

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's  
**New Arts, Commerce, and Science College**  
**Ahmednagar (Autonomous)**  
(Affiliated to Savitribai Phule Pune University, Pune)



**National Education Policy (NEP)**  
**Choice Based Credit System (CBCS)**

**Programme Framework**  
**B. Sc. - I (Zoology)**

**Implemented from**  
**Academic Year 2024-25**

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's  
**New Arts, Commerce and Science College, Ahmednagar**  
**(Autonomous)**  
**Board of Studies in Zoology**

Sr. No.	Name	Designation
1.	Prof. Dr. S. N. Pokale	Chairman
2.	Dr. Harkal A. D.	Member
3.	Mr. Wakchoure G. G.	Member
4.	Ms. Devdhe G. R.	Member
5.	Ms. Dongare P. N.	Member
6.	Ms. Kalhapure P. P.	Member
7.	Ms. Mhaske S. S.	Member
8.	Hon. Prof. R. J. Chavan	Academic Council Nominee
9.	Hon. Prof. S. S. Nanware	Academic Council Nominee
10.	Hon. Dr. S. S. Teradalkar	Vice-Chancellor Nominee
11.	Hon. Prof. B. A. Pawar	Alumni
12.	Hon. Ms. Manjushree Tadvalkar	Industry Expert

### 1.Prologue/ Introduction of the programme:

Zoology stands as a foundational discipline within the realm of Basic Sciences, delving comprehensively into the intricacies of animal biology. Encompassing a diverse array of captivating subjects, it requires students to grasp a broad spectrum of topics to stay abreast of developments in Life Sciences. The undergraduate Zoology program at New Arts, Commerce, and Science College, Ahmednagar (Autonomous), is meticulously crafted by the Board of Studies to cater to the multifaceted needs of budding zoologists. Aligned with the directives of the University Grants Commission, New Delhi, this curriculum, crafted in accordance with the National Education Policy 2020, seamlessly integrates classical Zoology fundamentals with cutting-edge specialized domains.

The syllabus is meticulously structured to provide students with a progressively broader understanding of the subject as they advance through each year of the degree program. To enrich their learning experience, the curriculum incorporates field trips, educational visits, and project work, facilitating the practical application of classroom theory. Upon completion of the program, students are expected to develop a profound comprehension and appreciation for various aspects, including animal diversity, practical applications of Zoology, cellular and organismal structure, functions, life processes, evolutionary significance, and fundamental principles of human health.

Through hands-on laboratory sessions, fieldwork, and project assignments, students will gain valuable insights into both theoretical concepts and practical methodologies. The introduction of this revised syllabus for B.Sc. Zoology I is the result of collaborative efforts involving input from all stakeholders, aimed at enhancing its relevance and effectiveness. Scheduled for implementation from the academic year 2024-2025, the course will adhere to the Semester mode prescribed by the National Education Policy 2020, tailored specifically to meet the unique needs of B.Sc. Zoology students. Embracing the evolving landscape of Life Sciences, the contents of the syllabus are thoughtfully curated to accommodate the expanding horizons of the discipline, reflecting the evolving demands and aspirations of students.

This curriculum design is tailored to foster holistic student development. Credit calculation and CGPA determination will adhere strictly to Academic Council guidelines. By striking a balance between traditional and practical elements, the B.Sc. Zoology program offers students a comprehensive understanding of the subject. Through this updated curriculum, students will cultivate proficiency in scientific instrument operation, laboratory planning, and execution, as well as honing critical thinking, independent reasoning, and problem-solving abilities.

## **2. Programme Outcomes (POs)**

**Comprehensive Understanding:** Students will possess a deep understanding of the principles and concepts of Zoology, including Animal Physiology, Cell and Molecular Biology, Immunology and Developmental Biology.

**Analytical Skills:** Students will develop strong analytical skills, enabling them to critically analyze complex biological systems, genetic mechanisms, and ecological interactions in diverse animal species.

**Practical Proficiency:** Students will be proficient in laboratory techniques, fieldwork methodologies, and experimental design, allowing them to conduct scientific investigations effectively and ethically.

**Integration of Knowledge:** Students will integrate knowledge from multiple disciplines within Zoology, such as Genetics, Biochemistry and Ecology to address contemporary issues in Animal Biology and Conservation.

