

**UNDER GRADUATE COURSE CURRICULUM  
LECTURE OUTLINE  
OF  
B. TECH. (BIOTECHNOLOGY)**

**(As per V<sup>th</sup> Dean's Committee Recommendation, ICAR)**



**ASPEE SHAKILAM BIOTECHNOLOGY INSTITUTE  
NAVSARI AGRICULTURAL UNIVERSITY  
ATHWA FARM, GHOD DOD ROAD  
SURAT- 395 007(GUJARAT)**



## GENERAL OUTLINE of B. Tech. (Biotechnology)

### UG Degree: B.Tech. (Biotechnology)

The curriculum has a total of 184 credit hours including non-credit hours for the Biotechnology UG degree programme.

Four electives, each of 18 credit hours have been finalized for the degree programme and the students will have to opt for one of these electives during their sixth semester of the degree. The finalized curriculum has more than 68 per cent courses from biotechnology discipline itself.

Instead of Rural Agricultural Work Experience Programme (RAWEP), this includes a well structured two semester student 'Rural Entrepreneurship Awareness Development Yojana (READY)' for a maximum of 40 credit hours divided as follows:

- 24 weeks 'Student READY In-house Skill Development Modules' of 20 credit hours which includes four modules (only one to be opted):
  - A. Plant Biotechnology
  - B. Animal Biotechnology
  - C. Microbial and Environmental Biotechnology
  - D. Bioinformatics
- 10 weeks 'Student READY Project Formulation, Execution and Presentation' of 10 credit hours
- 10 weeks On-campus/Off-campus 'Student READY Entrepreneurial Development in Biotechnology' of 10 credit hours

## DISTRUBUTION OF COURSES

### Biotechnology Core Courses

**Total Credit Hours=64**

Course No.	Course Title	Credit hours
Biotech. 101	Cell Biology	2+0
Biotech. 102	Basic Genetics	2+1
Biotech. 103	Introduction to Biotechnology	2+1
Biotech. 104	Plant Tissue Culture	2+1
Biotech. 105	Molecular Biology	2+1
Biotech. 201	Recombinant DNA Technology	2+1
Biotech. 202	Introductory Bioinformatics	2+1
Biotech. 203	Plant Genetic Transformation	2+1
Biotech./ECE 204	Fundamentals of Electronics and Instrumentation in Biotechnology	1+1
Biotech. 205	Classical and Molecular Cytogenetics	2+1
Biotech. 301	Immunology	2+1
Biotech. 302	Molecular Genetics	2+0
Biotech. 303	Nanobiotechnology	2+0
Biotech. 304	Animal Biotechnology	3+1
Biotech. 305	Molecular Marker Technology	2+0
Biotech. 306	Genomics and Proteomics	3+0
Biotech. 307	IPR, Biosafety and Bioethics	2+0
Biotech. 308	Computational Biology	2+1
Biochem. 201	General Biochemistry	3+1
Biochem. 301	Enzymology and Enzyme Technologies	2+1
Bot./Zoo. 102	Biodiversity and its Conservation	2+0
Micro. 101	Microbiology	2+1
Micro. 201	Microbial Genetics	2+1

### Agriculture Courses

**Total Credit Hours= 15**

Course No.	Course Title	Credit hours
Agron. 101	Crop Production Technology	2+1
*Hort. 101	Production Technologies for Horticultural Crops	2+1
*PB 101	Basics of Plant Breeding	2+1
*PB 201	Breeding of Field Crops	2+1

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\*Ent-Pl.Path. 201 Fundamentals of Crop Protection 2+1

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Courses marked \* are optional to the package of Animal Science courses marked as \*\*

**Animal Science Courses**

**Total Credit Hours= 15**

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<b>Course No.</b>	<b>Course Title</b>	<b>Credit hours</b>
**AS 101	Anatomy and Physiology of Livestock	3+0
**AS 102	Introduction to Animal Breeding	2+1
AS 201	Livestock Production and Management	2+1
**AS 202	Livestock Product Technology	2+1
**AS203	Animal Health Care	2+1

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Courses marked \*\* are optional to the package of Agriculture Courses marked as \*

**Deficiency/Remedial Courses**

**Total Credit hours= 6**

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<b>Course No.</b>	<b>Course Title</b>	<b>Credit hours</b>
Bot. 101	Basic Botany	2+1
Zoo. 101	Basic Zoology	2+1
Math. 101	Basic Mathematics – I	3+0
Math.102	Basic Mathematics - II	3+0

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Bot. 101 + Zoo. 101 or Math. 101 + Math. 102

