

# **Module Plan**

CCF System

Semester 1

Department of Zoology

Surendranath College

## Steps to prepare a Module Plan (As directed by IQAC)

To efficiently distribute teaching responsibilities, optimize the use of teachers' expertise, and provide a well-rounded educational experience for students.

**Identify Course Modules:** First, break down the course into its constituent modules or units. These are smaller sections of the course that cover specific topics or themes.

**Teacher Selection:** Determine which teachers or instructors are qualified and available to teach the course. Consider their expertise in the subject matter and teaching experience.

**Module Allocation:** Assign each module or unit to a specific teacher based on their strengths, expertise, and availability. Consider factors like the complexity of the content and the teacher's familiarity with it.

**Teacher Training:** Ensure that teachers assigned to specific modules are adequately prepared. They may need training or resources to effectively teach the assigned content.

**Communication:** Clearly communicate the module allotments to teachers, including expectations, deadlines, and any specific guidelines for teaching their assigned modules.

**Coordination:** Foster collaboration and communication among teachers who are handling different parts of the course. This helps maintain consistency and coherence in course delivery.

**Monitoring and Support:** Provide ongoing support and supervision to teachers throughout the course. Monitor their progress, help when needed, and address any challenges that arise.

**Assessment Alignment:** Ensure that assessment methods align with the modular structure and follows Bloom's Taxonomy. Each teacher should be responsible for assessing the students in their assigned module.

**Feedback and Evaluation:** Collect feedback from students and teachers to assess the effectiveness of the modular approach. Use this feedback to make improvements for future courses.

**Flexibility:** Be prepared to make adjustments to module allotments if necessary. Sometimes, changes may be required due to unforeseen circumstances or teacher availability.

**B.Sc.-Hons  
CCF System  
Semester I**

**Cell Biology (Major/ MDC/Minor) Theory**

Paper	Unit	Topic	Modules allotted to faculty	Classes allotted for module completion	Steps to be followed for Teaching	Methods to be followed for Assessment	Name of substitute teacher
<b>Cell Biology Major/ MDC/Minor</b>	<b>Unit 1: Plasma Membrane</b>	<b>Lipid Bilayer (Phospholipids and Cholesterol), Peripheral and Integral Membrane proteins, Fluid Mosaic Model with special reference to Lipid rafts</b>	<b>SM</b>	<b>2</b>	1. Review of the student's current knowledge base 2. Mentioning of course objectives 3. Input on the subject 4. Guided practice of various problems	For both the formative and summative assessments, the questions would be set to assess the following skills using the six-level methodology of Bloom's Taxonomy as far as practicable.  <b>Knowledge</b>	<b>CB</b>
		<b>Glycolipids and Glycoproteins (basic concept of Glycocalyx)</b>		<b>1</b>			
		<b>Mobility of membrane lipids (FRAP assay) and Mobility of Membrane Proteins (Frye-Edidin Experiment)</b>		<b>2</b>			
		<b>Cell-cell junctions; Transport through plasma membrane.</b>		<b>2</b>			
	<b>Unit 2: Cytoplasmic organelles I</b>	<b>ER Morphology, Targeting proteins to ER, The Signal hypothesis;</b>	<b>CB</b>	<b>1</b>	5. Independent practice by home/class formative assignments 6. Discussion on the last 10 years' university questions	<b>Comprehension</b>  <b>Application</b>  <b>Analysis</b>  <b>Evaluation/Judgement</b>  <b>Synthesis/Creation</b>	<b>ST/SR/SM</b>
		<b>Insertion of proteins into ER membrane,</b>		<b>1</b>			
		<b>Protein folding and processing in ER,</b>		<b>1</b>			
		<b>Export of proteins and lipids from ER;</b>		<b>1</b>			
		<b>Golgi Apparatus; Morphology, Protein glycosylation within Golgi;</b>		<b>1</b>			
		<b>, Protein sorting and export from Golgi apparatus</b>					

