Shobhit
Institute of Engineering & Technology
Deemed to-be-University
EDUCATION EMPOWERS

NAAC

SCHEME OF TEACHING
&
SYLLABUS

For

BACHELOR OF SCIENCE (BIOTECHNOLOGY)
B.S.C
(Three Year, Six Semester Program, Four Years Honours with Research Program)

"Based on Outcome Based Education (OBE), NEP-2020, NCrF"

(Academic Session 2024 – '27, 2025-'29)

School of Biotechnology & Life Sciences

Shobhit Institute of Engineering & Technology

[NAAC 'A' Grade Accredited Deemed-to-be University estd u/s 3 of UGC Act, 1956]

Campus: NH - 58, Modipuram, Meerut - 250110, Delhi NCR

NAAC A GRADE ACCREDITED UNIVERSITY

E : mail@shobhituniversity.ac.in

W : www.shobhituniversity.ac.in

NAAC | UGC | AICTE | AIU | BCI | NCTE | SIRO | TBI | AICTE IDEA Lab | NCC

3 Years Full Time Program

(Academic Session 2024-'27)

4 Years Full Time Honors Program

4th year with Research

(Academic Session 2025-'29)

VISION

To be recognized as a leading institution in India and globally for academic excellence, transformative research, and holistic development of students, actively contributing towards an empowered, inclusive, and enlightened society.

MISSION

M1. To provide a comprehensive, multidisciplinary and interdisciplinary education in biotechnology, equipping students with theoretical knowledge and practical skills.

M2. To cultivate a passion for scientific inquiry, innovation, and problem-solving, empowering students.

M3. To foster practical learning through innovative teaching and learning techniques, and to enhance students' foundation by organizing seminars and workshops.

M4. To contribute to the sustainable development of society, improve human health, and promote environmental conservation through the application of biotechnology.

Program Outcome: Bachelor of Science (B.Sc.) offers theoretical as well as practical knowledge about different subject areas. These subject areas include Physics, Chemistry, Mathematics and Biology and other fields depending on the specialization a student opts. This programme course is most beneficial for students who have a strong interest and background in Science and Mathematics. The course is also beneficial for students who wish to pursue multi and inter-disciplinary science careers in future. Following are the various programme outcomes:

PO1. Understand concepts of Biotechnology and demonstrate interdisciplinary skills acquired in cell biology, genetics, biochemistry, microbiology, and molecular biology.

PO2. Demonstrate the Laboratory skills in cell biology, basic and applied microbiology with emphasis on technological aspects

PO3. Be competent to apply the knowledge and skills gained in the fields of plant biotechnology, animal biotechnology and microbial technology in pharma, food, agriculture, beverages, herbal and nutraceutical industries.

PO4. Critically analyze environmental issues and apply the biotechnology knowledge gained for conserving the environment and resolving environmental problems.

PO5. Demonstrate comprehensive innovations and skills in the fields of biomolecules, cell and organelles, molecular biology, bioprocess engineering and genetic engineering of plants, microbes, and animals with respect to applications for human welfare

PO6. Apply the knowledge and skills of immunology, bioinformatics, computational modelling of proteins, drug design and simulations to test models and aid in drug discovery.

PO7. Critically analyze, interpret data, and apply tools of bioinformatics and multiomics in various sectors of biotechnology including health and food.

PO8. Demonstrate communication skills, scientific writing, data collection and interpretation abilities in all the fields of biotechnology.

PO9. Learn and practice professional skills in handling microbes, animals and plants and demonstrate the ability to identify ethical issues related to recombinant DNA technology, genetic engineering, animals handling, intellectual property rights, biosafety, and biohazards.

PO10. Explore the biotechnological practices and demonstrate innovative thinking in addressing the current day and future challenges with respect to food, health, and environment.

PO11. Demonstrate thorough knowledge and application of good laboratory and good manufacturing practices in biotech industries

PO12. Understand and apply molecular biology techniques and principles in forensic and clinical biotechnology.

PO13. Demonstrate entrepreneurship abilities, innovative thinking, planning, and setting up of small-scale enterprises or CROs

Program Specific Outcome:

Objective of this program is Graduates of the BSc Biotechnology program will possess a comprehensive understanding of biological systems and biotechnological applications, enabling them to apply theoretical knowledge to real-world problems in healthcare, agriculture, and environmental sectors. They will be proficient in modern biotechnological techniques and laboratory practices, equipped with the skills to design, conduct, and analyze research projects. They will also have a strong ethical and social awareness, understanding the implications of biotechnology and promoting its responsible use. Additionally, graduates will be prepared for diverse career paths in biotechnology-related industries, research institutions, and higher education, with strong communication, teamwork, and problem-solving abilities. Some of the common job roles and responsibilities of a biomedical scientist are:

PSO1. Develop a comprehensive understanding of biological systems and biotechnological applications, enabling the application of theoretical knowledge to solve real-world problems in healthcare, agriculture, and environmental sectors.