**Research Competence:** Students will have the ability to design and execute independent research projects, applying quantitative and qualitative methods to address scientific questions and contribute to the advancement of Zoological knowledge.

**Communication Skills:** Students will communicate scientific information effectively through written reports, oral presentations, and visual media, catering to both scientific and non-scientific audiences.

**Ethical Awareness:** Students will demonstrate ethical awareness and responsibility in their professional practice, including considerations for animal welfare, conservation ethics, and the responsible conduct of research.

**Interdisciplinary Collaboration:** Students will collaborate effectively with professionals from diverse disciplines, including Biologists, Ecologists, Veterinarians, and Policymakers, to address complex challenges in Zoology and related fields.

**Community Engagement and Outreach:** Students will engage with local communities, conservation organizations, and educational institutions to promote public awareness of Zoological issues, foster environmental stewardship, and contribute to biodiversity conservation efforts.

**B. Sc. Programme Framework: Credit Distribution**

Level / Difficulty	Sem	Subject-1 (Selected as Major)						Subject-2		Subject-3		(SEC)	GE/OE		IKS	AEC	VEC	CC	Total
		T		P				T	P	P	T	P	T	P					
Certificate 4.5 / 100	I	02		02				02	02	02	02	-	02		02	02	02	02	22
	II	02		02				02	02	02	02	02	-	02		--	02	02	02
		Credits Related to Major						Selected as Minor											
		Core		Elective		VSC	FP / OJT / CEP/ RP												
		T	P	T	P	P	P	T	P	-	P	T	P	-	-	-	-	-	
Diploma 5.0 / 200	III	04	02	--		02	02	02	02	-	02	02		-	02	-	02	22	
	IV	04	02	--		02	02	02	02	-	02		02	--	02	-	02	22	
Degree 5.5 / 300	V	06	04	02	02	2	2	02	-	-	-	-	-	02	-	-	-	22	
	VI	06	04	02	02	2	4	02	-	-	-	-	-	-	-	-	-	22	
<b>Total</b>		<b>24</b>	<b>16</b>	<b>04</b>	<b>04</b>	<b>08</b>	<b>10</b>	<b>10</b>	<b>08</b>	<b>04</b>	<b>04</b>	<b>06</b>	<b>08</b>	<b>04</b>	<b>08</b>	<b>04</b>	<b>08</b>	<b>132</b>	
6.0/400 Honours	VII	08	06	02	02	-	RM-04											22	
	VIII	08	06	02	02		OJT-04											22	
6.0/400 Honours with Research	VII	06	04	02	02		RM-04 RM-04											22	
	VIII	06	04	02	02		RM-08											22	
<b>Total</b>		<b>40/36</b>	<b>28/24</b>	<b>08</b>	<b>08</b>	<b>08</b>	<b>18/26</b>	<b>10</b>	<b>08</b>	<b>04</b>	<b>04</b>	<b>06</b>	<b>04</b>	<b>04</b>	<b>04</b>	<b>08</b>	<b>04</b>	<b>08</b>	<b>176</b>

**B.Sc. Programme Framework: Course Distribution**

Level / Difficulty	Sem	Subject-1 (Selected as Major)						Subject-2		Subject-3		(SEC)	GE/OE		IKS	AEC	VEC	CC	Total
		T		P				T	P	P	T	P	T	P					
Certificate 4.5 / 100	I	01		01				01	01	01	01	-	01		01	01	01	01	11
	II	01		01				01	01	01	01	01	-	01	--	01	01	01	11
		Credits Related to Major						Selected as Minor											
		Core		Elective		VSC	FP / OJT / CEP / RP												
		T	P	T	P	P	P	T	P	-	P	T	P	-	-	-	-	-	
Diploma 5.0 / 200	III	02	01	--		01	FP-01	01	01	-	01	01		-	01	-	01	11	
	IV	02	01	--		01	CEP-01	01	01	-	01		01	--	01	-	01	11	
Degree 5.5 / 300	V	03	02	01	01	01	FP-01	01	-	-	-	-		01	-	-	-	11	
	VI	03	02	01	01	01	OJT-01	01	-	-	-	-		-	-	-	-	10	
<b>Total</b>		<b>12</b>	<b>08</b>	<b>02</b>	<b>02</b>	<b>04</b>	<b>04</b>	<b>06</b>	<b>04</b>	<b>02</b>	<b>02</b>	<b>03</b>	<b>04</b>	<b>02</b>	<b>04</b>	<b>02</b>	<b>04</b>	<b>65</b>	
6.0/400 Honours	VII	03	03	01	01	-	RM-01											09	
	VIII	03	03	01	01		OJT-01											09	
6.0/400 Honours with Research	VII	02	02	01	01		RM-01 RM-01											08	
	VIII	02	02	01	01		RM-01											07	
<b>Total</b>		<b>18/16</b>	<b>14/12</b>	<b>04</b>	<b>04</b>	<b>04</b>	<b>06/07</b>	<b>06</b>	<b>04</b>	<b>02</b>	<b>02</b>	<b>03</b>	<b>04</b>	<b>02</b>	<b>04</b>	<b>02</b>	<b>04</b>	<b>83/80</b>	

