

## CURRICULUM OVERVIEW BS IN BIOTECHNOLOGY

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### Curriculum

#### Compulsory Requirements

(i.e. Student has no choice)

**9 Courses**

**24 Credit Hours**

#### Subject

English I

English II

English III

Pakistan Studies

Islamic Studies

Biosafety & Bioethics

Mathematics- I (Pre-calculus)/Intro to Biology

Biomathematics

Introduction to computer science

#### Cr.hrs.Subject

3+0

3+0

3+0

2+0

2+0

2+0

3+0

3+0

2+1

24

#### General Courses

To be chosen from other Department

**8 Courses**

**24 Credit Hours**

#### Cr. hrs.

Physical & Inorganic Chemistry 2+1

Organic Chemistry 2+1

Basic Anatomy & Physiology I 2+1

Basic Anatomy & Physiology II 3+0

General Pathology 3+0

Pharmacology 2+1

Two social science courses:

Economics 3+0

Marketing

3+0

24

| <b>Discipline Specific</b>             | <b>Major Courses</b>                    |   | <b>Elective Courses</b>     |                              |                 |
|--|---|---|-----------------------------|------------------------------|-----------------|
| Foundation Courses                     | (including research project/Internship) |   | within the major            |                              |                 |
| <b>13 Courses</b>                      | <b>13 Courses</b>                       |   | <b>Any 4 to be selected</b> |                              |                 |
| <b>39 Credit Hours</b>                 | <b>35 Credit Hours</b>                  |   | <b>12 Credit Hours</b>      |                              |                 |
| <b>Subject</b>                         | <b>Cr.hrs.</b>                          | <b>Subject</b>  | <b>Cr. hrs.</b>             | <b>Subject</b>               | <b>Cr. hrs.</b> |
| Microbiology                           | 2+1                                     | Principle of Biochemical Engineering & Thermodynamics | 3+0                         | Pharmaceutical Biotechnology | 3+0             |
| Biochemistry-I                         | 2+1                                     | Agriculture Biotechnology                             | 2+1                         | Cell and Tissue Culture      | 2+1             |
| Biochemistry-II                        | 2+1                                     | Health Biotechnology                                  | 3+0                         | Hospital Waste Management    | 2+1             |
| Cell & Molecular Biology-I             | 3+0                                     | Environmental Biotechnology                           | 3+0                         | Marine Biotechnology         | 3+0             |
| Classical Genetics                     | 3+0                                     | Food Biotechnology                                    | 2+1                         | Animal Biotechnology         | 3+0             |
| Probability & Biostatistics            | 3+0                                     | Genomics & Proteomics                                 | 3+0                         | Molecular Diagnostics        | 3+0             |
| Analytical Chemistry & instrumentation | 2+1                                     | Bioinformatics  | 2+1                         | Virology                     | 3+0             |
| Cell & Molecular Biology-II            | 2+1                                     | Industrial Biotechnology                              | 3+0                         | Fungal Biotechnology         | 3+0             |
| Introduction to Biotechnology          | 2+1                                     | Research Methodology                                  | 3+0                         | Radiobiology                 | 3+0             |
| Immunology                             | 3+0                                     | Seminar-I   | 1+0                         | Biosensors                   | 3+0             |

|  |     |  |     |                              |     |
|--|-----|--|-----|------------------------------|-----|
| Methods in Molecular Biology                                 | 1+2 | Seminar-II   | 1+0 | Fermentation Biotechnology   | 2+1 |
| Quality control and regulatory requirements in biotechnology | 3+0 | Research Project OR Internship OR special Paper- I (M) | 3+0 | Biofuels and Bio refineries  | 3+0 |
| Microbial Biotechnology                                      | 2+1 | Research Project OR Internship OR special paper- II(M) | 3+0 | Water & wastewater treatment | 2+1 |
|  | 39  |  | 35  |                              | 12  |

The undergraduate semester wise degree plan as scheme of 4 years is shown below:

#### **YEAR-I SEMESTER-I**

| <b>Serial #</b> | <b>Course Title</b>                      | <b>Credit Hours</b> |
|-----------------|--|---------------------|
| 1               | English-I                                | 3                   |
| 2               | Pakistan Studies                         | 2                   |
| 3               | Mathematics-I OR Introduction to Biology | 3                   |
| 4               | Inorganic and Physical chemistry         | 2+1                 |
| 5               | Microbiology                             | 2+1                 |
| 6               | Introduction to computer science         | 2+1                 |