PSO2. Gain proficiency in modern biotechnological techniques and laboratory practices, including DNA/RNA manipulation, protein analysis, and bioinformatics tools.

PSO3. Cultivate the ability to design, conduct, and analyze biotechnological research projects, fostering innovation and critical thinking skills essential for scientific advancements.

PSO4. Understand the ethical, legal, and social implications of biotechnology, promoting responsible use of technology and addressing global challenges like sustainable development and bioethics.

PSO5. Prepare for diverse career paths in biotechnology-related industries, research institutions, and higher education by developing strong communication, teamwork, and problem-solving skills.

CREDIT DISTRIBUTION

SEM	VAC	CC	DSE	MDC	AEC	SEC	PROJECT	TOTAL	SI
I	0	9	4	0	3	6	0	22	0
II	5	9	4	0	2	3	0	23	2
III	3	9	4	3	0	3	0	22	0
IV	0	9	4	3	3	3	0	22	2
V	0	12	4	3	3	3	0	22	0
VI	3	12	4	0	0	0	3	25	0
TOTAL	11	60	24	9	11	18	3	136	4

ACRONYMS

VAC	Value added courses
CC	Core courses
DSE	Department specific elective.
MDC	Multidisciplinary Course
AEC	Ability enhancement course
SEC	Skill enhancement course
SI	Summer internship
PROJECT/ MZP	Minor Project/Major project

B.Sc. BIOTECHNOLOGY 1ST SEMESTER

S.NO	Course Type	COURSE Code	Course title	L	T	P	Credit
1.	CC	**T02BSBT0101**	**Cell Biology**	2	1	0	**3**
2.	CC	**T02BSMB0102**	**General Microbiology**	2	1	0	**3**
3.	CC	**T02BSBT0103**	**Biochemistry**	2	1	0	**3**
4.	DSE	**T02BSBT0130**	**Developmental Biology**	3	1	0	**4**
5.	SEC	**T02BSBT0161**	**Cell Biology Lab**	0	0	4	**2**
6.	SEC	**T02BSMB0162**	**General Microbiology Lab.**	0	0	4	**2**
7.	SEC	**T02BSBT0163**	**Biochemistry Lab.**	0	0	4	**2**
8.	AEC	**T05ASEN0151**	**Professional Communication**	2	1	0	**3**
		TOTAL		**11**	**5**	**12**	**22**

B.Sc. BIOTECHNOLOGY 2nd SEMESTER

S.NO	Course Type	COURSE Code	Course title	L	T	P	Credit
1.	**CC**	**T02BSBT0201**	**Principles of Genetics**	2	1	0	**3**
2.	**CC**	**T02BSMB0202**	**Immunology**	2	1	0	**3**
3.	**CC**	**T02BSBT0203**	**Bio-instrumentation**	2	1	0	**3**
4.	**DSE**	**T05ASMA0231**	**Biostatistics**	3	1	0	**4**
5.	**VAC**	**T04BTAT0280**	**Environmental sciences**	2	1	0	3
6.	**VAC**	**T06BTME0280**	**Idea Lab**	0	0	4	**2**
7.	**SEC**	**T02BSBT0261**	**Principles of Genetics Lab**	0	0	2	**1**
8.	**SEC**	**T02BSMB0262**	**Immunology Lab.**	0	0	2	**1**
9.	**SEC**	**T02BSBT0263**	**Bio-instrumentation Lab**	0	0	2	**1**
		TOTAL		**10**	**05**	**10**	**21**
10.	**EXIT OPTION (UG CERTIFICATE)**	**Summer Internship**	**T02BSBT0290**	**0**	**0**	**4**	**2**

B.Sc. BIOTECHNOLOGY 3rd SEMESTER

S.NO	Course Type	COURSE Code	Course title	L	T	P	Credit
1.	**CC**	**T02BSBT0301**	**Molecular Biology**	**2**	1	0	**3**
2.	**CC**	**T02BSBT0302**	**Introduction to Forensic Sciences**	**2**	1	0	**3**
3.	**CC**	**T02BSBT0303**	**Bioinformatics**	**2**	1	0	**3**
4.	**DSE**	**T02BSBT0330**	**Enzyme Technology**	**3**	1	0	**4**
5.	**VAC**	**T02BSBT0380**	**Scientific writing & Presentation skills**	**2**	1	0	**3**
6.	**MDC**	**T02BSBT0340**	**Bio-computation**	2	1	0	**3**
7.	**SEC**	**T02BSBT0361**	**Molecular Biology Lab.**	**0**	0	2	**1**
	SEC	**T02BSBT0362**	**Forensic Sciences Case Studies**	**0**	0	2	**1**
8.	**SEC**	**T02BSBT0363**	**Bioinformatics Lab.**	**0**	0	2	**1**
		TOTAL		**13**	**6**	**6**	**22**