**B. Sc. -Zoology: Credit and Course Distribution in Brackets**

Level / Difficulty	Sem	Subject-1							Total
		T		P					
4.5	I	02 (01)		02 (01)				04(02)	
	II	02 (01)		02 (01)				04(02)	
		Credits Related to Major							
		Core		Elective		VSC	FP / OJT/ CEP	IKS	
		T	P	T	P	P	P	T	
5.0	III	04(02)	02(01)	--		02(01)	FP-02(01)		10(05)
	IV	04(02)	02(01)	--		02(01)	CEP-02(01)		10(05)
5.5	V	06(03)	04(02)	02(01)	02(01)	02(01)	FP-02(01)	02(01)	20 (10)
	VI	06(03)	04(02)	02(01)	02(01)	02(01)	OJT-04(01)		20(09)
<b>Total</b>		<b>12</b>	<b>08</b>	<b>(02)</b>	<b>(02)</b>	<b>04</b>	<b>04</b>	<b>(01)</b>	<b>33</b>
6.0	VII	03	03	(01)	(01)	-	RM-04(01)		22(09)
	VIII	03	03	(01)	(01)		OJT-04(01)		22(09)
6.0	VII	(02)	(02)	(01)	(01)		RM-04(01) RP-04(01)		22(08)
	VIII	(02)	(02)	(01)	(01)		RM-08(01)		22(07)
		<b>18/16</b>	<b>14/12</b>	<b>04</b>	<b>04</b>	<b>04</b>	<b>06/07</b>	<b>(01)</b>	<b>51/48</b>

