

# EKLAVYA UNIVERSITY, DAMOH (M.P.)

Scheme of Examination B.Sc I Year

/For batch admitted in Academic Session 2020-21/

*Subject wise distribution of marks and corresponding credits*

S. No.	Subject Name	Subject Code	Paper Name	Maximum Marks Allotted														Total Marks	Contact Periods Per week			Total Credits					
				Theory Slot				Practical Slot		End Sem	Quiz/Assignment/Attendance	Lab Work/Sessional	L	T	P												
				Final Yearly		Half Yearly		End Sem																			
				P1	P2	P3	P4		P1							P2	P3		P4								
1	Common	BAECC20Y101	Environmental and Disaster Management (University Core Under Ability Enhancement Course (AEC-1))	60				30										10			2	0	0	0	2		
		BAECC20Y102	Communication Theory (University Core under Ability Enhancement Course (AEC-2))	60				30											10			4	0	0	0	4	
		BYOGA20Y101	Yoga- 1 (University Core)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60	40		2	0	0	0	2
		BZOOL20Y101	Invertebrate Paper - I (Core Course - 2A)	30				15											5			50	3	1	0	4	
		BZOOL20Y102	Cell Biology and Developmental Biology Paper - II (Core Course - 2B)	30						15									5			50	3	1	0	4	
2	Zoology	BZOOL20Y103	Paper I and Paper II, Practical (Practical 2A & 2B, Core Course 2C)																	30	20		0	0	2	2	
		BZOOL20Y104	Ecology, Animal Behaviours and Evolution Paper - III (Core Course - 2D, for Honors)								15							5			50	3	1	0	4		
		BZOOL20Y105	Paper III, Practical (Practical 2D for Honours, Core Course 2E)																	30	20		0	0	1	1	
3	Common	BASPR20Y101	Assingment Presentation for 3 Core Courses																	50	0	3	0	3			

**Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.**






Class		B.Sc. Zoology
Year		I Year
Subject & Subject Code		Zoology - BZOOL20Y101
Paper	English	Invertebrate Paper - I
	हिन्दी	अकशेरुकी
Max. Marks		30 (ETE) + 20 (IA) = 50
Credit		4
Total Credits		
L	T	
3	1	0

**Course Objectives:**

1. To study individual organism and populations, as well as their relationships to each other and to the environment, with the core foundation of evolution and ecology.
2. To comprehend the genetics, anatomy, physiology and behavior along with other specialized fields of interest.
3. To comprehend the basic phylogenetic relationships of the major groups of vertebrates.
4. To comprehend and analyze the adaptive changes that have occurred in invertebrates & vertebrates.
5. To comprehend and analyze the changes in homologous structures which accompanied the invasion of terrestrial habitats by vertebrates.
6. To recognize, describe, and point out the external and internal features that characterize the major groups of modern day vertebrate & invertebrates.
7. To gain an in-depth knowledge and practical skills in various aspects of animal biology.

**Course Outcome:**

At the end of the course, learners will be able to :

1. Learn basic concept of biosystematics and procedure in taxonomy.
2. Identify the taxonomic status of the entire non-chordates up to annelids and discuss the evolutionary model of the group.
3. Describe the general biology of few selected non-chordates useful to mankind.
4. Know about some of the important and common protozoans, helminthes of parasitic nature causing diseases in human beings.
5. Understand the importance of metamerism in annelids.

**Student Learning Outcomes (SLO):**

Students will:

1. Describe the variety of invertebrate organisms and explain their evolutionary origin and diversification.
2. Investigate invertebrates in laboratory and field conditions, and identify major taxonomic groups.
3. Describe general taxonomic rules on animal classification.
4. Classify Protista up to phylum using examples from parasitic adaptation.
5. Classify Phylum Porifera to Echinodermata with taxonomic keys.
6. Describe Phylum Nematoda and give examples of pathogenic Nematodes.