**General Courses**

**Total Credit Hours= 18**

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<b>Course No.</b>	<b>Course Title</b>	<b>Credit hours</b>
CSPD 101	Communication Skills and Personality Development	1+1
EDBM 201	Entrepreneurship Development and Business Management	1+1
Econ. 201	Economics and Marketing	2+1
Env.101	Environmental Studies and Disaster Management	2+1
FT 101	Food Science and Processing	1+1
HD 101	Human Ethics	1+0
ICT 201	Information and Communication Technology	1+1
ICT 301	Agricultural Informatics	2+1

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**Basic Science Courses****Total Credit Hours=14**

<b>Course No.</b>	<b>Course Title</b>	<b>Credit hours</b>
Bot. 201	Plant Physiology	2+1
Math. 201	Biomathematics	2+1
Phy. 201	Biophysics	2+1
Stat. 101	Basic Statistics	1+1
Stat. 301	Biostatistics	2+1

**Elective Courses in Biotechnology (Only one to be opted)****Elective I. Plant Biotechnology Total Credit Hours=18**

<b>Course No.</b>	<b>Course Title</b>	<b>Credit hours</b>
Biotech. 411	Plant Tissue Culture and its Applications	2+1
Biotech. 412	Principles and Applications of Plant Genetic Transformation	2+1
Biotech. 413	Applications of Genomics and Proteomics	2+1
Biotech. 414	Molecular Breeding in Field Crops	2+1
Biotech. 415	Molecular Breeding of Horticultural Crops and Forest Trees	2+1
Biotech. 416	Epigenetics and Gene Regulation	2+1

**Elective II. Animal Biotechnology Total Credit Hours=18**

Biotech. 421	Principles and Procedures of Animal Cell Culture	2+1
Biotech. 422	Animal Genomics	2+1
Biotech. 423	Embryo Transfer Technologies	2+1
Biotech. 424	Transgenic Animal Production	3+0
Biotech. 425	Molecular Diagnostics	2+1
Biotech. 426	Molecular Virology and Vaccine Production	2+1

**Elective III. Microbial and Environmental Biotechnology Total Credit Hours=18**

Biotech. 431	Microbial Biotechnology	2+1
Biotech. 432	Bio-prospecting of Molecules and Genes	3+0
Biotech. 433	Molecular Ecology and Evolution	3+0
Biotech. 434	Fundamentals of Molecular Pharming and Biopharmaceuticals	2+1
Biotech. 435	Food Biotechnology	2+1

Biotech. 436	Green Biotechnology	2+1
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**Elective IV. Bioinformatics Total Credit Hours=18**

Biotech. 441	Programming for Bioinformatics	2+2
Biotech. 442	Bioinformatics Tools and Biological Databases	2+1
Biotech. 443	Structural Bioinformatics	2+1
Biotech. 444	Pharmacogenomics	2+1
Biotech. 445	Metabolomics and System Biology	2+1
Biotech. 446	Computational Methods for Data Analysis	1+1

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**Student READY Programme (VII & VIII Semesters)**

**Total Credit Hours=40**

<b>Course No.</b>	<b>Course Title</b>	<b>Credit hours</b>
Biotech. 491	In-house Skill Development Modules	20
Biotech. 492	Project Formulation, Execution and Presentation	10
Biotech. 493	Entrepreneurial Development in Biotechnology (on campus /off campus)	10

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**Non Credit Courses**

**Total Credit Hours=6**

<b>Course Title</b>	<b>Non Credit hours</b>
Educational Tour	2
NCC/NSO/NSS	4

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## SEMESTER WISE DISTRUBUTION OF COURSES

### Semester- I

Sr. No.	Course No.	Course Title	Credit hours
1	Bot. 101/ Math. 101	Basic Botany/ Basic Mathematics - I	2+1/ 3+0
2	Agron. 101	Crop Production Technology	2+1
3	Biotech.101	Cell Biology	2+0
4	Biotech. 102	Basic Genetics	2+1
5	Biotech. 103	Introduction to Biotechnology	2+1
6	CSPD 101	Communication Skills and Personality Development	1+1
7	Env. 101	Environmental Studies and Disaster Management	2+1
8	FT 101	Food Science and Processing	1+1
9	HD 101	Human Ethics	1+0
10		NCC/NSO/NSS	0+1 NC
<b>Total</b>			<b>15+8 =23</b>