		Mechanism of Vesicular Transport: Cargo selection, coat proteins and vesicle budding, Vesicle fusion.;		2	7. Closure of the course with a final summative assessment		
		Lysosome: Polymorphism, Lysosomal acid hydrolases, Endocytosis and lysosome formation.		1			
	Unit 3: Cytoplasmic organelles II	Mitochondria: Structure, Semi-autonomous nature, Mitochondrial DNA	SR	1		ST/SM	
		Endosymbiotic hypothesis					
		Mitochondrial Respiratory Chain		1			
		Chemiosmotic hypothesis and Oxidative Phosphorylation with reference to ATP Synthase and ATP synthesis		1			
		Peroxisomes: Structure and Functions;		1			
		Centrosome and its organization		1			
	Unit 4: Cytoskeleton	Structure and Types: Microtubules,	AS	1		CB	
		Actin filaments, and Intermediate filaments;		1			
		Basic composition and function of ECM;		1			
		Cell matrix Interactions(Integrins)		1			
	Unit 5: Nucleus	Nuclear envelope	CB	1		ST/SR	
		nuclear pore complex (transport not included), Kinetochore and centromeric DNA;					
		Chromatin and levels of its packaging.		1			
		Euchromatin& Heterochromatin,		1			
		Position effect variegation.		1			
		Chromatin remodeling complex.		1			

	Unit 6: Cell Cycle	Cell Cycle: Phases of the eukaryotic cell cycle,	SR	1			CB
		Protein Kinases and Cell cycle regulation,					
		MPF, Growth factors and regulation of G1-Cdks,		1			
		S phase and regulation of DNA replication,		21			
		DNA damage checkpoints;		1			
		Cell Death: Caspases,		1			
		Bcl-2 family, Intrinsic (Death receptors) and Extrinsic Pathway (apoptosome);		1			
		Cancer: Basic Concept of Protooncogene [Ras] & Tumor suppressor genes [Rb and p53]		2			
		Different ways of activation of a protooncogene to Oncogene.		2			
	Unit 7: Cell Signalling	Signalling system: Modes of cell-cell signalling;	SM	1			CB
		Types of Signalling molecules Signalling receptors:		1			
		Types and example with special reference to regulation of G protein, Adenyl cyclase-cAMP,		2			
		Enzyme linked Receptors: RTK (ras-raf) and JAK/STAT		1			
	Unit 8: Tools and Techniques in Cell Biology	Animal Cell Culture: Primary cell culture and Cell line. ·	SM	1			SR

		Subcellular fractionation and Ultracentrifugation.	AS	1			SM
		Freeze fracture Replication and Freeze Etching		1			
		Principle of Light Microscope: Bright field,		1			
		Fluorescence Microscope with reference to FRET,		1			
		Principle of SEM & TEM. Cryofixation and use of frozen specimen; Specimen Preparation for Electron Microscopy , Phase contrast microscope		1			

### Cell Biology (Major/ MDC/Minor) Practical

Paper	List of Practical	Module allotted	Classes allotted for module completion	Name of Substitute Teacher
Cell Biology Major/ MDC/Minor	1. Cell viability study by Trypan Blue Exclusion method.	SR	5	SM
	2. Standardization of Ocular and Stage Micrometer and Measurement of cell or microscopic specimen such as Paramoecium sp.	SM	5	SR
	3. Preparation of squamous epithelial cell with staining.	CB	5	SM
	4. Isolation of Bone Marrow Cells from Rat/Mouse and Giemsa Staining.	CB+SM+SR	5	-

### SEC-I Applied Entomology (Theory)

Paper	Unit	Topic	Modules allotted to faculty	Classes allotted for module completion	Steps to be followed for Teaching	Methods to be followed for Assessment	Name of substitute teacher
Applied Entomology	Unit 1: Basics of Entomology	Morphological adaptation of insects: Head and antenna	MKB	1	1.Review of the student's current knowledge base  2. Mentioning of course objectives  3.Input on the subject  4. Guided practice of various problems  5. Independent practice by home/class formative assignments  6. Discussion on the last 10 years' university questions  7. Closure of	For both the formative and summative assessments, the questions would be set to assess the following skills using the six-level methodology of Bloom's Taxonomy as far as practicable.  <b>Knowledge</b>  <b>Comprehension</b>  <b>Application</b>  <b>Analysis</b>  <b>Evaluation/Judgement</b>  <b>Synthesis/Creation</b>	ST
		Mouthparts of honey bee and cockroach;		1			
		Thorax and thoracic appendages- legs and wings		1			
		Physiological adaptation in cockroach: Digestive system: Alimentary canal and digestive glands, digestion;		2			
		Respiratory organs and mechanism of gaseous exchange;		1			
		Sense organs compound eyes, chemoreceptors.		1			
		Orthoptera, Dictyoptera, Hemiptera,		1			
		Coleoptera, Lepidoptera, Diptera,		1			
		Hymenoptera, Anoplura, Siphonaptera(Imms, A.D., 1938);		1			
		Ticks and Mites: General features; difference between ticks and mites; Soft ticks and Hard ticks.		1			