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Unit	Syllabus	Periods
UNIT - I	Elementary Knowledge of Zoological Nomenclature and International Code. Classification of Lower Invertebrates (According to Parker and Haswell 7 <sup>th</sup> Edition ) (1.Protozoa, 2.Porifera, 3.Coelenterata, 4.Helminthes ) Classification of Higher Invertebrates (According to Parker and Haswell 7 <sup>th</sup> edition ) (1. Annelida, 2. Arthropoda ,3.Mollusca 4.Echinodermata 5.Hemichordata)	15
	प्राणिकीय नामकरण एवं अंतर्राष्ट्रीय कोड का सामान्य अध्ययन निम्नतर अकशेरुकी प्राणियों का वर्गीकरण (पारकर एवं हेजवैल का 7 वॉ संस्करण अनुसार ) (1)प्रोटोजोआ (2) पोरीफेरा (3) सीलेंट्रेटा (4) हेल्मिंथस उच्चतर अकशेरुकी प्राणियों का वर्गीकरण (पारकर एवं हेजवैल का 7 वॉ संस्करण अनुसार) (1)ऐनेलिडा (2) आर्थोपोडा (3) मोलस्का (4) इकाइनोडर्मेटा (5) हेंमीकार्डेटा	
UNIT - II	Protozoa- Type Study of Plasmodium. Protozoa- and Diseases. Porifera-Type study of Sycon. Coelenterata-Type study of Obelia. Corals and Coral Reef formation.	15
	प्रोटोजोआ-प्लाजमोडियम का प्रारूप अध्ययन प्रोटोजोआ एवं रोग पोरीफेरा-साइकॉन का प्रारूप अध्ययन सीलेंट्रेटा -ओबेलिया का प्रारूप अध्ययन प्रवाल एवं प्रवालभित्ती का निर्माण	
UNIT - III	Helminthes- type study of Liver Fluke (Fasciola hepatica) Nematodes and diseases. Annelida -Type study of Earthworm (pheretima) Metamerism in Annelida Structure and significance of Trochophore larva.	15
	हेल्मिंथस-फेसिलोला का प्रारूप अध्ययन नेमेटोडा एवं रोग ऐनेलिडा-केंचुए का प्रारूप अध्ययन ऐनेलिडा में मेटामेरिज्म ट्रोकोफोर लार्वा की संरचना एवं महत्व	
UNIT - IV	Arthropoda- Type study of prawn (palaemon) Larval Forms of Crustacea. Insect as Vectors of human diseases. Mollusca-Type study of Pila (An Apple Snail). Larval Forms of Mollusca	15
	आर्थोपोडा-झींगे का प्रारूप अध्ययन (पेलीमॉन) कस्टेशिया के लार्वा मानव रोगों के वाहक कीट मोलस्का-पाइला का प्रारूप अध्ययन (एपल घोंघा) मोलस्का के लार्वा	

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UNIT - V	Echinodermata-External Features and Water Vascular system of Star fish. Larval Forms of Echinoderms. Minor Phyla-Ectoprocta and Rotifera. Hemichordata -Type Study of Balanoglossus Affinities of Balanoglossus.	15
	इकाइनोडर्मेटा-तारा मछली की बाह्य संरचना एवं जल सवहन तंत्र इकाइनोडर्मेटा के लार्वा माइनर फाइला- एक्टोप्रोक्टा एवं रोटिफेरा हेमीकॉर्डेटा-बैलेनोग्लासेस का प्रारूप अध्ययन बैलेनोग्लासेस की बंधुता	

#### Text Books-

- 1 Text Book of Invertebrate Zoology by Parker and Haswell .
- 2 RL Invertebrate by Kotpal,.
- 3 RL Developmental Biology by Kotpal,.
- 4 Invertebrate Zoology a Functional Evolutionary Approach, 7th ed., 2004, Thomson Brools / Cole By Ruppert, E.E., Fox, R.S., and R.D. Barns,
- 5 Dictionary of Word Roots and Combining Forms by Borror, D.J., 1971. Mayfield Publishing Co. Palo Alto California.

