

- Have a better understanding of lifestyle choices and the diseases associated with them
- Recognise certain diagnostic features to become aware of any abnormalities
- Have a better understanding for making better lifestyle decisions

Module 1: **15 hours**

Introduction of lifestyle disorders or diseases- Definition.
Lifestyle diseases in India, risk factors- Erratic sleep patterns, wrong food choice, alcohol abuse, stress, drug abuse, lack of physical activities

Module2: **20 hours**

Diabetes and obesity- risk factors, complication, diagnosis, prevention and control.
Respiratory diseases- obstructive pulmonary diseases, Asthma, risk factors, diagnosis, prevention and control. Cardiovascular diseases- coronary atherosclerosis, heart failure, stroke, cardiomyopathy, hypertension- risk factors, diagnosis, prevention and control

Module 3: **10 hours**

WHO Global Action Plan and monitoring, framework for prevention and control of non-communicable diseases, NPHCE (National Programme for Health Care of Elderly), Fit India Movement (Yoga and Meditation)

Total lecture hours **45 hours**

Text Books:

1	James M.R, Lifestyle Medicine, 2nd Edition, CRC Press, 2013
2	Tortora, G.J. and Grabowski, S. (2006). Principles of Anatomy and Physiology. XI edition. John Wiley & sons
3	Cooper, G.M., Hausman, R.E. (2009). The Cell: A Molecular Approach. V Edition, ASM Press and Sinauer Associates.

Reference books:

1	Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. XI Edition. Harcourt Asia PTE Ltd/W.B. Saunders Company.
2	Widmaier E, Raff H and Strang K. (2013) Vander's Human Physiology. The Mechanism of Body Functions. McGraw-Hill Education 13th Edition.

	BIOMIMICRY IN ARCHITECTURE	L	T	P	C
		3	0	0	3

Pre-requisite: Knowledge of biology at (10+2) level

Course Objectives:

- To explore, understand and recognize the relation between nature and human.
- To comprehend and appreciate the natural construction by the organisms in nature.
- To generate similar approaches from nature in the built forms.

Course Outcome:

- Basic knowledge of biomimicry
- Application of nature in technology
- Application of nature's design for sustainable development

Module 1:	**10 hours**
Definition: biomimicry- bionics-biomimetics; bio-mimicry vs biophilic; concept of biomimicry/ biomimetics; biomimicry applications	
Module 2:	**20 hours**
Biomimicry in architecture; relation between nature and architecture; emerging biomimetic techniques; biomimetic products	
Module 3:	**15 hours**
Biomimicry and sustainable development; examples of biomimetic buildings, biomimetic cities; Biomimetics future approach	
Module 4:	
Assignments on the concepts of biomimicry and documentation of the influence of biomimicry in Architecture with case study.	
Total Lecture hours	**45 hours**

Text Book(s)

1. Benyus, J. M. (2002). Biomimicry: Innovation Inspired by Nature. William Morrow.
2. Gruber, P. (2011). Biomimetics in Architecture: Architecture of Life and Buildings. Springer.

Reference Books

1. Hansell, M. (2005). Animal Architecture (Oxford Animal Biology Series). OUP Oxford.
2. Mazzoleni, I. (2013). Architecture Follows Nature-Biomimetic Principles for Innovative Design (Biomimetics). CRC Press
3. Pawlyn, M. (2011). Biomimicry in Architecture. RIBAPublishing