		<b>Concept of Vectors: Mechanical and biological vectors, modes of transmission;</b>		<b>1</b>	the course with a final summative assessment		
	<b>Unit 2 Medical Entomology</b>	<b>Biological vector and disease cycle.</b>	<b>PM</b>	<b>1</b>			<b>MKB</b>
		<b>Biology of Anopheles, Culex and Aedes:</b>		<b>1</b>			
		<b>Study of mosquito borne diseases- Malaria, Dengue, and Filariasis;</b>		<b>2</b>			
		<b>control of mosquitoes.</b>		<b>1</b>			
		<b>Biology of Musca domestica: Disease relationship; control of house fly.</b>		<b>1</b>			
		<b>Biology and systematicsof Bed bug Cimexlectularius; disease relationship; Control of Bed Bug. T</b>		<b>1</b>			
		<b>Ticks as Causative agents and Vectors: Rickettsiosis, Tick-borne encephalitis.</b>		<b>1</b>			
		<b>Forensic Entomology: General perceptions and status of Forensic entomology;</b>		<b>2</b>			
		<b>Insects and other arthropods of forensic importance;</b>		<b>1</b>			
		<b>Pattern of insect succession on carcass;</b>		<b>1</b>			



		Postmortem Interval (PMI) and its estimation process;		1			
		Applications and limitations of Forensic Entomology		1			
	Unit 3 Agricultural Entomology	Concept of insect pest; Economic Injury Level (EIL), Economic Threshold Level (ETL), Dynamics of EIL	ST	2			
		Pests of Paddy, Scirpophagaincertulus		1			
		Pests of Jute, Anomissabulifera;		1			
		Pests of brinjal, Leucinodes orbonalis;		1			
		Stored grain pest: Sitophilus oryzae;		1			
		Invasive insect pests of India and their consequences.		1			
		Insect Pest control: Chemical, Mechanical,		1			
		Cultural and Biological control measures;		1			
		Integrated Pest Management (IPM)		2			
		Study of appliances used in pest control: Dusters; Sprayers- categories of sprayers,		2			
		agricultural Aircrafts; Granule applicator; soil injectors.		1			
							TIG

	Unit 4 Sericulture	Types of Silk Moths with special reference to their scientific name, geographical distribution, and host plants.	TIG	1			ST
		Life cycle of Bombyx mori; Structure of Silk Gland;					
		Voltinism, Rearing of mulberry silkworm;		1			
		Reeling and extraction of silk;					
		Mulberry cocoon management;					
		Mulberry plant types and cultivation;		1			
		Common diseases and pests of mulberry silkworm and their control measures;		1			
		Prospects of Sericulture in West Bengal; employment potential in sericulture.		1			
		Various domesticated species of Honeybee;					
	Unit 5 Apiculture	Social organization and life cycle of Honeybee;	TIG	1			PM
		Modern method of Beekeeping: Newton Box and Langstroth Box;		1			
		extraction of honey and composition of honey;		1			

		Pests, Parasites and Diseases and their control measures;		1			
		Bee-economy: Apiculture products and their uses.		1			

### SEC-I Applied Entomology (Practical)

Paper	Module	Topic	Module allotted	No. of Classes required	Substitute Teacher
SEC-I Applied Entomology (Practical)	Applied Entomology Lab: SEC-1-P	1. Dissection and temporary mounting of: - Antennae and mouth parts of Cockroach, House fly and Mosquito	ST+TIG+MKB+PM	3	-
		2. Methods of collection, preservation, and identification of economically important insects.		3	
		3. Identification of following insect pests (Order, family and specimen characters only):		2	
		Scirpophaga incertulus;			
		Sitophilus oryzae;			
		Callosobruchus chinensis,			
		Leucinodes orbonalis;			
		Anomis sabulifera;			
		Pyrillaper pusilla.			
		4. Morphological studies of various castes of Apis sp.		1	
		5. Identification of life stages of		1	