#### **YEAR-I SEMESTER-II**

| <b>Serial #</b> | <b>Course Title</b>    | <b>Credit Hours</b> |
|-----------------|------------------------|---------------------|
| 1               | English-II             | 3                   |
| 2               | Islamic studies/ethics | 2                   |

|   |                                   |     |
|---|-----------------------------------|-----|
| 3 | Biomathematics                    | 3   |
| 4 | Basic Anatomy and Physiology-I2+1 |     |
| 5 | Organic chemistry                 | 2+1 |
| 6 | Introduction to Biotechnology     | 3   |

### **YEAR-II SEMESTER-III**

| <b>Serial #</b> | <b>Course Title</b>              | <b>Credit Hours</b> |
|-----------------|----------------------------------|---------------------|
| 1               | English-III                      | 3                   |
| 2               | Microbial Biotechnology          | 2+1                 |
| 3               | Basic Anatomy and Physiology-II3 |                     |
| 4               | Cell and Molecular Biology-I     | 3                   |
| 5               | Organic chemistry                | 2+1                 |
| 6               | Biochemistry-I                   | 2+1                 |

### **YEAR-II SEMESTER-IV**

| <b>Serial #</b> | <b>Course Title</b>                         | <b>Credit Hours</b> |
|-----------------|---|---------------------|
| 1               | Immunology                                  | 3                   |
| 2               | Probability and Biostatistics               | 3                   |
| 3               | General pathology                           | 3                   |
| 4               | Analytical chemistry and instrumentation2+1 |                     |
| 5               | Cell and Molecular Biology-II               | 2+1                 |
| 6               | Biochemistry-II                             | 2+1                 |

### **YEAR-III SEMESTER-V**

| <b>Serial #</b> | <b>Course Title</b>                                      | <b>Credit Hours</b> |
|-----------------|--|---------------------|
| 1               | Genomics and proteomics                                  | 3                   |
| 2               | Pharmacology   | 3                   |
| 3               | Biosafety and Bioethics                                  | 2                   |
| 4               | Principles of Biochemical Engineering and thermodynamics | 2+1                 |
| 5               | Biophysics   | 3                   |

### **YEAR-III SEMESTER-VI**

| <b>Serial #</b> | <b>Course Title</b>                        | <b>Credit Hours</b> |
|-----------------|--|---------------------|
| 1               | Food Biotechnology                         | 3                   |
| 2               | Economics                                  | 3                   |
| 3               | Methods in molecular biology               | 2+1                 |
| 4               | Elective I                                 | 3                   |
| 5               | Research Methodology and Skill Enhancement | 3                   |
| 6               | Research Methodology and Skill Enhancement | 2+1                 |

### **YEAR-IV SEMESTER-VII**

| <b>Serial #</b> | <b>Course Title</b>         | <b>Credit Hours</b> |
|-----------------|-----------------------------|---------------------|
| 1               | Health Biotechnology        | 3                   |
| 2               | Seminar I                   | 1                   |
| 3               | Environmental Biotechnology | 3                   |

|   |  |   |
|---|--|---|
| 4 | Elective II  | 3 |
| 5 | Research Project OR Internship OR Special Paper – I3 |   |
| 6 | Research Project OR Internship OR Special Paper – I3 |   |

#### **YEAR-IV SEMESTER-VIII**

| <b>Serial #</b> | <b>Course Title</b>                                   | <b>Credit Hours</b> |
|-----------------|---|---------------------|
| 1               | Agriculture Biotechnology                             | 2+1                 |
| 2               | Industrial Biotechnology                              | 3                   |
| 3               | Research Project OR Internship OR Special Paper – II3 |                     |
| 4               | Elective III  | 3                   |
| 5               | Elective IV   | 3                   |
| 6               | Elective IV   | 1                   |

Following are the elective courses, within the major, among which any 4 are to be selected:

| <b>Serial #</b> | <b>Elective Course Title</b> | <b>Serial #</b> | <b>Elective Course Title</b>   |
|-----------------|------------------------------|-----------------|--------------------------------|
| 1               | Pharmaceutical Biotechnology | 8               | Fungal Biotechnology           |
| 2               | Cell and Tissue Culture      | 9               | Radiobiology                   |
| 3               | Hospital Waste Management    | 10              | Biosensors                     |
| 4               | Marine Biotechnology         | 11              | Fermentation Biotechnology     |
| 5               | Animal Biotechnology         | 12              | Biofuels and Bio refineries    |
| 6               | Molecular Diagnostics        | 13              | Water and wastewater treatment |
| 7               | Virology                     |                 |                                |