## Programme Framework (Courses and Credits): B. Sc. Zoology

Sr. No.	Year	Semester	Level	Course Type	Course Code	Title	Credits
1.	I	I	4.5	DSC-01	BS-ZO 111T	Animal Physiology	02
2.	I	I	4.5	DSC-02	BS-ZO 112P	Practicals in Animal Physiology	02
3.	I	II	4.5	DSC-03	BS-ZO 121T	Cell and Molecular Biology	02
4.	I	II	4.5	DSC-04	BS-ZO 122P	Practicals in Cell and Molecular Biology	02
5.	II	III	5.0	DSC-05	BS-ZO 231T	Animal Systematics and Diversity-I	02
6.	II	III	5.0	DSC-06	BS-ZO 232T	Immunology	02
7.	II	III	5.0	DSC-07	BS-ZO 233P	Practical Zoology-I	02
8.	II	III	5.0	VSC-01	BS-ZO 234P	Practical Zoology-II	02
9.	II	III	5.0	FP-01	BS-ZO 235T	Field Project	02
10.	II	IV	5.0	DSC-08	BS-ZO 241T	Animal Systematics and Diversity -II	02
11.	II	IV	5.0	DSC-09	BS-ZO 242T	Tools and Techniques in Zoology	02
12.	II	IV	5.0	DSC-10	BS-ZO 243P	Practical Zoology-III	02
13.	II	IV	5.0	VSC-02	BS-ZO 244T	Practical Zoology-IV	02
14.	II	IV	5.0	CEP-01	BS-ZO 245P	Community Engagement Project	02
15.	III	V	5.5	DSC-11	BS-ZO 351T	Developmental Biology	02
16.	III	V	5.5	DSC-12	BS-ZO 352T	Principles of Genetics	02
17.	III	V	5.5	DSC-13	BS-ZO 353T	Applied Zoology	02
18.	III	V	5.5	DSC-14	BS-ZO 354P	Practical Zoology-V	02
19.	III	V	5.5	DSC-15	BS-ZO 355P	Practical Zoology-VI	02
20.	III	V	5.5	DSE-01	BS-ZO 356T(A)	Entomology	02
	III	V	5.5	DSE-01	BS-ZO 356T(B)	Parasitology	02
21.	III	V	5.5	DSE-02	BS-ZO 357P(A)	Practical Zoology-VII(A)	02
22.	III	V	5.5	DSE-02	BS-ZO 357P(B)	Practical Zoology-VII(B)	02
23.	III	V	5.5	VSC-03	BS-ZO 358P	Histology	02
24.	III	V	5.5	FP-02	BS-ZO 359P	Field Project	02
25.	III	V	5.5	IKS-02	BS-ZO 360T	IKS (Zoology)	02
26.	III	VI	5.5	DSC-16	BS-ZO 361T	Biochemistry	02
27.	III	VI	5.5	DSC-17	BS-ZO 362T	Environmental Physiology	02
28.	III	VI	5.5	DSC-18	BS-ZO 363T	Immunology	02
29.	III	VI	5.5	DSC-19	BS-ZO 364P	Practical Zoology-VIII	02
30.	III	VI	5.5	DSC-20	BS-ZO 365P	Practical Zoology-IX	02
31.	III	VI	5.5	DSE-03	BS-ZO 366T(A)	Organic Evolution	02
32.	III	VI	5.5	DSE-03	BS-ZO 366T(B)	Ecology	
33.	III	VI	5.5	DSE-04	BS-ZO 367P(A)	Practical ZoologyX	02
34.	III	VI	5.5	DSE-04	BS-ZO 367P(B)	Practical Zoology-XI	
35.	III	VI	5.5	VSC-04	BS-ZO 368T	Laboratory Techniques in Biochemistry	02
36.	III	VI	5.5	OJT-01	BS-ZO 369P	On-job Training	04



**B. Sc. Zoology (Honours)**

37.	IV	VII	6.0	DSC-21	BS-ZO 471T	Comparative Animal Physiology	03
38.	IV	VII	6.0	DSC-22	BS-ZO 472T	Cell and Molecular Biology	03
39.	IV	VII	6.0	DSC-23	BS-ZO 473T	Economic Zoology	02
40.	IV	VII	6.0	DSC-24	BS-ZO 474P	Zoology Practical Paper - XIII	02
41.	IV	VII	6.0	DSC-25	BS-ZO 475P	Zoology Practical Paper - XIV	02
42.	IV	VII	6.0	DSC-26	BS-ZO 476P	Zoology Practical Paper - XV	02
43.	IV	VII	6.0	DSE-05	BS-ZO 477T	Biochemistry/Metabolic Pathways	02
44.	IV	VII	6.0	DSE-06	BS-ZO 478P	Zoology Practical Paper - XVI	02
45.	IV	VII	6.0	RM-01	BS-ZO 479T	Research Methodology	04
46.	IV	VIII	6.0	DSC-27	BS-ZO 481T	Genetics and Biostatistics	03
47.	IV	VIII	6.0	DSC-28	BS-ZO 482T	Endocrinology and Bioinformatics	03
48.	IV	VIII	6.0	DSC-29	BS-ZO 483T	Developmental Biology	02
49.	IV	VIII	6.0	DSC-30	BS-ZO 484P	Zoology Practical Paper - XVII	02
50.	IV	VIII	6.0	DSC-31	BS-ZO 485P	Zoology Practical Paper - XVIII	02
51.	IV	VIII	6.0	DSC-32	BS-ZO 486P	Zoology Practical Paper - XIX	02
52.	IV	VIII	6.0	DSE-07	BS-ZO 487T	Ethology	02
53.	IV	VIII	6.0	DSE-08	BS-ZO 488P	Zoology Practical Paper - XX	02
54.	IV	VIII	6.0	OJT-02	BS-ZO 489P	On Job Training	04

