Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Structure and Curriculum of Four Year Multidisciplinary Degree (Honors/Research) Programme with Multiple Entry and Exit option

Undergraduate Programme of Science and Technology

B.Sc. (Honors/Research) in Zoology

Board of Studies

in

Zoology

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

W.e.f. June, 2023

(In Accordance with NEP-2020)

Review Statement

The NEP Cell reviewed the Curriculum of **B.Sc. (Honors/Research) in Zoology** Programme to be effective from the **Academic Year 2023-24.** It was found that, the structure is as per the NEP-2020 guidelines of Govt. of Maharashtra.

Date: 09/08/2023

Place: Latur

NEP CELL

Rajarshi Shahu Mahavidyalaya, Latur

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CERTIFICATE

I hereby certify that the documents attached are the Bonafide copies of the Curriculum of **B.Sc. (Honors/Research) in Zoology** Programme to be effective from the **Academic Year 2023-24.**

Date: 08/08/2023

Place: Latur

Dr. D.S. Rathod
Chairperson
Board of Studies in Zoology

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Members of Board of Studies in the Subject Zoology

Under the Faculty of Science and Technology

Sr. No.	Name	Designation	In position
1	**Dr. D.S.Rathod** Head, Department of Zoology Rajarshi Shahu Mahavidyalaya (Autonomous), Latur	Chairperson	HoD
2	**Prof. S. P .Chavan** Director, School of Life Science Swami Ramanand Teerth Marathwada University, Nanded	Member	V.C. Nominee
3	**Prof. Ragvender Rao** Walchand Centre for Research in Nanotechnology & Bio-Nanotechnology Walchand College of Arts and Science, Ashok Chowk, Solapur – 413006 Maharashtra, India	Member	Academic Council Nominee
4	**Dr. Mamidala Estari** Head, Department of Zoology, Infectious Diseases & Metabolic Disorders Research Lab, Kakatiya University, Hanumakonda-506 009. Telangana State, India.	Member	Academic Council Nominee
5	**Prof. D. H. Jadhav** Head, Department of Zoology Maharashtra Mahavidyalaya, Nilanga	Member	Expert from outside for Special Course
6	**Mr. Ishrar Deshmukh** Pharma Pune, Maharashtra, India	Member	Expert from Industry
7	**Dr. Vinay Biradar** Department of Zoology, Savitribai Phule University ,Pune	Member	P.G. Alumni
8	**Dr. K. S. Raut**	Member	Faculty Member
	Mr. Datta Nalle	Member	Faculty Member
	Mrs. Dhanshree Jagtap	Member	Faculty Member
9	**Dr. A. A. Yadav**	Member	Member from same Faculty

From the Desk of the Chairperson…

The Department of Zoology was established in the year 1971. The department has been recognized by our parent University as Research center since 8th May 2003 and now it has been developed into center of teaching and research in Zoology.

To reach the mission of "Pursuit of Excellence" in higher education to make our students globally competent. The departmental staff is committed towards our work with dedication, determination and devotion.

National Education Policy NEP-2020 focuses more on practical rather than theoretical learning. It also focus on developing overall personality of students by incorporating Humanitarian and Constitutional values, creativity and critical thinking, harnessing innovation, use of modern technology and interaction with various stakeholders. It uses the practical based pedagogy to evolve and make education more experiential, holistic, integrated, learner-centric, flexible and developing skill etc. To skilled and trained students can accept the challenge of the future, as we know that the new policy also envisages the refinement and improvement in the Learning Outcome based Curriculum Framework.

The syllabus of B.Sc. I has been designed as per the National Education Policy (NEP), 2020, the present structure comprises Discipline specific courses (DSC), Discipline Specific Electives (DSE), Discipline Specific Minor Course (DSM), Generic/Open Electives (GE/OE), Vocational Specific Course (VSC), Skill Enhancement Course (SEC), Ability Enhancement Course (AEC) etc. The discipline specific courses (DSC) are compulsory and the elective courses can be chosen from the given Basket. Except Ability Enhancement courses, all other courses, comprise theory and practicals.

The project work is specially underlined in this structure. The project will mainly involve experimental work. The students will be asked their choice for project. The Generic Electives will be offered to the students of other departments of the college. The students will have the option to choose one generic elective from the given Basket. The generic elective comprises theory as well as practical. The students will also undertake one Vocational Specific Course (VSC) and one Skill Enhancement Course (SEC) of two credits each. The VSC and SEC also comprise theory and practicals. These courses will be chosen by the students from the concerned basket. One of the DSC is specified for Indian Knowledge Systems (IKS). Indian Knowledge Systems have a strong foundation in Indian Culture, Philosophy and Spirituality and have evolved through thousands of years.

B.Sc. Zoology course will help to understand the behaviour, structure and evolution of animals. Zoologists use a wide range of approaches to do this, from genetics to molecular and cellular biology, as well as physiological processes and anatomy, whole animals, populations, and their ecology. The scope of Zoology as a subject is very broad. The intention is to understand the subject of Zoology in the evolving biological paradigm in modern times; where, living beings need to be understood at the level of atomic interactions; and comparative systems of organisms need to be studied through the prism

of integrated chemical, physical, mathematical and molecular entities to appreciate the inner working of different organisms at morphological, cellular, molecular, interactive and evolutionary levels. The key areas of study within the disciplinary/subject area of Zoology comprise: animal diversity, principles of ecology, comparative anatomy and developmental biology of vertebrates, physiology and biochemistry, genetics and evolutionary biology, animal biotechnology, applied zoology, behaviour, immunology, reproductive biology, and insect, vectors and diseases. B.Sc. degree programme in Zoology also deals with skill enhancement courses such as apiculture, aquarium fish keeping, medical diagnostics, sericulture etc. The depth and breadth of study of individual topics dealt with would vary with the nature of specific Zoology programmes.

Our institution gives importance in mission to provide value and need based education which can be useful to students to get the skill for entrepreneurship and jobs or self-help for earnings. This institution is connected long back with anti-superstition activity to develop the scientific attitude among students. As a part of the efforts to enhance the interest and employability of graduates of Zoology programmes, the curricula for these programmes are expected to include learning experiences that offer opportunities for higher studies and research at reputed laboratories.

