SAVEETHA SCHOOL OF ENGINEERING
SAVEETHA UNIVERSITY
B.Tech., BIOTECHNOLOGY PROGRAMME

CURRICULUM & SYLLABUS
REGULATION-2019

VISION

To be a Centre of excellence in the field of biotechnology equipped to create graduates who endeavor for the welfare of mankind and to nurture world-class bioengineers with a potential to innovate, invent and disseminate knowledge for the benefit of society and environment.

MISSION

- Regular updation of the course curriculum to cater to the needs of academia and industry.
- Initiate multi-disciplinary programs through academia-industry interface with special emphasis on implementation of bioprocess design and scale-up.
- Emphasis on recent trends in bioengineering through organization of conferences, symposia, workshops.
- To impart quality education for lifelong professional growth and opportunity in a wide range of Careers.
- To create awareness towards socio-ethical implications of potentials of biotechnology.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The Educational Objectives of Biotechnology Undergraduate Program at Saveetha Institute of Medical and Technical Sciences are as follows:

PEO 1: Our graduates will contribute to the field of biotechnology and allied industries designing, developing and providing solutions for product/processes/technology development.

PEO2: Work as entrepreneurs and techno managers with strong ethics and communication skills.

PEO 3: Pursue higher education and research in reputed institute at national and international level.
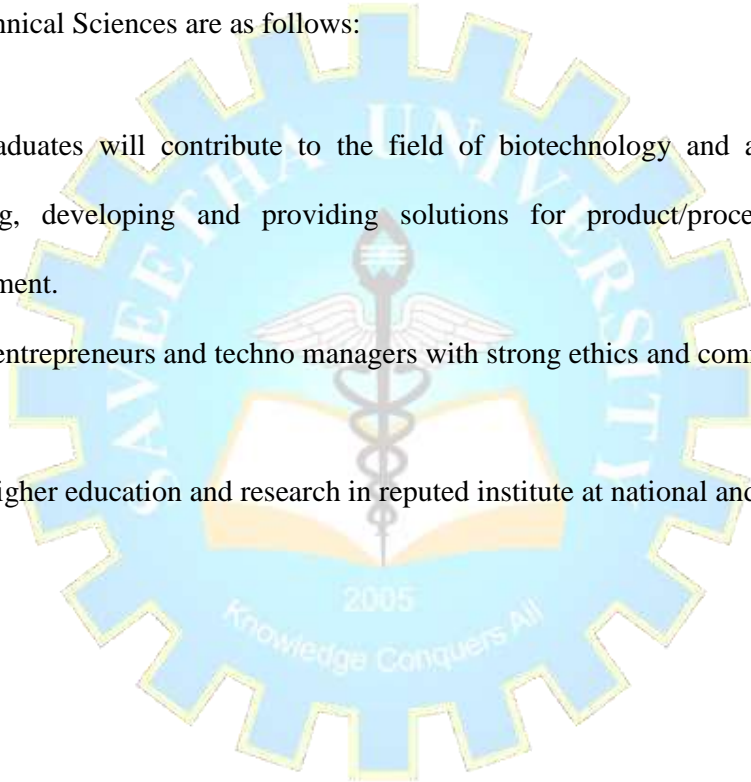
GRADUATE ATTRIBUTES RECOMMENDED BY NATIONAL BOARD OF ACCREDITATION (NBA)

GA1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

GA2: Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

GA3: 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.

GA4: Conduct investigations of complex problems:

The problems

- That cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline.
- That may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions.
- That requires consideration of appropriate constraints/requirements not explicitly given in the problem statement. (Like: cost, power requirement, durability, product life,etc.).
- Which need to be defined (modelled) within appropriate mathematical framework.
- That often requires use of modern computational concepts and tools.

GA5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering 21 activities with an understanding of the limitations.

GA6: 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.

GA7: 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.

GA8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

GA9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

GA10: 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.

GA11: 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.

GA12: Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAM OUTCOMES

On completion of the Biotechnology Undergraduate Program, graduates at Saveetha Institute of Medical And Technical Sciences will be able to:

a) Apply the knowledge of mathematics, science, engineering fundamentals, for the solution of complex engineering problems in Biotechnology.

b) Identify, formulate and analyse complex engineering problems solving substantiated conclusions using principles of mathematics, basic science, and engineering sciences.

c) Design solutions for complex engineering problems and design system components that meet the specified needs with appropriate consideration for health, safety, societal, and environmental considerations.

d) Use research-based knowledge and research methods including design of experiments, and interpretation of data, and to blend information to provide valid conclusions.

e) Create, select, and apply appropriate techniques, resources, and modern IT tools, including prediction and modeling to complex engineering activities,

f) Apply reasoning gathered by the contextual knowledge to assess health, safety and cultural issues relevant to the professional engineering and technological practice.

g) Understand the impact of the professional engineering solutions in societal and environmental contexts, and to demonstrate need for sustainable development.

h) Apply ethical principles and responsibilities and norms of the engineering and technology practice.

i) Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary domains

j) Communicate effectively with the engineering community, being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

k) Demonstrate knowledge and understanding of the engineering and managerial principles and apply these to one's own work, and leader in a team, to manage projects and in multi domain environments.

l) Recognize the need for, and have the training and ability to connect in life-long learning in the context of technological change.

