Noida International University

Evaluation Scheme & Syllabus

For

B. Tech
(Bio Technology)

On

AICTE MODEL CURRICULUM

(Effective from the Session: 2018-19)

Noida International University

Introduction- B. Tech in Biotechnology is an academic programme of the duration of four years. Biotechnology engineering is an undergraduate degree programme in applied sciences that amalgamates the facts from both Biological sciences and technology. This study utilizes the biological processes which include the study of microorganisms or knowledge of antibiotics and further implement them in various industrial purpose.

In simple terms, Biotechnology is a study which involves the use of living organisms. The living organisms are used to make useful chemicals which can be utilized in industries. Biotechnological products are used in areas like agriculture, food sciences and medicine.

Program Educational Objectives (PEOs)

The Department of Biotechnology has developed and maintained a well-defined set of educational objectives and desired program outcomes. Educational objectives of the program cater to the requirements of the stakeholders such as students, parents, employers, alumni, faculty etc. The program educational objectives are as follows:

- **PEO**1: Provide graduates with a strong foundation in mathematics, science and engineering fundamentals to enable them to devise and deliver efficient solutions to challenging problems in Electronics, Communications and allied disciplines.
- **PEO**2: Impart analytic and thinking skills to develop initiatives and innovative ideas for R&D, Industry and societal requirements.
- **PEO**3: Provide sound theoretical and practical knowledge of both Biological sciences and technology, managerial and entrepreneurial skills to enable students to contribute to the well-being of society with a global outlook.
- **PEO**4: Inculcate qualities of teamwork as well as social, interpersonal and leadership skills and an ability to adapt to evolving professional environments in the domains of engineering and technology.
- **PEO**5: Motivate graduates to become good human beings and responsible citizens for the overall welfare of the society.

Programme specific outcome (PSO)

- Acquire knowledge on the fundamentals of biotechnology for sound and solid base which enables them to understand the emerging and advanced engineering concepts in life sciences.

- Acquire knowledge in domain of biotechnology enabling their applications in industry and research.

- Empower the students to acquire technological knowhow by connecting disciplinary and interdisciplinary aspects of biotechnology

Program outcomes (POs)

Engineering Graduates will be able to:

- **PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Credit System-Credit requirement for award of B. Tech:

- Every semester shall offer a minimum of 12 credits and a maximum of 24 credits.
- Credits for the Project or Thesis can vary from 10 to 15.
- The total number of credits for the B. Tech Degree Course could vary from a minimum of 158 credits to a maximum of 178 credits.
- All courses of study put together would engage the students for a minimum of 26 periods or hours of study a week and a maximum of 30 periods or hours a week.

Under the Choice based credit system, which is a student or learner centric system, the courses of study in the B. Tech Degree course shall be as under:

a) Professional Core (PC) Course: A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

b) Basic Sciences and Engineering Science (BS and ES) Course: A course which informs the Professional core and should compulsorily be studied.

c) Elective Course: Generally, a course which can be chosen from a pool of courses and are of two types:

(i) Professional Elective (PE) which may be very specific or specialized or advanced or supportive to the discipline or subject of study or which provides an extended scope

(ii) Open Elective (OE) which enables an exposure to some other discipline or subject or domain or nurtures the candidate 's proficiency or skill

The Weightage in terms of Credits for each of the above in the prescribed curriculum of the institution shall be as follows:

S.no.	Credit Breakups	Credits
1	Humanities and Social Sciences including Management courses	11
2	Basic Science courses	23
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	20
4	Professional core courses	59
5	Professional Elective courses relevant to chosen specialization/branch	16
6	Open subjects – Electives from other technical and /or emerging subjects	12
7	Project work, seminar and internship in industry or elsewhere	17
8	Mandatory Courses	0
		*158

Minor variation is allowed as per need of the respective disciplines.

While calculating credits the following guidelines shall be adopted, namely: -
- 1 Hr. Lecture (L) per week 1 credit
- 1 Hr. Tutorial (T) per week 1 credit
- 1 Hr. Practical (P) per week 0.5
- 2 Hours Practical (Lab)/week 1 credit

Credit distribution in each semester (160 credits to 8 semesters)

Semester	Credits		
	Theory	Practical	Total
1st	14	6.5	20.5
2nd	13	4.5	17.5
3rd	18	4	22
4th	18	3	21
5th	17	5	22
6th	18	3	21
7th	14	7	21
8th	6	9	15
Total	**113**	**42**	**160**

Course coding system

Every course coded as follows:

BSC : Basic Science Courses

ESC : Engineering Science Course

MC : Mandatory Courses

HSMC : Humanities and Social Sciences including Management

PCC : Program core courses

PEC : Program Elective courses

OEC : Open Elective courses

B. TECH BIOTECHNOLOGY

(LIST OF PROFESSIONAL ELECTIVES & OPEN ELECTIVES SUBJECTS)

DEPARTMENTAL ELECTIVES -I
DE BT 11: Pharmaceutical Biotechnology
DE BT 12: Nano Biotechnology
DE BT 13: Biomedical Instrumentation
DE BT 14: Metabolic Engineering

DEPARTMENTAL ELECTIVES - II
DE BT 21: Biofuels and alcohol technology
DE BT 22: Descriptive Statistics & Process Control
DE BT 23: 3-D Printing
DE BT 24: Molecular modelling and drug design

DEPARTMENTAL ELECTIVES – III
DE BT 31: Animal Biotechnology
DE BT 32: Biomarker & Diagnostics
DE BT 33: Food Biotechnology
DE BT 34: Entrepreneurship in Biotechnology

DEPARTMENTAL ELECTIVES – IV
DE BT 41: Big Data Analytics
DE BT 42: Biosimilar Technology
DE BT 43: Stem Cell Technology
DE BT 44: Gene Expression & Transgenic

DEPARTMENTAL ELECTIVES – V
DE BT 51: Precision Medicine & Wellness
DE BT 52: Tissue Engineering
DE BT 53: Waste Management & Upcycling

OPEN ELECTIVES-I
1. Database Management System
2. Embedded System
3. GIS & Remote Sensing
4. Computer based Numerical Techniques

OPEN ELECTIVES-II
1. Internet of Things
2. Artificial Intelligence
3. Software Project Management System

OPEN ELECTIVES-III
1. Robotics
2. Food and Nutrition Technology
3. Cyber Security

OPEN ELECTIVES-IV
1. Bioterrorism and National Security
2. Data Sciences
3. Block chain