### Semester- II

Sr. No.	Course No.	Course Title	Credit hours
1	Zoo. 101/ Math. 102	Basic Zoology/ Basic Mathematics - II	2+1/ 3+0
2	Biotech. 104	Plant Tissue Culture	2+1
3	Biotech. 105	Molecular Biology	2+1
4	Bot. /Zoo. 102	Biodiversity and its Conservation	2+0
5	*Hort. 101/ **AS 101	Production technologies for Horticultural Crops/ Anatomy and Physiology of Livestock	2+1/ 3+0
6	Micro. 101	Microbiology	2+1
7	*PB 101/ **AS 102	Basics of Plant Breeding/ Introduction to Animal Breeding	2+1
8	Stat. 101	Basic Statistics	1+1
9		NCC/NSO/NSS	0+1 NC
<b>Total</b>			<b>15+8 =23</b>



### Semester- III

Sr. No.	Course No.	Course Title	Credit hours
1	AS 201	Livestock Production and Management	2+1
2	Biotech. 201	Recombinant DNA Technology	2+1
3	Bot. 201	Plant Physiology	2+1
4	ICT 201	Information and Communication Technology	1+1
5	Econ. 201	Economics and Marketing	2+1
6	*Ent.-Pl.Path. 201/ **AS 202	Fundamentals of Crop Protection/ Livestock Product Technology	2+1
7	Math. 201	Biomathematics	2+1
8	*PB 201/ **AS 203	Breeding of Field Crops/ Animal Health Care	2+1
9		NCC/NSO/NSS	0+1 NC
<b>Total</b>			<b>15+9 =24</b>

### Semester- IV

Sr. No.	Course No.	Course Title	Credit hours
1	EDBM 201	Entrepreneurship Development and Business Management	1+1
2	Biochem. 201	General Biochemistry	3+1
3	Biotech. 202	Introductory Bioinformatics	2+1
4	Biotech. 203	Plant Genetic Transformation	2+1
5	Biotech./ECE 204	Fundamentals of Electronics and Instrumentation in Biotechnology	1+1
6	Biotech. 205	Classical and Molecular Cytogenetics	2+1
7	Micro. 201	Microbial Genetics	2+1
8	Phy. 201	Biophysics	2+1
9		NCC/NSO/NSS	0+1 NC
<b>Total</b>			<b>15+9 =24</b>

### Semester- V

Sr. No.	Course No.	Course Title	Credit hours
1	Biochem. 301	Enzymology and Enzyme Technologies	2+1
2	Biotech. 301	Immunology	2+1
3	Biotech. 302	Molecular Genetics	2+0
4	Biotech. 303	Nanobiotechnology	2+0
5	Biotech. 304	Animal Biotechnology	3+1
6	Biotech. 305	Molecular Marker Technology	2+0
7	Biotech. 306	Genomics and Proteomics	3+0
8	Biotech. 307	IPR, Biosafety and Bioethics	2+0
9	ICT 301	Agricultural Informatics	2+1
<b>Total</b>			<b>20+4=24</b>

### Semester- VI

Sr. No.	Course No.	Course Title	Credit hours
1	Biotech. 308	Computational Biology	2+1
2	Stat. 301	Biostatistics	2+1
3	Optional/ Elective Courses (6)	Electives (4): Only one to be chosen (each with six courses) 1.Plant Biotechnology 2.Animal Biotechnology 3.Microbial and Environmental Biotechnology 4.Bioinformatics	18 (12+6) (13+5) (14+4) (11+7)
<b>Total</b>			<b>22+2=24</b>

### Semester- VII

Sr. No.	Course No.	Module*	Credit hours
1	Biotech. 491	1. Plant Biotechnology 2. Animal Biotechnology 3. Microbial and Environmental Biotechnology 4. Bioinformatics	0+20
	Student READY In-house Skill Development Modules		
*To opt only one module as per the chosen elective in sixth semester			

2	Educational Tour	2 NC
<b>Total</b>		<b>20+2=22</b>

### Semester- VIII

Sr. No.	Course No.	Course Title	Credit hours
1	Biotech. 492	Student READY- Project Formulation, Execution and Presentation	0+10
2	Biotech. 493	Student READY- Entrepreneurial Development in Biotechnology (On-campus/Off Campus)	0+10
<b>Total</b>			<b>0+20 =20</b>

### Curriculum Summary

Deficiency/Remedial Courses Credit hours: 6

General Course Credit hours: 18

Biotechnology Courses Credit hours: 122

Basic Science Course Credit hours: 14

Agriculture Course Credit hours: 15\*

Animal Sciences Courses Credit hours: 15\*\*

Compulsory Credit Hours of Credit Courses: 178

Edu. Tour Educational Tour: 0+2 NC

NCC/NSO/NSS: 4 NC

\*12 Credit hours of Agriculture courses exchangeable with \*\*12 Credit hours of Animal Science courses