		Bombyx mori; Identification of Bivoltine and multivoltine mulberry cocoon.			
		6. Identification and medical significance of following insects (adults) through permanent slides/photographs: Aedes sp.,		2	
		Culex sp.,			
		Anopheles sp. [for mosquito, larvae and both sexes of adults],			
		Musca sp.,			
		Phlebotomus sp.,			
		Cimex sp.,			
		Pediculus human uscapitis.,			
		Xenopsylla sp.			
		7. Visits to any one place of applied entomological significance (submission of a field report):		8	

**MDC SEC G**

**Applied Zoology Theory**

Paper	Unit	Topic	Modules allotted to faculty	Classes allotted for module completion	Steps to be followed for Teaching	Methods to be followed for Assessment	Substitute Teacher
MDC SEC G Applied Zoology	Unit I: Agricultural Entomology	Pest- definition and types (major and minor pests with example);	ST	6	1.Review of the student’s current knowledge base	For both the formative and summative assessments, the questions would be set to assess the following skills using the six-level methodology of Bloom’s Taxonomy as far as practicable.  <b>Knowledge</b>  <b>Comprehension</b>  <b>Application</b>  <b>Analysis</b>  <b>Evaluation/Judgement</b>  <b>Synthesis/Creation</b>	AS
		Scirpophaga incertulus of paddy,					
		Anomissabulifera of Jute,					
		Bandicoota stored house pest;					
		Insect Pest control: Chemical, Mechanical, Cultural and Biological control measures; Integrated Pest Management (IPM).					
	Unit II: Sericulture	Types of Silkworms with special reference to their scientific name,	TIG	8	4. Guided practice of various problems		MKB
		geographical distribution and host plants;					
		Bombyx mori: Silk gland, Composition of silk,					
		Uses of silk;					
		Lifecycle;					
		Rearing,					
		Extraction and Reeling of mulberry silk;					
		Silkworm diseases, pests and their control.					

	<b>Unit III: Apiculture</b>	<b>Various domesticated species of Honeybee;</b>	<b>MKB</b>	<b>7</b>	assessment		<b>PM</b>
		<b>Social organization of Honeybee;</b>					
		<b>Bee keeping: Langstroth Box for rearing of honey bee,</b>					
		<b>Extraction and processing of honey;</b>					
		<b>Composition of honey,</b>					
		<b>apiculture by products and their uses;</b>					
		<b>Pests and Diseases of bees and their control measures</b>					
	<b>Unit IV: Vermiculture</b>	<b>Scope of Vermiculture;</b>	<b>CB</b>	<b>7</b>			<b>SR</b>
		<b>Habit categories of earthworms;</b>					
		<b>methodology of vermicomposting: containers for culturing, raw materials required, preparation of bed, environmental pre- requisites, feeding, harvesting and storage of vermicompost; Advantages of vermicomposting;</b>					
		<b>Diseases and pests of earthworms.</b>					
	<b>Unit V: Aquaculture</b>	<b>Principles, definition and scope;</b>	<b>AS</b>	<b>8</b>			<b>TIG</b>
		<b>Prawn culture: Penaeid and Palaemonid features with examples; Semi-intensive method of prawn culture; Application of prawn culture;</b>					
		<b>Difference between major and minor carps</b>					

		with examples;					
		Composite fish farming: General concepts, advantages and disadvantages;					
		Induced breeding: method and advantages;					
		Integrated fish farming.					
	Unit VI: Live Stock Management	Dairy: Introduction to common dairy animals: Types of Cattle breeds and their distribution in India; Exotic cattle breeds;	SR	8			PM
		Artificial insemination and MOET in breeding;					
		Cattle feed: Roughage and Concentrate;					
		dairy by products, preservation and uses. Dairy pathology and vaccination programme.					
		Poultry: Types of breeds (fowl) with features and examples;					
		Rearing method: Deep litter system;					
		feed formulation for chicks;					
		poultry by products with economic importance;					
		Poultry Diseases					
	Unit VII: Lac Culture	Life cycle,	PM	6			SR
		host plants and strains of Lac insect;					

		Lac cultivation: Local practice, improved practice,					
		propagation of Lac insect, inoculation period,					
		harvesting of Lac; Lac composition, processing					
		Products and uses;					
		Natural enemies of lac insect and their management					