#### Reference Books-

- 1 Freshwater Invertebrates (general) by Smith, D. G. 2001.
- 2 Pennak's Freshwater Invertebrates of the United States. Fourth Edition by John Wiley and Sons, Inc., New York.

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Class		B.Sc. Zoology	
Year		I Year	
Subject & Subject Code		Zoology- BZOO20Y102	
Paper	English	Cell Biology and Developmental Biology Paper - II	
	हिन्दी	कोशिका विज्ञान एवं भ्रौणिकी विकास	
Max. Marks		30 (ETE) + (IA) 20 = 50	
Credit		Total Credits	
L	T	P	4
3	1	0	
<b>Course Objectives:</b>			
<p>1. Students will understand the structures and purpose of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membrane, and organelles .</p> <p>2. Students will understand how these cellular components are used to generate and utilize energy in cells .</p> <p>3. Students will understand the cellular components underlying Mitotic cell division. Students will apply their Knowledge of cell biology to selected examples of changes or losses in cell function.</p> <p>4. The objective of this course is to provide a comprehensive understanding of the concepts of early animal development.</p> <p>5. Students taking this course must develop a critical appreciation of methodologies specifically used to study the process of embryonic development in animals</p>			
<b>Course Outcome:</b>			
<p>At the end of the course, learners will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the structure of cells and cell organelles in relation to the functional aspects and understanding of the working principles and applications of microscopes.</li> <li>2. Describe the composition of prokaryotic and eukaryotic cells.</li> <li>3. Understand the structure and functions of chromosome; mitotic and meiotic cell divisions and their significance.</li> <li>4. Understand the process of development of animals.</li> <li>5. Understand the process of organogenesis of selected organs, development of extra embryonic membrane and the nature and physiology of placenta.</li> <li>6. Know the inducer and inductor role in embryogenesis and knowledge about metamorphosis and the process of regeneration.</li> </ol>			
<b>Student Learning Outcomes (SLO):</b>			
<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Observe chromosomal arrangements during cell division</li> <li>2. Distinguish different chromosomal aberrations in man</li> <li>3. Familiarise knowledge of conventional biotechnological procedures</li> <li>4. Perform routine blood analysis.</li> <li>5. Familiar with various stages involved in the developing embryo</li> <li>6. Apply the knowledge to collect various Biological data</li> <li>7. Explain various Prenatal Diagnosis</li> <li>8. Familiarise with the principle of developmental biology</li> </ol>			

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Unit	Syllabus	Periods
UNIT - I	History of Cell Biology Cell theory ,Prokaryotic and Eukaryotic Cells. Structure and function of Golgi body, Endoplasmic Reticulum, Lysosomes. Structure and Functions of Mitochondria, Ribosome, Centriole, Microsome.	15
	कोशिका विज्ञान का इतिहास, कोशिका सिद्धांत एप्रोकैरियोटिक एवं यूकेरियोटिक कोशिका गोल्जी बॉडी , एन्डोप्लाज्मिक रेटिकुलम, लाइसोसोम की संरचना एवं कार्यए माइटोकॉन्ड्रियाँ, राइबोसोम, सेंट्रिओल, माइक्रोसोम की संरचना एवं कार्य ।	
UNIT - II	Structure and Functions of Nucleus and Nucleolus. Structure and functions of typical Chromosome. Special type of Chromosome-Lampbrush and polytene. Nucleocytoplasmic interaction. Cell Cycle, Mitotic and Meiotic cell division	15
	केन्द्रक एवं केन्द्रिका की संरचना एवं कार्य एप्रारूपिक गुणसूत्र की संरचना एवं कार्य विशेष प्रकार के गुणसूत्र –लेम्नश एवं पॉलीटीन एकोशिका चक्र, समसूत्री एवं अर्ध सूत्री कोशिका विभाजन ।	
UNIT - III	Spermatogenesis Oogenesis Fertilization Parthenogenesis Regeneration	15
	शुक्राणुजनन अंडाणुजनन निषेचन अनिषेकजनन पुनरुद्भवन	
UNIT - IV	Development of Frog Cleavage Blastulation Fate map Construction Gastrulation and Formation of three germinal layers Structure of Tadpole Larva	15
	मेंढक का विकास विदलन ब्लास्टुलेशन फेटमेप का निर्माण गेस्ट्रुलेशन एवं तीन जनन स्तरों का निर्माण टैडपोल लार्वा की संरचना	

