

## Templates for programs Biological Sciences and Bioengineering (BSBE)

### Template for BT Program in Biological Sciences and Bioengineering

| Semester 1                           | Semester 2   | Semester 3             | Semester 4             | Semester 5            | Semester 6            | Semester 7            | Semester 8            |
|--------------------------------------|--------------|------------------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| SCHEME-1 (9)<br>ELC111/ELC112/ELC113 | ETH111 (3)   | SCHEME-2<br>EME (9-11) | SCHEME-3<br>HSS-I (11) | SCHEME*<br>HSS-II (9) | SCHEME*<br>HSS-II (9) | SCHEME*<br>HSS-II (9) | SCHEME*<br>HSS-II (9) |
| MTH 111 (6)                          | MTH 113 (6)  | ESO206 (9)             | ESC201 (14)            | BSE311 (9)            | BSE321 (8)            | DE-4                  | DE-6                  |
| MTH 112 (6)                          | MTH 114 (6)  | E/SO (9-11)            | BSE222 (9)             | BSE312 (9)            | BSE421 (9)            | DE-5                  | DE-7                  |
| PHY 115 (11)                         | PHY 112 (11) | BSE211 (9)             | BSE223 (9)             | BSE411 (9)            | OE-2(9)               | OE-3                  | OE-5                  |
| PHY 111 (3)                          | CHM 111 (3)  | BSE221 (9)             | BSE322 (9)             | BSE412 (9)            | DE-2 (9)              | OE-4                  | OE-6                  |
| TA 111 (9)                           | ESC 111 (7)  | OE-1 (9)               |                        | DE-1 (9)              | DE-3 (9)              |                       |                       |
| CHM 112 (4)                          | ESC 112 (7)  |                        |                        |                       |                       |                       |                       |
| CHM 113 (4)                          | LIF111 (6)   |                        |                        |                       |                       |                       |                       |
| PE111 (3)                            | PE112 (3)    |                        |                        |                       |                       |                       |                       |
| 55                                   | 52           | 54-58                  | 50-52                  | 45-54                 | 44-53                 | 36-45                 | 36-45                 |

UGPs: BSE496 and BSE498 will be offered in ODD semesters and BSE497 and BSE499 will be offered in EVEN semesters. UGPs will be considered as DEs. All UGPs have 9 credits and letter grades. A student can take at most 1 UGP per semester (in any order).

| Credit Table for BT Program in Biological Sciences and Bioengineering |                          |                                   |
|---|--------------------------|-----------------------------------|
| Course type   | Recommended Credit range | Credit in the department template |
| Institute Core (IC)   | 112                      | 112                               |
| E/SO  | 18-45                    | 18-20                             |
| Department requirements   | 144-179                  | 161 (98 DC + 63 DE)               |
| Open electives (OE)   | 51-57                    | 54                                |
| SCHEME  | 54-58                    | 54-58                             |
| Total for 4-year BT/BS  | 391-420                  | 399-405                           |

Template for BTH program in Biological Sciences and Bioengineering

Two department UGP-1 and UGP-2 (9 credits each) should be completed in place of two DEs of the BT program. Additional three DEs (27 credits) should be taken from the following Honors course basket.

— Honors course basket (list of courses):

- BSE611A (09): Modern instrumental methods in biological sciences
- BSE642A (09): Microbiology and Immunology
- BSE652A (09): Developmental Biology
- BSE653A (09): Functional Genomics
- BSE654A (09): Human Molecular Genetics
- BSE655A (09): Physiology
- BSE661A (09): Biological Membranes

— **CPI criteria for BTH: 8.5**

Template for the BTM program in Biological Sciences and Bioengineering

Students have to take 54 credits of course from the Management Track Basket (MTB)

| Template for 3 <sup>rd</sup> to 8 <sup>th</sup> semester for BTM program in Biological Sciences and Bioengineering |                                       |                           |                           |                           |                           |
|--|---------------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Semester 3   | Semester 4                            | Semester 5                | Semester 6                | Semester 7                | Semester 8                |
| SCHEME-2<br>EME (9-11)/ HSS-I<br>(11)  | SCHEME-3<br>HSS-I (11)/<br>EME (9-11) | SCHEME<br>* HSS-II<br>(9) | SCHEME<br>* HSS-II<br>(9) | SCHEME<br>* HSS-II<br>(9) | SCHEME<br>* HSS-II<br>(9) |
| ESO206 (9)   | ESC201 (14)                           | BSE311 (9)                | BSE321 (8)                | DE-3                      | DE-4                      |
| E/SO (9-11)  | BSE222 (9)                            | BSE312 (9)                | BSE421 (9)                | OE-3                      | MTB-4                     |
| BSE211 (9)   | BSE223 (9)                            | BSE411 (9)                | OE-2 (9)                  | MTB-2                     | MTB-5                     |
| BSE221 (9)   | BSE322 (9)                            | BSE412 (9)                | DE-2 (9)                  | MTB-3                     | MTB-6                     |
| OE-1 (9)   |                                       | DE-1 (9)                  | MTB-1                     |                           |                           |
|  |                                       |                           |                           |                           |                           |
|  |                                       |                           |                           |                           |                           |
| 54-58  | 50-52                                 | 45-54                     | 44-53                     | 36-45                     | 36-45                     |