**B. Sc. Zoology (Honours with Research)**

34.	IV	VII	6.0	DSC-21	BS-ZO 471T	Comparative Animal Physiology	03
35.	IV	VII	6.0	DSC-22	BS-ZO 472T	Cell and Molecular Biology	03
36.	IV	VII	6.0	DSC-23	BS-ZO 473P	Zoology Practical Paper- XIII	02
37.	IV	VII	6.0	DSC-24	BS-ZO 474P	Zoology Practical Paper-XIV	02
38.	IV	VII	6.0	DSE-05	BS-ZO 475T	Biochemistry / Metabolic Pathway	02
39.	IV	VII	6.0	DSE-06	BS-ZO 476P	Zoology Practical Paper- XV	02
40.	IV	VII	6.0	RM-01	BS-ZO 477T	Research Methodology	04
41.	IV	VII	6.0	RP-01	BS-ZO 478P	Research Project	04
42.	IV	VIII	6.0	DSC-19	BS-ZO 481T	Genetics and Biostatistics	03
43.	IV	VIII	6.0	DSC-20	BS-ZO 482T	Endocrinology and Bioinformatics	03
44.	IV	VIII	6.0	DSC-21	BS-ZO 483P	Zoology Practical Paper- XVI	02
45.	IV	VIII	6.0	DSE-04	BS-ZO 484P	Zoology Practical Paper- XVII	02
46.	IV	VIII	6.0	DSE-07	BS-ZO 485T	Developmental Biology/ Ethology	02
47.	IV	VIII	6.0	DSE-08	BS-ZO 486P	Zoology Practical Paper- XVIII	02
48.	IV	VIII	6.0	PR-02	BS-ZO 487P	Research Project	08

**Ahmednagar Jilha Maratha Vidya Prasarak Samaj's  
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(Autonomous)  
Syllabus  
B. Sc. -I (Zoology)**

Title of the Course Animal Physiology								
Year: I				Semester: I				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-01	BS-ZO 111T	02	00	02	30	15	35	50

**Learning Objectives:**

1. To understand the physiology of digestion, respiration and circulation.
2. To understand the physiology of excretion, locomotion and reproduction.
3. To understand the mechanism of signalling and coordination

**Course Outcomes (Cos)**

After completion of this course students will be able to:

1. Understand the physiology of digestion, respiration and circulation.
2. Understand the physiology of excretion, locomotion and reproduction.
3. Understand the mechanism of signalling and coordination

**Detailed Syllabus:**

Unit	Name of topic	Lectures Allotted
1.	<b>An introduction to Animal Physiology</b> The body fluids of animals Concept of Homeostasis, Acclimation and Acclimatization	(01)
2.	<b>Nutrition and Digestion</b> Anatomy of Mammalian Digestive System Physiology of Digestion : Enzymes and Hormones	(03)
3.	<b>Ventilation and Gas Exchange</b> Anatomy of Mammalian Respiratory System Lung ventilation Structure and Function of Haemoglobin Transport of gases: O <sub>2</sub> and CO <sub>2</sub> transport	(03)
4.	<b>Circulation</b>	(04)

Blood: Definition and its constituents, functions of blood, blood clotting

Heart: Structure of human heart, Cardiac Cycle

Blood Vessels types: Arteries and Veins.

Portal System, ECG

**5. Excretion (04)**

Structure of Mammalian Kidney, Structure and function of Nephron

Mechanism of urine formation

Acid-Base Balance

**6. Muscle physiology (04)**

Types of Muscles, Microscopic structure of skeletal muscles.

Sliding filament theory

Muscle twitch, Summation, Tetanus

**7. Reproduction (04)**

Structure of Male and Female Reproductive System (Rat)

Hormones of Testes and Ovaries

**8. Endocrine System (03)**

Major Endocrine Glands their Hormones and Functions (Hypothalamus, Pituitary,

Thyroid, Adrenal)

**9. Nervous Control and Coordination (04)**

Structure of Nerve Cell, Types of Nerve Cell

Action Potential: Impulse generation and conduction, Resting Membrane Potential

Synapses: Types and transmission

**Suggested Readings/Material:**

**1.Introduction to Animal Physiology**, Ian Kay, 2000, Bios Scientific Publishers Limited.

**2.Textbook of Medical Physiology**, Guyton A. C. & Hall J. E., 2006, 11th Edition, Hercourt Asia Pvt. Ltd. / W. B. Saunders Company

**3.Principles of Anatomy and Physiology** Tortora, G. J. and Derrickson, B. H. (2009) (12th edition) John Wiley and Sons, Inc.