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	Development of Chick Cleavage Blastulation Fate map construction Gastrulation Development of Chick embryo upto formation of primitive streaks. Extra embryonic membrane in chicks	
UNIT - V	चूजे का विकास विदलन ब्लास्टुलेशन फेटमेप का निर्माण गेस्टुलेशन प्रिमिटिव स्ट्रीक बनने तक चूजे के भ्रूण का विकास चूजे में वाह्य भ्रूण झिल्लियाँ ।	15

#### Text Books-

- 1 Cell and Molecular Biology, 1987 by Sheelar & Bianchi .
- 2 Karp Cell and Molecular Biology, 1979.
- 3 Introduction to Cytology by Rastogi V.B.
- 4 Cell and Molecular Biology, 1980 by De-Robertis.
- 5 Cell Biology, 1991 by Powar, C.B .,
- 6 Cell Biology, Genetics, Biology Evolution by Varma P.S. & Agrawal V.K.
- 7 Molecular Biology of Cells, (2002), by Alberts's et. al.

#### Reference Books-

- 1 Molecular Cell Biology" by Darnell J.
- 2 Cell Biology" by Kimball T W.
- 3 Developmental Biology: A Very Short Introduction (Very Short Introductions)" by Lewis Wolpert.

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Class	B.Sc. Zoology
Year	I Year
Subject & Subject Code	Practical Zoology- BZOO20Y103
Paper	Paper I and Paper II, Practical
Max. Marks	50= (30+20) (ETE + IA)
L	2
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**PRACTICALS**

- 1 Study of museum specimens and slides relevant to invertebrates studied in the theory.
- 2 Mounting /squash preparation-
  - (a) Prawn statocyst
  - (b) Pila- Ctenidium / Redula / Osphridium
  - (c) Earthworm- Septal nephridia
  - (d) Squash preparation onion root tip
- 3 **Dissection-**
  - (a) Earthworm- Digestive System, Nervous System, Reproductive System.
  - (b) Prawn- Nervous System, Appendages
  - (c) Pila- Nervous System
- 4 Exercise related to frog and chick embryology.
- 5 Exercise related to cell biology-
  - (a) Stages of mitotic and meiotic cell division
  - (b) Special types of Chromosome

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Class	B.Sc. Zoology (Honours)		
Semester/Year	I Year		
Subject & Subject Code	Zoology Honours - BZOOL20Y104		
Paper	Ecology, Animal Behaviors and Evolution Paper - III		
Max. Marks	30(ETE) + 20(IA) = 50		
Credit	Total Credits		
L	T	P	4
3	1	0	

**Course Objectives:**

1. To study individual organisms and populations, as well as their relationships to each other and the environment, with the core foundation of evolution and ecology.
2. To comprehend the genetics, anatomy, physiology and behavior along with other specialized fields of interest.
3. To comprehend the basic phylogenetic relationships of the major groups of vertebrates
4. To comprehend and analyze the adaptive changes that have occurred in invertebrates & vertebrates
5. To comprehend and analyze the changes in homologous structures which accompanied the invasion of terrestrial habitats by vertebrates.
6. To recognize, describe, and point out the external and internal features that characterize the major groups of modern day vertebrate & invertebrates.