(**Dr. D. S. Rathod)**

Chairperson

Board of Studies in Zoology

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

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Shiv Chhatrapati Shikshan Sanstha's

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Faculty of Science and Technology

Structure for Four Year Multidisciplinary Undergraduate Degree Programme in Zoology

Multiple Entry and Exit (In accordance with NEP-2020)

Year & Level	Sem	Major		Minor	GE/OE	VSC/ SEC (VSEC)	AEC/ VEC	OJT,FP,CEP, RP	Credit per Sem.	Cum./Cr. per exit
		DSC	DSE							
1	**2**	**3**		**4**	**5**	**6**	**7**	**8**	**9**	**10**
I 4.5	I	DSC I: 04 Cr. DSC II: 04 Cr.	NA	NA	GE-I: 04 Cr.	VSC-I: 02 Cr. SEC-I: 02 Cr.	AEC-I MIL: 02 Cr. VEC-I: 02 Cr.	CC-I: 02 Cr. (NSS, NCC, Sports, Cultural)/ CEP-I: 02 Cr. (SES-I)/ OJT: 02 Cr. / Mini Project: 02 Cr.	22	44 Cr. UG Certificate
	II	DSC III: 04 Cr. DSC IV: 04 Cr.	NA	NA	GE-II: 04 Cr.	VSC-II: 02 Cr. SEC-II: 02 Cr.	AEC-II MIL: 02 Cr. VEC-II: 02 Cr.	Generic IKS: 02 Cr.	22	
	Cum. Cr.	16	-	-	08	04+04= 08	04+02 +02=08	04	44	
Exit Option: Award of UG Certificate in Major with 44 Credits and Additional 04 Credits Core NSQF Course/Internship or continue with Major and Minor										

Abbreviations:

1.	DSC	: Discipline Specific Core (Major)
2.	DSE	: Discipline Specific Elective (Major)
3.	DSM	: Discipline Specific Minor
4.	GE/OE	: Generic/Open Elective
5.	VSEC	: Vocational Skill and Skill Enhancement Course
6.	VSC	: Vocational Skill Courses
7.	SEC	: Skill Enhancement Course
8.	AEC	: Ability Enhancement Course
9.	MIL	: Modern Indian Languages
10.	IKS	: Indian Knowledge System
11.	FSRCE	: Fostering Social Responsibility & Community Engagement
12.	VEC	: Value Education Courses
13.	OJT	: On Job Training
14.	FP	: Field Projects
15.	CEP	: Community Engagement and Service
16.	CC	: Co-Curricular Courses
17.	RP	: Research Project/Dissertation
18.	SES	: Shahu Extension Services

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Department of Zoology

B.Sc. (Honors/Research) Zoology

Year & Level	Semester	Course Code	Course Title	Credits	No. of Hrs.
I 4.5	I	101ZOO1101 (DSC-I)	Life and Diversity of Non-chordates	03	45
		101ZOO1103	Lab Course-I	01	30
		101ZOO1102 (DSC-II)	Life and Diversity of Chordates	03	45
		101ZOO1104	Lab Course-II	01	30
		GE-I	From Basket	04	60
		101ZOO1501 (VSC-I)	Biochemical Techniques and Instrumentation	02	60
		(SEC-I)	From Basket	02	60
		(AEC-I)	From Basket	02	60
		(VEC-I)	Constitution of India	02	60
		AIPC/OJT-I	Mini Project	02	60
	Total Credits			**22**	
	II	101ZOO2101 (DSC-III)	Cell Biology	03	45
		101ZOO2103	Lab Course-III	01	30
		101ZOO2102 (DSC-IV)	Histology and Histochemistry	03	45
		101ZOO2104	Lab Course-IV	01	30
		GE-II	From Basket	04	60
		101ZOO2501 (VSC-II)	Sericulture Industry and Marketing	02	60
		(SEC-II)	From Basket	02	60
		(AEC-II)	From Basket	02	60
		(VEC-II)	FSRCE (CBPR)	02	60
		Generic IKS	Introduction to Indian Knowledge System	02	60
	Total Credits			**22**	
Total Credits (Semester I & II)				**44**	

Programme Outcomes (POs) for B.Sc. Programme	
PO No.	Upon completion of this programme the students will be able to
PO 1	The Students are expected to acquire the knowledge of animal Science, natural phenomenon, and manipulation of nature and environment by man.
PO 2	Understanding the scientific terms, concepts, facts, phenomenon and their interrelationship.
PO 3	Applications of the knowledge develop skills in practical work, experiments and laboratory materials.
PO 4	Students followed and understood general laboratory practice guidelines, including safety.
PO 5	They are able to handle instruments for basic and modern analysis.
PO 6	To develop scientific attitude which is the major objective this makes the students open minded, critical observations, curiosity, thinking etc.
PO 7	Abilities to apply scientific methods, collection of scientific data, problem solving.
PO 8	Students are expected to work.
PO 9	Utilize the developed expertise in concepts, theories, and emerging methodologies to succeed in tackling real-world issues in aquaculture and aquatic science.
PO 10	Demonstrate advanced knowledge and competency in taxonomy and natural history of aquatic flora and fauna.
PO 11	Demonstrate hands-on experience in aquatic sampling inventory and measurement techniques. Become an independent, self-motivated professional with the ability to recognize problems in their field of aquaculture and aquatic science and apply critical thinking and problem-solving skills.

Semester - I

Shiv Chhatrapati Shikshan Sanstha's

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Department of Zoology

Course Type: DSC-I

Course Title: DSC-I: Life and Diversity of Non chordates

Course Code: 101ZOO1101

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1.To understands general characters and classification of lower Invertebrates.

LO 2.To understand general characters and classification of Platy helminthes and Annelida

LO 3.To understand general characters and classification upto classes Phylum Onychophora, Arthropoda and Mollusca

LO 4.To understand relationship between these Phylum Echinodermata and Hemichordata

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Understand general characters and classification of lower Invertebrates

CO 2. Understand general characters and classification of Platy helminthes and Annelida

CO 3. Understand general characters and classification upto classes Phylum Onychophora, Arthropoda and Mollusca

CO 4. Comprehend relationship between these Phylum Echinodermata and Hemichordata

Unit No.	Title of Unit & Contents	Hrs.
I	General characters and classification of lower Invertebrates	**12 Hrs.**
	Phylum Protozoa: General characters and classification upto classes; Structure, lifecycle of Plasmodium, Malaria and its control measures. **Phylum Porifera:** General characters and classification upto classes; Canal system in Sponges **Phylum Cnideria:** General characters and classification upto classes ; Polymorphism in Coelenterates; Corals and Coral reef formation and their significance	
	Unit Outcome: UO 1. After completion of the unit the students will be able to Understand general characters and classification of lower Invertebrates	
II	General characters and classification of Platy helminthes and Annelida	**10 Hrs.**
	Phylum Platy helminthes: General characters and classification upto classes; life cycle of Fascicle hepatica,	

