FOUR YEAR UNDERGRADUATE PROGRAM (NEP–2020)

Program: Bachelor in Life Sciences (2024 -28)

DISCIPLINE –BIOTECHNOLOGY

Session – 2024 -25

DSC -01 to 08		DSE -01 to 12		DGE -01 & 02	
Code	Title	Code	Title	Code	Title
BTSC -01T	Cell Biology & Biochemistry	BTSE -01T	Environmental Biotechnology	BTGE -01T	Cell Biology & Biochemistry
BTSC -01P	Lab course	BTSE -01P	Lab course	BTGE -01P	Lab course
BTSC -02T	Microbiology & Molecular Biology	BTSE -02T	Bioprocess engineering	BTGE -02T	Microbiology & Molecular Biology
BTSC -02P	Lab course	BTSE -02P	Lab course	BTGE -02P	Lab course
BTSC -03T	Genetics & Biophysics	BTSE -03T	Industrial Biotechnology		
BTSC -03P	Lab course	BTSE -03P	Lab course		
BTSC -04T	Recombinant DNA technology	BTSE -04T	Medical Biotechnology		
BTSC -04P	Lab course	BTSE -04P	Lab course		
BTSC -05T	Enzymology	BTSE -05T	Genomics		
BTSC -05P	Lab course	BTSE -05P	Lab course	SEC	
BTSC -06T	Immunology	BTSE -06T	Proteomics	BTSEC-01	Biopesticides & Biofertilizers
BTSC -06P	Lab course	BTSE -06P	Lab course		
BTSC -07T	Plant & Animal Biotechnology	BTSE –07T	Agricultural Biotechnology		
BTSC -07P	Lab course	BTSE –07P	Lab course	VAC	
BTSC -08T	Biostatistics & Bioinformatics	BTSE –08T	Pharmaceutical Biotechnology	BTVAC-01	Plants-based Secondary Metabolites

BTSC -08P	Lab course	BTSE – 08P	Lab course		
		BTSE - 09T	Microbial Products for Human Consumption		
		BTSE - 09P	Lab course		
		BTSE - 10T	Microbial Products for Agriculture		
		BTSE - 10P	Lab course		
		BTSE - 11T	Microbial Products for Industrial uses		
		BTSE - 11P	Lab course		
		BTSE - 12T	IPR, Biosafety & Bioethics		
		BTSE - 12P	Lab course		

Program Outcomes (PO):

1) The student will develop competency to explore natural resources with scientific validation.
2) Multifold skills will be developed for their entrepreneurship competency and self-reliance.
3) The program will ensure scientific competency, research aptitude, and competency for the promotion of the future of the nation.

Program Specific Outcomes (PSO): (If any)

1) The graduates will be competent for sustainable scientific exploration in the field of agriculture, medicine, food and environment.
2) The program will integrate traditional and modern knowledge to meet the challenges of the future by the help of genomics, proteomics, bioprocess engineering and biotechnological tools for environmental corrections.

Name and Signature of Convener and Members of CBoS:

(Keshav Kant Sahu)

(Amrita Panda)

Dr. Shivani Sharma

(Dr. Neha Behar)

(Dr. Shubha Diwan)

11/6/24

(Dr. Sanjaya Bhagat)

Dr Pramod Mahish

(Dr. Amrita Kulkarni)

Four Year Undergraduate Program (2024-28)
Department of Biotechnology
Course Curriculum

Part A: Introduction			
Program: Bachelor in Life Sciences (Certificate/Diploma/Degree/Honors)		Semester: **I Sem**	Session:**2024-2025**
1	Course Code	**BTSC-01-T**	
2	Course Title	**Cell Biology and Biochemistry**	
3	Course Type	Discipline Specific Course (DSC)	
4	Pre-requisite (if any)	As per program	
5	Course Learning Outcomes (CLO)	After completing this course, the students will be able to – • Explore and validate the Indian knowledge system and its significance in the field of biotechnology. • Understand cellular organization, their division for the continuation of life, and the natural cellular death mechanism. • Understand the basic biochemicals for organizational and functional expression of life. • Understand the metabolic regulations for survival and continuation of life.	
6	Credit Value	03 Credits (Credit = 15 Hours - learning & observation)	
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