BSC BIOTECHNOLOGY 4th SEMESTER

S.NO	Course Type	COURSE Code	Course title	L	T	P	Credit
1.	**CC**	**T02BSBT0401**	**Plant Biotechnology**	**2**	**1**	**0**	**3**
2.	**CC**	**T02BSBT0402**	**Proteomics & Genomics**	**2**	**1**	**0**	**3**
3.	**CC**	**T02BSBT0403**	**Food Biotechnology**	**2**	**1**	**0**	**3**
4.	**DSE**	**T02BSBT0430**	**Biophysical Techniques**	**3**	**1**	**0**	**4**
5.	**MDC**	**T02BSBT0440**	**Non-conventional Energy Resources**	**2**	**1**	**0**	**3**
6.	**SEC**	**T02BSBT0461**	**Plant Biotechnology Lab**	**0**	**0**	**2**	**1**
7.	**SEC**	**T02BSBT0462**	**Proteomics & Genomics Lab.**	**0**	**0**	**2**	**1**
8.	**SEC**	**T02BSBT0463**	**Food Biotechnology Lab**	**0**	**0**	**2**	**1**
9.	**AEC**	**T02BSBT0450**	**Logical Skill Building and soft Skills**	**2**	**1**	**0**	**3**
		TOTAL		**13**	**6**	**6**	**22**
EXIT (UG DIPLOMA)	**SI**	**T02BSBT0490**		**0**	**0**	**4**	**2**
		TOTAL		**13**	**6**	**10**	**24**

B.Sc. BIOTECHNOLOGY 5th SEMESTER

S.NO	Course Type	COURSE Code	Course title	L	T	P	Credit
1.	**CC**	**T02BSBT0501**	**Animal Biotechnology**	2	1	0	**3**
2.	**CC**	**T02BSBT0502**	**Environmental Biotechnology**	2	1	0	**3**
	CC	**T02BSBT0504**	**Pharmaceutical Biotechnology**	2	1	0	**3**
3.	**CC**	**T02BSBT0503**	**IPR in Life Sciences**	2	1	0	**3**
4.	**DSE**	**T02BSMB0531**	**Microbial Bio-diversity**	3	1	0	**4**
5.	**MDC**	**T02BSBT0540**	**Entrepreneurship & Innovation In Biotechnology**	2	1	0	**3**
6.	**SEC**	**T02BSBT0561**	**Animal Biotechnology Lab.**	0	0	2	**1**
7.	**SEC**	**T02BSBT0562**	**Environmental Biotechnology Lab**	0	0	2	**1**
8.	**SEC**	**T02BSBT0563**	**IPR Case Studies**	0	0	2	**1**
		TOTAL		**13**	**6**	**6**	**22**

BSC BIOTECHNOLOGY 6th SEMESTER

S.NO	Course Type	COURSE Code	Course title	L	T	P	Credit
1.	**CC**	**T02BSBT0601**	**Medical Biotechnology**	**2**	**1**	**0**	**3**
2.	**CC**	**T02BSBT0602**	**Downstream processing**	**2**	**1**	**0**	**3**
3.	**CC**	**T02BSBT0603**	**Recombinant DNA Technology**	**2**	**1**	**0**	**3**
4.	**CC**	**T02BSBT0604**	**Industrial Biotechnology**	**2**	**1**	**0**	**3**
5.	**DSE**	**T02BSBT0630**	**Biotechnology & Human welfare**	**3**	**1**	**0**	**4**
6	**AEC**	**T02BSBT0650**	**AI in Biotechnology**	**2**	**1**	**0**	**3**
7.	**VAC**	**T02BSBT0680**	**Workshop/Seminar / Training/ Conference/ Field Activity**	**0**	**0**	**6**	**3**
8.	**MAP**	**T02BSBT0696**	**MAJOR PROJECT**	**0**	**0**	**6**	**3**
		TOTAL		**16**	**6**	**6**	**25**

**The Mini Project or internship (4 weeks) will be done during summer break after 2nd semester.

Marking Scheme

1. All courses irrespective of assigned credits will be for 100 marks.
2. Continuous internal assessment will be for 40 marks, comprising quiz, test, seminar/assignment. Mid semester examination will be for 20 marks. All internal will thus be for 60 marks.
3. End semester examination will be for 40 marks.
4. It is mandatory to secure 30% marks individually in internal and end semester examination Overall, 40% marks are mandatory for passing each course.