Unit No.	Title of Unit & Contents	Hrs.
	Phylum Nematohelminthes: General characters and classification up to classes; Life history of Ascaris lumbricoides and its parasitic adaptations **Phylum Annelida:** General characters and classification up to classes; Metamerism in Annelida; Significance of Hirudin of Leech	
	Unit Outcome: After completion of the unit the students will be able to understand general characters and classification of Platyhelminthes and Annelida	
III	General characters and classification upto classes Phylum Onychophora, Arthropoda and Mollusca	**11 Hrs.**
	Phylum Onychophora: General characters and classification upto classes. **Phylum Arthropoda:** General characters and classification upto classes : Cockroach type study **Phylum Mollusca:** General characters and classification classes;	
	Unit Outcome: UO 1. After completion of the unit the students will be able to understand general characters and classification upto classes Phylum Onychophora, Arthropoda and Mollusca	
IV	General characters and classification upto classes Phylum Echinodermata and Hemichordata	**12 Hrs.**
	Phylum Echinodermata: General characters and classification up to classes; Water-vascular system in Asteroidea; **Hemichordates and chordates.** Affinities of Balanoglossus with chordates and non-chordates.	
	Unit Outcome: UO 1. After completion of the unit the students will be able to comprehend relationship between these Phylum Echinodermata and Hemichordata	

Learning Resources:

1. Protozoa through Echinodermata, Kotpal Volumes Rastogi Publications
2. Invertebrate Zoology, Jordan &Verma (revised editions) S. Chand and Co. Ltd., New Delhi.
3. Biology of the Invertebrates, Jan Pechenik (2014). McGraw-Hill Science, 2014
4. Non-Chordate Zoology by Dhabi and Dhami Pradeep Publication, Opposite Sitla Mandir,Jalndhar-144008
5. Invertebrate Zoology (Multicolor Edition) By P.S. Verma

6. Textbook of Zoology Invertebrates-I, Parker and Haswell Paperback – 1 January 2021
7. Invertebrate Zoology, Author - E. L. Jorden and P. S. Verma.
8. Morden text book of Zoology Invertebrate, Author –R.L.Kotpal
9. https://www.google.co.in/books/edition/Invertebrate_Zoology_Multicolour_Edition/TAkrDAAAQBAJ?hl=en&gbpv=1&dq=invertebrate+zoology&printsec=frontcover
10. Handbook of Invertebrate Zoology for Laboratories and Seaside Work By William KeithBrooks https://www.google.co.in/books/edition/Handbook_of_Invertebrate_Zoology/pkUAAAAAQAAJ?hl=en&gbpv=1&dq=invertebrate+zoology&printsec=frontcover

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Department of Zoology

Course Type: Lab Course

Course Title: Lab Course –I (Based on DSC-I)

Course Code: 101ZOO1103

Credits: 01 **Max. Marks: 50** **Hours: 30**

Learning Outcomes:

LO 1. To understand practical approach of different invertebrate's specimens.

LO 2. To comprehend Identification, Classification of specimens

LO 3. To learn dissection of Cockroach skill by demonstration /Software/ Charts etc

LO 4. To learn the mounting techniques of invertebrates material

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Understand practical approach of different invertebrate's specimens.

CO 2. Comprehend Identification, Classification of specimens

CO 3. Learn dissection of Cockroach skill by demonstration /Software/ Charts etc

CO 4.Learn the mounting techniques of invertebrates material

Sr. No.	Practicals
1	Theoretical and practical knowledge of simple and compound microscope.
Identification, Classification and comments on the slides/specimens of;	
3	Protozoa: Amoeba, Euglena, Plasmodium, Paramecium, Trypanosoma, Elphidium, Vorticella,
4	Porifera: Sycon, Hyalonema, and Euplectella
5	Cnideria: Hydra, Obelia, Physalia, Aurelia, Tubipora
6	Aschelminthes: Ascaris, Ancylostoma, Wuchereria,
7	Platyhelminthes: Fasciola, Taenia and their larvae,
8	Arthropoda: Palaemon (Prawn), Crab, Palamnaeus
9	Annelida: Pheretima, Hirudinaria (Leech), Nereis, (Scorpion)
10	Mollusca: Pila (Apple snail), Lamellidens (Unio), Sepia, Octopus
11	Echinodermata: Asterias (Sea Star), Echinus (Sea urchin), Hemichordata: Balanoglossus

12	Dissection and/ or its demonstration through models/video/CD etc of Digestive system, reproductive system and nervous system of Earthworm, Cockroach.
13	Study of mouth parts of Cockroach, Honey Bee, and Mosquito
14	Preparation of permanent stained whole mounts of Hydra, Obelia, Trachea of Cockroach, Crustacean Larva, *Cyclops*, *Daphnia*

N.B.: Any Ten Practical from above.

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Department of Zoology

Course Type: DSC-II

Course Title: DSC-II: Life and Diversity of Chordates

Course Code: 101ZOO1102

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives

LO 1.To understand origin of chordates, General characters and classification of Protochordates and Agnatha

LO 2. To learn general characters and classification of Fishes and Amphibians parental care in Pisces and Amphibians

LO 3. To understand general characters and classification Reptiles and Aves

LO 4. To understand general characters and classification of Mammals and Type study: Rat.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Understand origin of chordates, General characters and classification of Protochordates and Agnatha

CO 2. Learn general characters and classification of Fishes and Amphibians parental care in Pisces and Amphibians

CO 3. Understand general characters and classification Reptiles and Aves

CO 4. Understand general characters and classification of Mammals and Type study: Rat.

Unit No.	Title of Unit & Contents	Hrs.
I	Origin of chordates and General characters and classification Protochordates and Agnatha	**12 Hrs.**
	Origin of chordates: Introduction and charterers of chordates. Classification of chordates up to order level. **Urochordata:** General characters and classification up to order level. and its affinities **Cephalochordates:** General characters and classification up to order level and its affinities.	