\* Students have to take only three SCHME (HSS-II) courses in semesters 5 to 8

Template for five year dual-degree program in Biological Sciences and Bioengineering

| Template for 7 <sup>th</sup> to 10 <sup>th</sup> semester of dual-degree program in BSBE (Category-A) |                     |                     |                      |
|---|---------------------|---------------------|----------------------|
| 7 <sup>th</sup> sem   | 8 <sup>th</sup> sem | 9 <sup>th</sup> sem | 10 <sup>th</sup> sem |
| DE PG-1 (9)   | DE PG-3 (9)         | BSE702A (0)         | Thesis credits (36)  |
| DE PG-2 (9)   | DE PG-4 (9)         | Thesis credits (36) |                      |
| BSE601A (0)   | BSE602A (0)         |                     |                      |
|   | BSE701A (0)         |                     |                      |
| 18  | 18                  | 36                  | 36                   |

*Minimum Credit Requirements in MT part for graduation:*

PG Components: 36 credits Thesis: 72 credits

*Remarks:*

- 1) All DE courses should be taken with the consent of the Supervisor
- 2) Up to 36 OE credits may be waived from the BT program for students opting for the dual- degree program.

**Category B dual-degree (UG from different department)**

| Template for 7 <sup>th</sup> to 10 <sup>th</sup> semester of dual-degree program in BSBE (Category-B) |                 |                     |                     |                     |                      |
|---|-----------------|---------------------|---------------------|---------------------|----------------------|
| UG component  |                 | PG component        |                     |                     |                      |
| Odd   | Even            | 7 <sup>th</sup> sem | 8 <sup>th</sup> sem | 9 <sup>th</sup> sem | 10 <sup>th</sup> sem |
| ESO206 (9)  | UGP in BSBE (9) | BSE613A (9)         | DE PG-3 (9)         | BSE702A (0)         | Thesis credits (36)  |
| BSE221 (9)  |                 | DE PG-1 (9)         | DE PG-4 (9)         | Thesis credits (36) |                      |
| BSE311 (9)  |                 | DE PG-2 (9)         | BSE602A (0)         |                     |                      |
|   |                 | BSE601A (0)         | BSE701A (0)         |                     |                      |
| 27  | 9               | 27                  | 18                  | 36                  | 36                   |

*Minimum Credit Requirements in MT part for graduation:*

PG Components: 45 credits

Thesis: 72 credits

*Remarks:*

- 1) All DE courses should be taken with the consent of the Supervisor
- 2) Upto 36 OE credits may be waived from the BT program for students opting for the dual- degree program.

Template for the double major: second major in Biological Sciences and Bioengineering

| <b>BSBE Double Major Template</b> |                |
|-----------------------------------|----------------|
| Odd Semester                      | Even Semester  |
| Pre-requisites                    |                |
| ESO206 (9)                        |                |
| Mandatory BSBE Core Courses       |                |
| BSE211 (9)                        | BSE222 (9)     |
| BSE221 (9)                        | BSE223 (9)     |
| BSE311 (9)                        | BSE322 (9)     |
| BSE312 (9)                        | BSE321 (8)     |
| BSE411 (9)                        | BSE421 (9)     |
| BSE412 (9)                        |                |
|                                   |                |
| DC credits: 54                    | DC Credits: 45 |

## Minors in Biological Sciences and Bioengineering

### 1. Tissue Engineering: (this Minor already exists)

- Three compulsory courses: BSE211 [09], BSE411 [09], BSE421 [09] (*the courses are the same as before but their credits are changing in the new UGARC*)

### 2. Engineering in Medicine:

*(This is a new Minor offered in the new UGARC)*

Requirement: Any 3 from the following basket of courses:

- BSE616A [09]: Biopharmaceuticals
- BSE644A [09]: Optical microscopy & bioimaging
- BSE656A [09]: Neurobiology
- BSE662A [09]: Decision making and the brain
- BSEXXXA [09]: Biodesign (to be floated)
- BSEYYYYA [09]: Biosensors and Biomedical Devices (to be floated)