**Course Outcome:**

At the end of the course, learners will be able to:

1. Identify and critically evaluate their own beliefs, values and actions in relation to professional and societal standards of ethics and its impact on ecosystem and biosphere due to the dynamics in population.
2. Understand anticipate, analyse and evaluate natural resource issues and act on a lifestyle that conserves nature.
3. Understand and appreciates the diversity of ecosystems and applies beyond the syllabi to understand the local lifestyle and problems of the community.
4. Link the intricacies of food chains, food webs and link it with human life for its betterment and for non-exploitation of the biotic and abiotic components.
5. Learn working in nature to save environment will help development of leadership skills to promote betterment of environment.
6. Learn Distribution of fauna in different realms interaction .
7. Understand Animal behaviour and response of animals to different instincts.

**Student Learning Outcomes (SLO):**

Students will:

1. Familiarize with various stages involved in the developing embryo.
2. Apply the knowledge to collect various Biological data.
3. Understand the initial development al procedures involved in Amphioxus, frog and chick.
4. Familiarize with types of placenta.
5. Explain various Prenatal Diagnosis.
6. Familiarize with the principle of developmental biology.

Unit	Syllabus	Periods
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UNIT - I	<p><b>Ecology:</b>  Concept of Biosphere (Lithosphere, Hydrosphere and atmosphere). Ecosystem: Definition, structure and function of typical ecosystem Structure (Abiotic and Biotic) and function ( Energy flow Biogeochemical cycle) of fresh water, grassland, desert and forest ecosystems.  Community structure and its ecological succession. Pollution and its hazards (air, water and sound). Wild-life conservation: Types and measures, National Parks and Sanctuaries.</p>	15	
UNIT - II	<p><b>Animal Behaviour:</b>  Scope of Ethology, Innate and learned behaviour.  Social behaviour in insects.  Parental care in fishes and amphibia.  Brooding, nesting and migratory behaviour in birds.  Concept of Biological clock.</p>	15	
UNIT - III	<p><b>Biometry:</b>  Scope and application of the followings statistical method in Biology.  Normal distribution and its attribution range, mode, median and arithmetic mean.  Standard error, standard deviation, Simple test and Chi-square test.</p>	15	
UNIT - IV	<p><b>Evolution:</b>  Sources of hereditary variation and their role in evolution.  theory of Natural selection &amp; Neo-Darwinism.  and their role in evolution.</p>	<p>Darwin's  Isolating mechanisms</p>	15
UNIT - V	<p><b>Genetics:</b>  Structure and function of DNA.  and function of RNA.  Mutation.  Linkage and Crossing over.</p>	<p>Structure  Gene</p>	15

#### Text Books-

- 1 Principles of Biochemistry by A.L. Lehninger.
- 2 Fundamental of Biochemistry by J.L. Jain
- 3 Animal Behavior: An Evolutionary Approach. Tenth Edition. By Alcock, J. 2013.
- 4 Exploring Animal Behavior: Readings from American Scientist. Sixth Edition by Sherman, P.W. and J. Alcock. 2013.
- 5 Principles of Animal Behavior, Third Edition (2013), by Lee Alan Dugatkin.
- 6 Animal Behavior: Mechanisms, Ecology, and Evolution by Drickamer, Lee C., Stephen H. Vessey, and Elizabeth Jakob. 2002. Fifth edition. McGraw-Hill Publishers.

#### Reference Books-

- 1 Fundamentals of Ecology by E. P. Odum, 2016
- 2 Animal Behavior: An Evolutionary Approach by John Alcock.
- 3 "The Behavior of Animals: Mechanisms, Function And Evolution" by Luc-Alain Giraldeau and Johan Bolhuis

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Class	B.Sc. Zoology (Honours)			
Year	I Year			
Subject & Subject Code	Practical Zoology Honours- BZOO20Y105			
Paper	Paper III, Practical			
Max. Marks	50= (30+20) (ETE + IA)			
L	T	P	1	
0	0	1		

**PRACTICALS**

- 1 Analysis of soil / pond biota.
- 2 Determination of dissolved oxygen and Ph of different water samples.
- 3 Calculation of the arithmetic mean and standard deviation of the samples provided.
- 4 Community structure of Grassland study.
- 5 Determine Moisture content of soil sample.

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