Unit No.	Title of Unit & Contents	Hrs.
	Cyclostomatous (Agnatha) General characters and classification up to order level. Study of Petromyzon, Maxine and its affinities.	
	Unit Outcome: **UO 1.** After completion of the course the students will be able to understand origin of chordates, general characters and classification of Protochordates and Agnatha	
II	General characters and classification of Fishes and Amphibians	**10 Hrs.**
	Fishes: General characters and classification up to order level Osmoregulation in Fishes; Migration and Parental care in fishes **Amphibian**: General characters and classification up to order level, Parental care in amphibia, neoteny and paedogenesis.	
	Unit Outcome: **UO 1**. After completion of the course the students will be able to learn general characters and classification of Fishes and Amphibians parental care in Pisces and Amphibians	
III	General characters and classification Reptiles and Aves	
	Reptiles: General characters and classification up to order level, Identification of poisonous and non-poisonous snakes and biting mechanism of snakes. **Aves:** General characters and classification up to order level. Flight adaptations & bird migration.	
	Unit Outcome: **UO 1.**After completion of the course the students will be able to general characters and classification Reptiles and Aves	
IV	General characters and classification of Mammals and Type study: Rat	**12 Hrs.**
	General characters and classification up to order level, **Type Study of Rat :** Morphology, Digestive system Respiratory system, Circulatory, Brain and Reproductive system Sense organs:- Ear and Eye	
	Unit Outcome: UO 1. After completion of the course the students will be able to understand general characters and classification of Mammals and Type study: Rat.	

Learning Resources:

1. Vertibrate Zoology by Jordan E.L. and P.S.Verma S.Chand Publication, and Co., Ltd. Ram Nager New Delhi
2. Chordate Zoology by Dhami and Dhami- Pradeep Publication, Opposite Sitla Mandir, Jalndhar-144008
3. Rat a mammalian type By G.R. Kshirsagar., G.Y.-Rane Prakashan, Tilak Road, Poona 30.
4. Kotpal (2015). Modern Textbook of Zoology Vertebrates, Rastogi publishers, New Delhi
5. Textbook of Zoology Vertebrates-II, Parker and Haswell Paperback – 1 January 2021
6. Vertebrate Zoology an Experimental Field Approach By Nelson G. Hairston · 1994 https://www.google.co.in/books/edition/Vertebrate_Zoology/gqM8AAAAIAAJ?hl=n&gbpv=1&dq=vertebrate+zoology&printsec=frontcover
7. A Course in Vertebrate Zoology A Guide to the Dissection and Comparative Study of Vertebrate Animals https://www.google.co.in/books/edition/A_Course_in_Vertebrate_Zo%C3%B6logy/vCgaAAAAYAAJ?hl=en&gbpv=1&dq=vertebrate+zoology&printsec=frontcover

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Zoology

Course Type: Lab Course

Course Title: Lab Course –II (Based on DSC-II)

Course Code: 101ZOO1104

Credits: 01 **Max. Marks: 50** **Hours: 30**

Learning Objectives

LO 1. To understand practical approach of Life and Diversity of chordate

LO 2 To understand Identification, Classification of different vertebrates specimens

LO 3. To learn mounting skills of different scales of fishes and other material of animals

LO 4. To understand skills of dissection of vertebrates

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Analyze Identification, Classification of different vertebrate's specimens.

CO 2. Comprehend the skills of Mounting of different materials of animals

CO 3.Learn mounting skills of different scales of fishes and other material of animals

CO 4.Understand skills of dissection of vertebrates

Sr.No.	Practical
Identification, Classification and Describe on the slides/specimens of;	
1	Protochordates: Herd mania; Amphioxus
2	Pisces: Branchiostoma, Petromyzon, Sphyrna, Pristis, Torpedo, Labeo, Exocoetus, Anguilla
3	Amphibia: Ichthyophis/Ureotyphlus, Salamandra, Bufo, Hyla
4	Reptiles: Cobra; Viper, Calotis; Varanus; Chamilon; Rock Python, Draco, Crocodiles, Gharial, turtle, tortoise.
5	Aves; Sparrow; Parrot; Columba; Myna Owl; Duck; Woodpecker, penguin
6	Collection of different types of feathers from birds
7	Mammals: Mole; Playtypus, Guinepig; Bat, Whale
8	Distinction between Poisonous and Non-poisonous snake
9	Estimation of age of fishes through Scales
10	Dissection and/ or its demonstration through models/video/CD etcof Digestive system, Brain , Afferent and Efferent artery of fish
11	Visit to Zoo park

N.B.: Any Ten practical from above.

Shiv Chhatrapati Shikshan Sanstha's

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Course Type: VSE-I

Course Title: VSC: Biochemical Techniques and Instrumentation

Course Code: 101ZOO1501

Credits: 02 **Max. Marks: 50** **Lectures: 60 Hrs.**

Learning Objectives:

LO 1. To understand Principle and working of Spectrophotometer, Colorimeter and Chromatography:

LO 2 to understand colorimetric, Chromatography and spectrophotometric analytical Techniques

LO 3 To understand Principle and working of Centrifugation, Electrophoresis, blotting techniques

LO 4.To understand analysis of different Biomolecules

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Learn about Theory and applications of Spectrophotometer Colorimeter and Chromatography.

CO 2. To understand Principle and working of Centrifugation, Electrophoresis, blotting techniques

.

CO 3. Learn about Principle and working of Centrifugation, Electrophoresis, and blotting techniques

CO .4 Understand Analysis of glucose, amino acids / proteins fatty acids/ lipids and RNA/DNA in fish tissues chromatography

Unit No.	Title of Unit & Contents	Hrs.
I	**Principle and working of Spectrophotometer, Colorimeter and Chromatography:**	**12 Hrs.**
	Spectrophotometer, Colorimeter Thin layer chromatography Column Chromatography Ion Exchange Chromatography	
	Unit Outcome: **UO 1.** After completion of the course the students will be able to understand Principle and working of Spectrophotometer, Colorimeter and Chromatography:	
II	Principle and working of Centrifugation, Electrophoresis, blotting techniques	**15 Hrs.**