#### MDC SEC G Applied Zoology Practical

Paper	Module	Topis	Class Allotted	No. of classes	Substitute Teacher
MDC SEC G Applied Zoology Practical	SEC G for MDC	1. Identification of various castes of Honey bee,	AS+MKB	8	PM
		life stages of Bombyxmori,			
		various life stages of Kerrialacca,			
		various earthworm species used in vermiculture and			
		ectoparasites of Poultry birds			
		2. Identification of the following fish and prawn specimens (Specimen characters only):	AS+TIG	2	SR
		Labeo rohita,			



		Catla catla,			
		Cirrhinus mrigela,			
		Cyprinus carpio,			
		L. bata,			
		Penaeus monodon,			
		Macrobrachium rosenbergi			
		3. Collection of any two pests and submission of specimen it along with a small report on its identifying	ST+SR	2	AS
		features, life cycle, nature of damage and control:			
		Sitophilus oryzae,			
		Tribolium castaneum,			
		Nilaparvata lugens,			
		Anomala subulifera			
		Leucinodes orbonalis			
		4. Visit to any one of the following and submission of report on the visit	ST+MKB+TIG	8	

### IDC Zoology 1<sup>st</sup> Semester Theory

Paper	Unit	Topic	Module allotted	No. of classes	Steps to be followed for Teaching	Methods to be followed for Assessment	Substitute Teacher
IDC Theory	Unit 1: Animal Diversity	Porifera,	PM+TIG+MKB	1	1.Review of the student's current knowledge base	<p>For both the formative and summative assessments, the questions would be set to assess the following skills using the six-level methodology of Bloom's Taxonomy as far as practicable.</p> <p><b>Knowledge</b></p> <p><b>Comprehension</b></p> <p><b>Application</b></p> <p><b>Analysis</b></p> <p><b>Evaluation/Judgement</b></p> <p><b>Synthesis/Creation</b></p>	AS+CB
		Cnidaria,		1			
		Ctenophora,		1			
		Platyhelminthes,		1	2. Mentioning of course objectives		
		Nemathelminthes,		1	3.Input on the subject		
		Annelida,		1			
		Arthropoda,		1	4. Guided practice of various problems		
		Mollusca and Echinodermata];		1			
		Chordata		2	5. Independent practice by home/class formative assignments		
	Unit 2: Genetics	1. Mendelian Principles and Laws of inheritance	CB+SR+SM	3			TIG+MKB
		2. Linkage and Recombination basic Concepts		3	6. Discussion on the last 10 years' university questions		
		3. Sex Determination with reference to Drosophila [only genic balance theory]		3	7. Closure of the course		

		4. Chromosomal Aberration [Structural and Numerical]		3	with a final summative assessment		CB+SM+AS
	Unit 3: Biodiversity and Wildlife	1. Biodiversity: Definition, types and value	ST+TIG+MKB	3			
	Unit	2. Biodiversity: Indices [Shannon & Simpson]		3			
		3. Conservation: in situ and ex situ [outline idea]		3			
		4. Conservation Priority: Hotspot, Megadiversity, Sensitive Ecosystem		3			
		5. Indigenous Knowledge and PBR: Basic Concepts		3			
		Unit 4: Insect Vectors		1. Concept of Vector: Biological and Mechanical Vectors with examples			PM+SR
	2. Disease cycle & Reservoir Concept						
	Major Vectors: Mosquito (Anopheles sp.) Life cycle, control, role as vector.						
	Major Vectors: Mosquito (Aedes sp.) Life cycle,						

		control, role as vector.					
	Unit 5: Laboratory techniques and Instrumentation	1. Basics of Light Microscopy		SR+SM			CB+AS
		2. Principles and Application of Colorimetry					
		3. Principles and application of Ultracentrifugation					

### IDC Zoology 1<sup>st</sup> Semester Practical

Paper	Unit	Topic	Class Allotted	No. of classes	Substitute Teacher
IDC Practical	Animal Biology Lab	Karyotype analysis of Klinefelter, Down, Turner, Edward &Patau Syndrome	SM+CB	7	SR
		Identification (Phylum and specimen characters): Amoeba, Paramoecium, Sycon, Neptune's Cup,  Taenia, Ascaris, Nereis, Pheretima, Pila, Lamelledens, Penaeus, Macrobrachium, Musca, Anopheles,	PM+TIG+ST	7	MKB

		Culex, Asterias.			
		One Local-Outdoor Trip for Biodiversity Studies.		6	