**4.Human physiology**, Vol. I & II, 1980, 12th Edn. Dr. C. C. Chatterjee, Medical Applied Agency, Kolkata

**5.Text book of Animal Physiology**, 2008, 2nd Edn. Nagabhushanam, S. V. S. Rana, S. Kalavathy, Oxford University Press, India.

**6.Animal Physiology: Adaptation and Environment**, 1997, Schmidt-Nielsen, Knut, Cambridge University Press.

**7.General and Comparative Physiology**, 1983, 3rd Edn., Hoar W. S., Prentice Hall, UK.7.

**8.Medical Physiology**, 2006, Asis Das, Books and Allied Pvt. Ltd., Kolkata.

**9.Endocrinology**, 2005, Lohar P. S., M J P Publishers, Chennai.

**10.Vander, Sherman, Luciano's Human Physiology: The Mechanisms of Body Function**, 2003,9 th Edn., Eric P. Widmaier, Hershel Raff, Kevin T. Strang, McGraw H.

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Title of the Course Practicals in Animal Physiology								
Year: I				Semester: I				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-02	BS-ZO 112P	00	02	02	60	15	35	50

**Learning Objectives:**

1. To understand tools and techniques in Haematology
2. To understand methods of urine analysis
3. To understand basic methodologies in Physiology

**Course Outcomes (Cos):**

After completion of this course students will be able to:

1. Learn tools and techniques in Haematology
2. Analyze the urine samples for various parameters
3. Learn basic methodologies in Physiology

**Detailed Syllabus: (Any 12)**

Unit	Name of topic	Practical Allotted
1.	Haemoglobin estimation using Sahli's Haemoglobinometer	(01)
2.	Preparation of Haemin and Haemochromogen crystals	(01)
3.	Estimation of bleeding and clotting time	(01)
4.	Detection of blood groups in human being	(01)
5.	Qualitative detection of nitrogenous waste products (Ammonia, urea, uric acid) in given sample	(01)
6.	Measurement of lung capacity	(01)
7.	Mapping of taste areas on Human tongue	(01)
8.	Normal and abnormal constituents of human urine	(01)
9.	Understanding pH profile of Gastro-intestinal tract	(01)
10.	Detection of carbohydrates in Mammalian gut	(01)
11.	Detection of lipids in Mammalian gut	(01)

12. Detection of proteins in Mammalian gut (01)
13. Temporary preparation of smooth and striated muscle (01)
14. Detection of allantoin in Mammalian urine (01)

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Title of the Course Cell and Molecular Biology								
Year: I				Semester: II				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-03	BS-ZO121T	02	00	02	30	15	35	50

**Learning Objectives:**

1. To understand cell structure and function
2. To understand mechanism of cell division
3. To understand mechanism and significance of various cell communication
4. To understand the structure and function of nucleic acids and
5. To understand fundamental principles of Molecular biology

**Course Outcomes (Cos)**

After completion of this course students will be able to:

1. Describe the structure and functions of cell and cell organelles.
2. Explain the process of cell division.
3. Discuss the role of cells in tissue organization, cell communication and development.
4. Analyze and describe the central dogma of Molecular biology

**Detailed Syllabus:**

Unit	Name of topic	Practical Allotted
1.	<b>Cell Structure and Function</b> Overview of the Cell Theory Cell Membrane : Structure and Function Organelles: Structure and Function (Nucleus, Endoplasmic Reticulum, Golgi Apparatus, Lysosomes , Mitochondria) Cytoskeleton: Microtubules, Microfilaments, Intermediate Filaments	(09)
2.	<b>Cell Division</b> Cell Cycle Phases (G1, S, G2, M) Mitosis: Stages and Significance Meiosis: Stages and Significance	(04)