	Centrifugation, Electrophoresis (Agarose and Polyacrylamide) , Southern Blotting, Northern Blotting and Western Blotting Polymerase chain reaction ,Cloning, Cell culture Hybridoma technology	
	Unit Outcome: UO 1. After completion of the course the students will Understand about Handling and principal of centrifugation	
III	**Practicals**	**10Hrs.**
	Analysis of glucose, amino acids / proteins fatty acids/ lipids and RNA/DNA in fish tissues by spectrophotometer/ Colorimeter.	
	Unit Outcome: **UO 1.** After completion of the course the students will be able to Learn about Principle and working of Centrifugation, Electrophoresis, and blotting techniques	
IV`	**Practicals**	**10Hrs.**
	Identification of amino acids by paper chromatography. Demonstration of blotting techniques and PCR. Sub-cellular fractionation by centrifugation.	
	Unit Outcome: **UO 1.** After completion of the course the students will be able to understand to handle paper chromatography, blotting techniques and PCR	
V	**Practicals**	**15Hrs.**
	1. Estimation of Glucose in Biological Fluids 2. Estimation of amino acid by Paper / Thin chromatography 3. Demonstration on polyacrylamide gel electrophoresis (PAGE) of proteins 4. Demonstration of separation of lipids by TLC. 5. Glucose by DNS method. 6. Protein by Biuret method. 7. Protein by Lowry's method 8. Extraction and estimation of DNA 9. Extraction and estimation of RNA	

Learning Resources:

1. Biological Instrumentation and methodology, Bajpai, P.K. S. Chand & Co. Ltd 2006.
2. Biochemistry and Molecular Biology K. Wilson and J. Walker Eds. 2005. Cambridge University Press.
3. Principles and techniques of Practical Biochemistry K. Wilson and KH Goulding. 1986.. (3 edn) Edward Arnold, London
4. Practical research methods 4.Dawson, C. (2002), UBS Publishers, New Delhi.
5. Principles and Techniques of Biochemistry and Molecular Biology, by Keith Wilson(Editor), John Walker, Cambridge University Press; 7th edition (4 March 2010)
6. Basic Techniques in Biochemistry and Molecular Biology, by R.K. Sharma Sangha Dreamtech Press (25 June 2020); Dreamtech Press
7. Advanced Lab Practices in Biochemistry & Molecular Biology, by Agarwal, Dreamtech Press (1 November 2019)
8. Introduction to instrumentation of Life Sciences, by Sharma, Notion Press; 1st edition (1 January 2019)
9. Introduction to Instrumentation in Life Sciences, By A SHARMA P S BISEN, CRC Press)1 January2012(
10. Basics of Clinical Biochemistry & Instrumentation, by Bachcheti, Vayu Education of India; Revised edition (1 January 2015)

Semester - II

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Zoology

Course Type: DSC-III

Course Title: DSC-III: Cell Biology

Course Code: 101ZOO2101

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To study the structural and functional organization of cell

LO 2. To understand endomembrane System

LO 3. To understand structure and functions of Mitochondria, Peroxisomes: Nucleus.

LO 4. To understand structure and functions of Cell Division, cell cycle

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Learn the structural and functional organization of cell

CO 2. Understand endomembrane System

CO 3. Understand structure and functions of Mitochondria, Peroxisomes, Nucleus and Chromosomes

CO 4. Understand structure and functions of Cell Division and cell cycle

Unit No.	Title of Unit & Contents	Hrs.
I	**Introduction to Cell Biology**	**12 Hrs.**
	Cell as a basic unit of life, Cell Theory, Structure and function of Prokaryotic cell (*E. coli*.) Structure of eukaryotic cell (Plant Cell and Animal Cell) Various models of plasma membrane structures Transport across membranes: active and passive transport, facilitated transport Structures and functions: Cell-cell junctions, Tight junctions, adherens junctions, gap junctions	
	Unit Outcome: **UO 1.** After completion of the course the students will be able to learn the structural and functional organization of cell	
II	**Endomembrane System**	**11 Hrs.**
	Introduction, Structure, location and functions: Endoplasmic Reticulum, Golgi apparatus, Lysosomes and Ribosomes.	
	Unit Outcome:	

Unit No.	Title of Unit & Contents	Hrs.
	UO 1. After completion of the course the students will be able to understand Endomembrane System	
III	Mitochondria Peroxisomes: Nucleus and Chromosomes	**11 Hrs**
	Introduction, ultrastructure and function of the mitochondria Peroxisomes: Nucleus and Chromosomes	
	Unit Outcome: UO 1. After completion of the course the students will be able to understand structure and functions of Mitochondria, ,Peroxisomes, Nucleus and Chromosomes	
IV	**Cell division and Cell cycle**	**11 Hrs.**
	Cell division : Mitosis, Meiosis, Cell cycle and its regulation	
	Unit Outcome: **UO 1.** After completion of the course the students will be able to Understand Cell division and Cell cycle	

Learning Resources:

1. Powar C.B. Cell biology, Himalaya Publication, Meerut.
2. Dr. P.S.Verma and Dr. V. K. Agrawal, Cell Biology, Molecular Biology,
3. Evolution and Ecology, S. Chand Higher Academic, Publications.
4. Karp, G. (2010) and Molecular Biology: Concept and Experiments.VI Edition
5. John Wiley and Sons. Inc.
6. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular
7. Biology. VII Edition. Lippincott Williams and Wilkins, Philadelphia.
8. Copper, G.M. and Hausman, R.E. (2009). The Cell: A Molecular Approach, V Edition. ASM Press and Sunderland, Washington, D.C.; Sinauer Associates, M.A.
9. Dr. K.S. Raut and Dr. D.B. Chawda: Fundamentals of Zoology

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Zoology

Course Type: Lab Course

Course Title: Lab Course –III (Based on DSC-III)

Course Code: 101ZOO2103

Credits: 01 **Max. Marks: 50** **Hours: 30**

Learning Objectives

LO.1 to study the Light microscope, Phase contrast microscope and Electron microscope.

LO.2 To understand the staining, mounting and micro techniques like blood smear. Squash preparation.

LO 3. To understand mitosis and the effect of colchicine on mitosis

LO 4. To understand cytochemical staining and preparation of permanent slide**.**

Learning Outcomes:

After completion of the course, students will be able to-

CO 1. Learn Light microscope, Phase contrast microscope and Electron microscope.

CO 2. Learn the staining, mounting and micro techniques like blood smear, Squash preparation.