Part B: Content of Course (Theory)		
Total No. of Teaching–learning Periods (01 Hr. per period)- 45 Periods (45 Hours)		
Unit	Topic (Course content)	No. of Period
I	**Basics and IKS** 1. The modern concept of the origin of life. 2. Contribution of Indian scientists in biology. 3. Significance of ancient Indian knowledge system in medical science. 4. Structure of cell.	12 (12 Hrs)
II	**Cell structure and division** 1. Ultrastructure of cell organelles. 2. Ultrastructure of chromosomes. 3. Cell division- Mitosis and meiosis. 4. Biology of cancer cells and apoptosis.	11 (11 Hrs)
III	**Basics of biochemistry** 1. Carbohydrates- Structure and classification. 2. Lipid- Structure and classification. 3. Amino acids - Structure and classification. 4. Three-dimensional structure of proteins.	11 (11 Hrs)
IV	**Metabolism** 1. Enzymes- Nomenclature and classification, mechanism of action, and factors affecting enzyme action. 2. Carbohydrate metabolism- Glycolysis, Kreb cycle, gluconeogenesis, glycogenesis. 3. Lipid metabolism- Beta oxidation of fatty acids, fatty acid biosynthesis. 4. Protein metabolism- Transamination, deamination, and synthesis of amino	11 (11 Hrs)

	acids.	
Keywords	Cell, Biomolecules, Cell Division.	

• Part C - Learning Resource
Text Books, Reference Books, Other Resources -
➢ Text Book- ➢ Biotechnology- U Satyanarayana. ➢ Cell Biology- C B Powar ➢ Cell and Molecular Biology- P K Gupta
Reference Book- • Practical Biochemistry- Wilson & Walker. o Cell biology – C.B.Powar o Molecular Biology of the Cell – Alberts o Molecular Cell Biology – Lodish o Cell and Molecular Biology – Gerald Karp o The Cell – Cooper o Lehninger- Principles of Biochemistry o Nelson & Cox. - Biochemistry o Voet& Pratt. - Biochemistry
Online resources- ➢ https://onlinecourses.nptel.ac.in/noc22_cy06/preview ➢ https://nptel.ac.in/courses/104105076

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: **Maximum Marks: 100 Marks** **Continuous Internal Assessment (CIA): 30 Marks** **End Semester Exam (ESE): 70 Marks**		
Continuous Internal Assessment (CIA) (By course teacher):	Internal Test / Quiz-(2): **20 +20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1.** Objective – **10 x1= 10** Mark; **Q2.** Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts., **1out of 2** from each unit-**4x10=40 Marks**	

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Dr. Shivani Sharma (Dr. Sanjana Bhagat) Dr. Ujwala Vyas

(Dr. Amit Kr. Kanjilal) Dr Pramod Mahajan

Four Year Undergraduate Program (2024-28)
Department of Biotechnology
Course Curriculum

Part A: Introduction			
Program: Bachelor in Life Sciences (Certificate/Diploma/Degree/Honors)		Semester: **I Sem**	Session:**2024-2025**
1	Course Code	**BTSC-01-P**	
2	Course Title	**Cell Biology and Biochemistry**	
3	Course Type	Discipline Specific Course (DSC) - Practical	
4	Pre-requisite (if any)	As per the program	
5	Course Learning Outcomes (CLO)	After completing this practical course, the students will be able to – • Identify animal and plant cells and its replication. • Understand karyogram. • Analyze biomolecules. • Develop expertise in chromatographic techniques.	
6	Credit Value	01 Credits Credit =30 Hours Laboratory or Field learning/Training	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20

Part B: Content of Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	Topic (Course content)	No. of Period
Lab./Field Training/ Experiment Contents of Course	1. Preparation of mitotic index from plants and animals. 2. Preparation of slide of blood cells. 3. Preparation of slide of giant chromosomes. 4. Preparation of slide of epithelial cells. 5. Biochemical test of carbohydrates. 6. Biochemical test of lipids. 7. Biochemical test of proteins. 8. The action of salivary amylase on starch. 9. The action of trypsin on proteins. 10. Separation of amino acids by chromatography. 11. Separation of chlorophyll by chromatography.	30
Keywords	Mitotic index, Giant chromosome, biomolecules.	

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○ Molecular Biology of the Cell – Alberts ○ Molecular Cell Biology – Lodish ○ Cell and Molecular Biology – Gerald Karp ○ The Cell – Cooper ○ Lehninger- Principles of Biochemistry ○ Nelson & Cox. - Biochemistry ○ Voet& Pratt. - Biochemistry
Online resources- ➢ https://onlinecourses.nptel.ac.in/noc22_cy06/preview ➢ https://nptel.ac.in/courses/104105076

Part D: **Assessment and Evaluation**			
Suggested Continuous Evaluation Methods: **Maximum Marks:** **50 Marks** **Continuous Internal Assessment (CIA):** **15 Marks** **End Semester Exam (ESE):** **35 Marks**			
Continuous Internal Assessment (CIA) (By course teacher):	Internal Test / Quiz-(2): 10 +10 Assignment / Seminar + Attendance- 05 Total Marks - **15**		Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance:** **A. On spot Assessment - 20** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**		Managed by course teacher as per lab status

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