- 3. Cell Signaling (03)**  
Introduction to Cell Signaling Pathways  
Types of cell Signaling (Autocrine, Paracrine, Endocrine, Juxtacrine)  
Signal Transduction Mechanisms (Receptor Activation, Intracellular Signaling Cascades)
- 4. Cell Communication and Cell-to-Cell Interactions (02)**  
Intercellular junctions: Gap junctions, Desmosomes, Tight junctions  
Cell Adhesion Molecules
- 5. Nucleic Acid Structure and Function (03)**  
DNA : Structure and Function  
RNA: Structure and Types (mRNA, tRNA, rRNA)  
Genome Organization
- 6. Central dogma of molecular biology ( with respect to Prokaryotes) (09)**  
DNA Replication: Mechanism, Enzymes involved, Fidelity and Accuracy  
Transcription: Initiation, Elongation, Termination, RNA Polymerase  
Translation: Genetic Code, Ribosomes, tRNA , Initiation, Elongation, Termination

**Suggested Readings/Material:**

- 1. Molecular Biology of the Cell.** Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., & Walter, P. (2008). Garland Science.
- 2. The Cell: A Molecular Approach.** Cooper, G. M. (1997). ASM Press.
- 3. Molecular Cell Biology.** Lodish, H., Baltimore, D., Berk, A., Zipursky, L., Matsudaira, M., & Darnell, J. (1995). Scientific American and W. H. Freeman.
- 4. Cell and Molecular Biology.** De Robertis, E. D. P., & De Robertis, E. M. E. (1987). Lea and Febiger.
- 5. Molecular Biology of the Gene.** Watson, J. D., Baker, T., Bell, S. P., Gann, A., Levine, M., & Lodwick, R. (2004). Pearson Education, Inc. and Dorling Kindersley Publishing, Inc.
- 6. Molecular Biology.** Weaver, R. (2007). McGraw-Hill Science.



7. **Molecular Biology of the Cell.** Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K., & Johnson, A. (2004). Garland Publishing.
8. **Essential Cell Biology.** Alberts, B., Bray, D., Hopkin, K., Johnson, A., Lewis, J., Raff, M., Roberts, K., & Walter, P. (2003). Garland Publishing.
9. **Gene X.** Lewin, B. (2010). Jones and Bartlett Inc.
10. **Molecular Biology.** De Robertis, E. D. P., & De Robertis, E. M. E.
11. **Cell Biology.** Karp, G. (2010). John Wiley and Sons (Asia) Pte Ltd.

**Ahmednagar Jilha Maratha Vidya Prasarak Samaj's  
New Arts, Commerce and Science College, Ahmednagar  
(Autonomous)  
Syllabus  
B. Sc. -I (Zoology)**

Title of the Course: Practicals in Cell and Molecular Biology								
Year: I				Semester: II				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-04	BS-ZO 122P	00	02	02	60	15	35	50

**Learning Objectives:**

1. To understand tools and techniques in cell biology
2. To understand the structure and functions of cells
3. To understand methods of nucleic acid extraction and quantitative estimation

**Course Outcomes (Cos)**

After completion of this course students will be able to:

1. Learn tools and techniques in cell biology
2. Learn isolation of cell and cell organelles
3. Learn basic methodologies in Molecular Biology

**Detailed Syllabus: (Any 12)**

Unit	Name of topic	Practical Allotted
1.	Microscopy: Basic principle and components of microscope (simple and compound)	(01)
2.	Measurement of the length and breadth of the given cell sample by using micrometer.	(01)
3.	To study mitotic cell division using onion root tip cells	(01)
4.	To study meiotic cell division in grasshopper testis/onion floral buds/Aloe Vera	(01)
5.	To isolate mitochondria from the given sample by cell fractionation	(01)
6.	Staining and visualization of mitochondria by Janus Green stain	(01)
7.	To isolate nuclei from the given sample by cell fractionation	(01)
8.	Staining and visualization of nuclei by Acetocarmine	(01)
9.	Observation of Barr Bodies in Human Female Buccal Epithelial Cells	(01)

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|------------|---|-------------|
| <b>10.</b> | Isolation of cellular DNA from liver/bacteria | <b>(01)</b> |
| <b>11.</b> | Protein separation by SDS- PAGE (D)           | <b>(01)</b> |
| <b>12.</b> | Preparation of DNA paper model                | <b>(01)</b> |
| <b>13.</b> | DNA estimation by Diphenyl Amine method       | <b>(01)</b> |
| <b>14.</b> | Cell viability study by Trypan Blue staining  | <b>(01)</b> |
| <b>15.</b> | Effect of osmolarity on RBCs                  | <b>(01)</b> |
| <b>16.</b> | Study of cell organelles using micrographs    | <b>(01)</b> |