CO 3. Understand mitosis and the effect of colchicine on mitosis

CO 4. Understand cytochemical staining and preparation of permanent slide

Sr. No.	Practical
1	Principle of Light microscope, Phase contrast microscope and Electron microscope and principle of cell fixation, staining and fractionation.
2	Preparation of temporary stained squash of onion root tip to study various stages of mitosis.
3	Study the effect of colchicine on mitosis at 24 hrs and 48 hrs.
4	Study of various stages of meiosis.
5	Preparation of temporary stained mount to show the presence of Barr body in human female blood cells/ cheek cells.
6	Preparation of blood smears to observe the blood cells.
7	Study of permanent slides of various stages of mitosis and meiosis.
8	Temporary preparation of mitotic cells from onion root tips.
9	Study of Cell organelles (any three) by using microphotographs.

10	Study of types of cells. (Permanent slide) any three.
11	Visit to Zoological Museum/ National Park/ Wildlife Sanctuary/ Various Institutes

N.B.: Any Ten practical from above.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Zoology

Course Type: DSC

Course Title: DSC-IV: Histology and Histochemistry

Course Code: 101ZOO2102

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1.To understand histological structure and function of different types of tissues

LO 2.To understand histological structure and function of different types of organs

LO 3. To understand histological structure and function of types of endocrine glands

LO 4. To understand histochemical techniques for different biomolecules

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Understand histological structure and function of different types of tissues

CO 2.To understand histological structure and function of different types of organs

CO 3.To understand histological structure and function of types of endocrine glands

CO 4. To understand histochemical techniques for different biomolecules

Unit No.	Title of Unit & Contents	Hrs.
I	**Histology of Tissues**	**12 Hrs.**
	1) Epithelial tissue: a) Squamous b) Cuboidal c) Columnar d) Glandular **2) Connective tissue:** **Loose connective tissue:** Areolar, adipose, and reticular tissues **Dense connective tissue :** Dense regular, Irregular connective tissue **Specialized connective tissue:** bone, cartilage, Blood, lymph **3) Muscular Tissue:** Skeletal, smooth, and cardiac muscle	
	Unit Outcome: **LO 1.** After completion of the this unit the students will understand histological structure and function of different types of tissues	
II	**Histology of organs**	**10 Hrs.**
	i) Stomach ii) Intestine iii) Liver iv) Kidney v) Pancreas	
	Unit Outcome: **LO 1.** After completion of the this unit the students will be able to understand histological structure and function of different types of organs	

III	**Histology of endocrine gland**	**11 Hrs.**
	i) Pituitary gland ii) Thyroid gland iii) Adrenal gland iv) Testis and Ovary	
	Unit Outcome: **LO 1.** After completion of the this unit the students will be able to understand histological structure and function of different types of organs	
IV	**Histochemical Technique for Biomolecules**	**12 Hrs.**
	i) Protein:-Ninhydrin Schiff Method (Amino groups) **ii) Carbohydrates:-** PAS reaction (Bauer-Feulgen method -Glycogen) **iii) Lipids:** Oil Red O Method, Sudan black B method. **iv) Nucleic Acid:** DNA – Feulgen Nuclear Method	
	Unit Outcome: **LO 1.** After completion of the this unit the students will be able to understand histological structure and function of different types of organs	

Learning Resources:

1. Patki, L.R. et al., 1983.An introduction to Micro technique. S. Chand
2. Bruce Cassel man, W.G. (1962) histochemical technique. Buffer and Tanners
3. Bancroft, J.D., Alan Stevens and Turner, D.R. 1996. Theory and Practice of Histological Techniques. Churchill Livingstone, New York
4. Histology Mammals: Athavale, M.V. and Lately, A.N.
5. Histology Greed: R.O. and Well.
6. A Text Book of Histology by Leslie P. Gartner

https://www.google.co.in/books/edition/Textbook_of_Histology_E_Book/edpQCwAAQBAJ?hl=en&gbpv=1&dq=Histology+book&printsec=frontcover

8.Text Book of Histology A Practical Guide by J. P. Gunasegaran

https://www.google.co.in/books/edition/Textbook_of_Histology_and_Practical_guid/qATbAgAAQBAJ?hl=en&gbpv=1&dq=Histology+book&printsec=frontcove

9.Basic Histology a Colour Atlas and Text by V Subhadra Devi

https://www.google.co.in/books/edition/Basic_Histology_A_Color_Atlas_Text/x0mJDAAAQBAJ?hl=en&gbpv=1&dq=Histology+book&printsec=frontcover

10.Textbook of Zoology ,Endocrinology by Dr. K.S. Raut and Dr. C. B. Chawda

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Zoology

Course Type: Lab Course

Course Title: Lab Course –IV (Based on DSC-IV)

Course Code: 101ZOO2104

Credits: 01 **Max. Marks: 50** **Hours: 30**

Learning Objectives

LO 1. To understand Temporary preparation of different types of tissues slides

LO 2. To understand permanent preparation of different types of organs slides

LO 3. To understand skill of section cutting

LO 4. To understand skills of analysis of biomolecules by histochemical techniques

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Understand Temporary preparation of different types of tissues slides

CO 2. Understand permanent preparation of different types of organs slides

CO 3. Understand skill of section cutting

CO 4. Understand skills of analysis of biomolecules by histochemical techniques

Sr.No.	Practical
1	Temporary preparation of Squamous epithelium, ciliated epithelium, skeletal Muscle fiber and blood smear.
2	Study of histological structure of following organs – Stomach, intestine, pancreas, liver, Kidney,
3	Study of histological structure of following organs testis, ovary, thyroid, adrenal and pituitary.
4	Tissues fixation ,dehydration, Preparation Paraffin wax block,
5	Section Cutting by Microtomes and Staining
6	Nomenclature and Classification of collected specimen
7	Demonstration of amino acid by Histochemical methods
8	Standard Demonstration of Lipids by Sudan black B Method For (Fats and Phospholipids)
9	Demonstration of DNA by Feulgen and rossenbeck's nuclear reaction method
10	Demonstration of Protein by Ninhydrin Schiff Method (Amino groups)
11	Demonstration of Carbohydrates by PAS reaction (Bauer-Feulgen method -Glycogen)

N.B.: Any Ten practical from above.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Course Type: VSC-II

Course Title: VSC-II: Sericulture Industry and Marketing

Course Code: 101ZOO2501

Credits: 02 **Max. Marks: 50** **Lectures: 60 Hrs.**

Learning Objectives

LO 1. This course has been designed to understand Sericulture Industry and Marketing... LO 2. To understand Seed Production.

LO 3. To understand Rearing requirements/method: Disinfections of rearing house and appliances.

LO 4. To understand Reeling of cocoons and Marketing.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Learn about Egg hatching and Development.

CO 2. The students will learn Rearing requirements.

CO 3. Students will Learn Cocoon preparations: Selection and preservation of cocoons for reeling, Drying /Stifling.

CO 4. The students will practical approaches of preservation of seed, Hatching and Brushing Percentage, Identification of embryonic growth, Study of Reeling appliances, and Market study with reference to silk cocoons.

Unit No.	Title of Unit & Contents	Hrs.
I	**Seed Production**	**12 Hrs.**
	Seed Production Seed Cocoons: Selection, preservation, incubation: Grainage Equipment. Moths: Emergence, mating, egg laying, infection examination and Eggs: Disease freeegg laying (DFLs) preparation, loose egg preparation. Egg preservation Egg hatching/Development: Embryonic development, Inhibition of embryonic development. Artificial hatching, (Hot and Cold acid treatment) Shipment of DFLs	
	Unit Outcome: **LO 1.** After completion of the this unit the students will be able to Learn about Egg hatching and Development	

II	**Silkworm rearing:**	**10 Hrs.**
	Rearing method/ requirements: Selection of silkworm race for rearing Collection of Seeds (DFLs), Rearing Equipment, Rearing house (Model and Thatched Roof) Rearing requirements/ method: Disinfections of rearing house and appliances, brushing of newly hatched larvae, Bed cleaning, Spacing and Dusting of disinfectants. Maintenance of temperature, photoperiod and humidity for rearing. **Food and Feeding:** Quality, harvesting and storage of mulberry leaves. Feeding andrearing of early and late stage larvae. Schedule of feeding, artificial diet Cocoon formation and adult: Ripening of worms, spinning of cocoon, emergencePre-pupal moulting, pupation and mounting of ripening worms. Types of montages, harvesting of cocoons. Emergence of adult moths from cocoons, Inhibition of adult emergence for silk production.	
	Unit Outcome: **LO 1.** After completion of the this unit the students will be able learn Silkworm rearing and Rearing requirements	
III	**Cocoon preparation ,processing and reeling**	**11 Hrs.**
	Cocoon preparations : Selection and preservation of cocoons for reeling, Drying /Stifling, Boiling, Top Boiling System, One Pan Boiling System, Three Pan boilingsystem, sunken system, brushing Reeling appliances: Country Charkha, Cottage basin/Domestic machine Filature/Multiend machine, Automatic reeling machine. Reeling methods : Charkha reeling, Cottage basin reeling, Filature Reeling operations: Reeling, Re-reeling, Lacing, Winding, And Single and double twisting,steaming, twist reeling, Book press, Storage of yarn, Seining unit. Cocoon marketing: Gradation of seed and reeling cocoons. Marketing of multivoltine, bivoltine and hybrid cocoons.	
	Unit Outcome: **LO 1.** After completion of the unit the students will be able to Learn Cocoon preparations: Selection andpreservation of cocoons for reeling, Drying /Stifling.	
IV	**Practical's**	**12 Hrs.**
	1. Silkworm seed Selection and preservation of seed.	

	2.Estimation of Hatching and Brushing Percentage of silkworm Eggs 3 Rearing of silkworm and harvesting of cocoons, 4. Disinfections, young age rearing, late age rearing, feeding, cleaning, spacing, dusting, moulting, 5. Determination of leaf cocoon ratio, mountage, spinning and harvesting of cocoons. 6. Practical demonstration of cooking, reeling and re-reeling of a sample cocoon. 7. Identification of embryonic growth in egg. Stage of fertilization, blastoderm, germband, spoon-shaped embryo, black head stage (4 – 10 days) 8. Process of reeling Cocoon drying/stifling, cocoon boiling, brushing, reeling, re- reeling, finishing and testing, winding, twisting, doubling, double twisting, steamingand twist reeling. 9.Study of Reeling appliances : Country Charkha, Cottage basin/Domestic machine 10.Study of Reeling methods: Charkha reeling, Cottage basin reeling, Filature. 11.Market study with reference to silk cocoons, yarn and silk fibre 12.Visit to Sericulture center.	
	Unit Outcome: **LO 1.** After completion of the this unit the students will be able to The students will practical approaches of preservation of seed, Hatching and Brushing Percentage, Identification of embryonic growth, Study of Reeling appliances, and Market study with reference to silk cocoons.	

Learning Resources:

1. Comprehensive Sericulture Manual: Mohan Rao, M.M. (1999), B.S. Publications, Hyderabad.
2. Principles of Biostatistics: Marcello Pagano Kimberlee Gauvreau, Duxburg, USA.
3. Economics of Sericulture and Silk Industry in India : Ramana, D.V. (1987), Deep and Deep Publishers, New Delhi
4. Silkman's Companion: Anonymous (1992), CSB Publication, Bangalore.
5. The Development of Indian Silk—A Wealth of Opportunities: Sinha, S. (1960).
6. An Introduction to Extension Education: Supe, S.V.
7. Education and Communication for Development: Dahama, O.P. and Bhatnagar, O.P. Pub. By Oxford & IBH Pub. Co. Pvt. Ltd., New Delhi.
8. Silk Production, processing and marketing: Nanavaty, M.N.
9. Biostatistics: Rama Krishna, P. 1996), Sara's Publication, Kanyakumari.

10. Economics of Sericulture under Irrigated and Rainfed Conditions: (1982) M.S. Jolly, CSR & TI, Mysore.
11. An Analysis of Demand and Supply prospectus for High Quality Raw Silk: Naik, G and Babu, K.R. (1991), Centre for Management in Agriculture, Ahmedabad.
12. Bioinformatics—Methods and Protocols: Ed. By Stephen Misener and Stephen, A. Krawetz Humana Press Totowa, New Jersey.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

UG First Year

Basket I: Generic/Open Elective (GE/OE)

(GEs offered to the Commerce and Management students in Sem.-I/II)

Sr. No.	BoS Proposing GE/OE	Code	Course Title	Credits	Hrs.
1	English	101ENG1401	Business Communication & Grammar	04	60
2	Computer Science	101COS1401	Fundamentals of Computers	04	60
3	Information Technology	101COA1401	Web Designing	04	60
4	Marathi	101MAR1401	स्पर्धा परीक्षा आणि मराठी भाषा	04	60
5	Mathematics	101MAT1401	Fundamentals of Mathematics	04	60
6	Political Science	101POL1401	Human Rights	04	60
7	Biotechnology	101BIO1401	Nutrition, Health and Hygiene	04	60
8	Information Technology	101COM1401	MS-Office	04	60
9	Music	101MUS1401	Indian Vocal Classical & Light Music	04	60
10	NCC Studies	101NCC1401	Introduction to NCC	04	60
11	Sports	101SPO1401	Counseling and Psychotherapy	04	60

Note: Student can choose any one GE from the basket

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

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UG First Year

Basket II: Skill Enhancement Courses (SEC)

(SEC offered to the Commerce and Management students in Sem.-I/II)

Sr. No.	BoS Proposing SEC	Code	Course Title	Credits	Hrs.
1	Commerce	101MAE1601	Office Management	02	30
2	Computer Science	101COS1601	Data Analysis and Computer Application	02	30-45
3	English	101ENG1601	Proof Reading and Editing	02	30
4	English	101ENG1602	Communication Skills	02	30
5	Geography	101GEO1601	Tourism & Travel Management	02	30-45
6	Information Technology	101COA1601	PC Assemble and Installation	02	30-45
7	Marathi	101MAR1601	कथा/पटकथालेखन	02	30
8	English	101ENG1603	Leadership and Personality Development	02	30
9	Zoology	101ZOO1601	Bee Keeping	02	30-45

Note: Student can choose any one SEC from the basket

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Rajarshi Shahu Mahavidyalaya, Latur

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UG First Year

Basket III: Ability Enhancement Courses (AEC)

(AEC offered to the Science & Technology students in Sem.-I)

Sr. No.	BoS Proposing AEC	Code	Course Title	Credits	Hrs.
1	Marathi	101MAR7101	भाषिक कौशल्य भाग – १	02	30
2	Hindi	101HIN7101	हिंदी भाषा शिक्षण भाग – १	02	30
3	Sanskrit	101SAN7101	व्यावहारीक व्याकरण व नितिसुभाषिते	02	30
4	Pali	101PAL7101	उपयोजित व्याकरण	02	30
5.	English			02	30

(AEC offered to the Science & Technology students in Sem.-II)

Sr. No.	BoS Proposing AEC	Code	Course Title	Credits	Hrs.
1	Marathi	101MAR7101	भाषिक कौशल्य भाग – १	02	30
2	Hindi	101HIN7101	हिंदी भाषा शिक्षण भाग – १	02	30
3	Sanskrit	101SAN7101	व्यावहारीक व्याकरण व नितिसुभाषिते	02	30
4	Pali	101PAL7101	उपयोजित व्याकरण	02	30
5.	English			02	30

Note: Student can choose any one AEC from the basket

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

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UG First Year

Extra Credit Activities

Sr. No.	Course Title	Credits	Hours T/P
1	MOOCs	Min. of 02 credits	Min. of 30 Hrs.
2	Certificate Courses	Min. of 02 credits	Min. of 30 Hrs.
3	IIT Spoken English Courses	Min. of 02 credits	Min. of 30 Hrs.

Guidelines:

Extra -academic activities

1. All extra credits claimed under this heading will require sufficient academic input/ contribution from the students concerned.
2. Maximum 04 extra credits in each academic year will be allotted.
3. These extra academic activity credits will not be considered for calculation of SGPA/CGPA but will be indicated on the grade card.

Additional Credits for Online Courses:

1. Courses only from SWAYAM and NPTEL platform are eligible for claiming credits.
2. Students should get the consent from the concerned subject Teacher/Mentor/Vice Principal and Principal prior to starting of the course.
3. Students who complete such online courses for additional credits will be examined/verified by the concerned mentor/internal faculty member before awarding credits.
4. Credit allotted to the course by SWAYAM and NPTEL platform will be considered as it is.

Additional Credits for Other Academic Activities:

1. One credit for presentation and publication of paper in International/National/State level seminars/workshops.
2. One credit for measurable research work undertaken and field trips amounting to 30 hours of recorded work.
3. One credit for creating models in sponsored exhibitions/other exhibits, which are approved by the concerned department.
4. One credit for any voluntary social service/Nation building exercise which is in collaboration with the outreach center, equivalent to 30 hours
5. All these credits must be approved by the College Committee.

Additional Credits for Certificate Courses:

1. Students can get additional credits (number of credits will depend on the course duration) from certificate courses offered by the college.
2. The student must successfully complete the course. These credits must be approved by the Course Coordinators.
3. Students who undertake summer projects/ internships/ training in institutions of repute through a national selection process, will get 2 credits for each such activity. This must be done under the supervision of the concerned faculty/mentor.

Note:

1. The respective documents should be submitted within 10 days after completion of Semester End Examination.
2. No credits can be granted for organizing or for serving as office bearers/ volunteers for Inter-Class / Associations / Sports / Social Service activities.
3. The office bearers and volunteers may be given a letter of appreciation by the respective staff coordinators. Besides, no credits can be claimed for any services/activities conducted or attended within the college.
4. All claims for the credits by the students should be made and approved by the mentor in the same academic year of completing the activity.
5. Any grievances of denial/rejection of credits should be addressed to Additional Credits Coordinator in the same academic year.
6. Students having a shortage of additional credits at the end of the third year can meet the Additional Credits Coordinator, who will provide the right advice on the activities that can help them earn credits required for graduation.

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(Autonomous)

Examination Framework

Theory:

40% Continuous Assessment Tests (CATs) and 60% Semester End Examination (SEE)

Practical:

50% Continuous Assessment Tests (CATs) and 50% Semester End Examination (SEE)

Course	Marks	CAT & Mid Term Theory				CAT Practical		Best Scored CAT & Mid Term	SEE	Total
1	2	3				4		5	6	5 + 6
		Att.	CAT I	Mid Term	CAT II	Att.	CAT			
DSC/DSE/ GE/OE/Minor	100	10	10	20	10	-	-	40	60	100
DSC	75	05	10	15	10	-	-	30	45	75
Lab Course/AIPC/ OJT/FP	50	-	-	-	-	05	20	-	25	50
VSC/SEC/ AEC/VEC/CC	50	05	05	10	05	-	-	20	30	50

Note:

1. All Internal Exams are compulsory
2. Out of 02 CATs best score will be considered
3. Mid Term Exam will be conducted by the Exam Section
4. Mid Term Exam is of Objective nature (MCQ)
5. Semester End Exam is of descriptive in nature (Long & Short Answer)
6. CAT Practical (20 Marks): Lab Journal (Record Book) 10 Marks, Overall Performance 10 Marks.