CORE COURSES

S. No	Course Code	Course Title	L	T	P	C	Category	Course Prerequisite
1	UBA02	Applications of Mathematics	2	1	2	4	-	Basic Sciences
2	UBA07	Applied Statistics	2	1	2	4	-	Basic Sciences
3	UBA12	Applied Probability	2	1	2	4	-	Basic Sciences
4	UBA27	Bio Physics	3	0	2	4	-	Basic Sciences
5	UBA28	Professional Ethics and Legal Practices	3	0	2	4	-	Basic Sciences
6	UBA29	Technical English	3	0	2	4	-	HSMC
7	BIA01	Biochemistry	3	0	2	4	-	Basic Sciences
8	BTA01	Biology and Environmental Science for Engineers	3	0	2	4	-	Basic Sciences
9	CSA01	Problem Solving Skills	3	0	2	4	-	Engineering Sciences
10	EEA01	Basic Electrical and Electronics Engineering	2	1	2	4	-	Engineering Sciences
11	MEA01	Engineering Graphics	3	0	2	4	-	Engineering Sciences
12	MEA02	Engineering Workshop	1	0	6	4	-	Engineering Sciences
13	BIA02	Cell Biology	3	0	2	4	-	Basic Sciences
14	BTA02	Microbiology	3	0	2	4	-	Basic Sciences
15	BIA05	Genetics	3	0	2	4	-	Engineering Sciences
16	BTA03	Basic Industrial Biotechnology	3	0	2	4	-	Engineering
17	CEA02	Engineering Mechanics	2	1	2	4	-	Engineering Sciences
18	BTA04	Principles of Chemical Engineering	2	1	2	4	-	Engineering
19	BTA05	Molecular Biology	3	0	2	4	BIA02	Engineering Sciences
20	BTA06	Food Biotechnology	3	0	2	4	-	Engineering
21	MEA10	Heat and Mass Transfer	2	1	2	4	-	Engineering
22	BIA10	Protein Engineering	3	0	2	4	BTA05	Engineering
23	BTA07	Bioprocess Engineering	2	1	2	4	MEA10	Engineering

24	BTA08	Plant Biotechnology	3	0	2	4	-	Engineering
25	BIA03	Basic Bioinformatics	3	0	2	4	-	Engineering
26	BTA09	Genetic Engineering	3	0	2	4	BIA05	Engineering
27	BIA04	Immunology	3	0	2	4	-	Basic Sciences
28	BTA10	Nano Biotechnology	3	0	2	4	-	Engineering
29	BTA11	Downstream processing	3	0	2	4	MEA10	Engineering
30	BTA12	Biopharmaceutical Technology	3	0	2	4	-	Engineering
31	SPIC3	Mini Project	0	0	0	3	-	Project
32	SPIC4	Core Project	0	0	0	8	-	Project
33	SPIC5	Industrial Internship	0	0	0	1	-	Project
		TOTAL				**132**		

ELECTIVE COURSES [ANY EIGHT]

S. No	Course Code	Course Title	L	T	P	C	Specialization	Course Prerequisite
1	BTA13	Bio-entrepreneurship	3	0	2	4	HSMC	-
2	BTA14	Clinical Research and Trials	3	0	2	4	Engineering Sciences	-
3	BTA15	Food Safety and Packaging	3	0	2	4	Engineering	-
4	ENA13	Fundamentals of Sustainable Development	3	0	2	4	Engineering Sciences	-
5	BTA16	Waste Management	3	0	2	4	Engineering Sciences	-
6	BTA17	Water Pollution and Management	3	0	2	4	Engineering Science	-
7	BTA18	Bioethics and Biosafety	3	0	2	4	HSMC	-
8	CSA02	C Programming	3	0	2	4	Engineering Science	-
9	BTA19	Medical Diagnostics	3	0	2	4	Engineering	BTA02
10	BTA20	Agricultural Engineering	3	0	2	4	Engineering	-
11	BTA21	Bioreactor Design	2	1	2	4	Engineering Science	CEA02
12	BTA22	Characterization and Fabrication of Nanomaterials	3	0	2	4	Engineering Science	-
13	BTA23	Marine Biotechnology	3	0	2	4	Engineering	-
14	BTA24	Medical Biotechnology	3	0	2	4	Engineering	-
15	BTA25	Neurobiology	3	0	2	4	Engineering Sciences	-
16	BTA26	Biomaterials	3	0	2	4	Engineering Sciences	-
17	BTA27	Human health and diseases	3	0	2	4	Engineering Sciences	-
18	BTA28	Toxicology	3	0	2	4	Engineering Sciences	BIA01
19	CSA51	Cryptography and Network Security	3	0	2	4	Engineering	-
20	BIA09	Molecular Modeling and Drug designing	3	0	2	4	Engineering	BIA03
21	BIA11	Structural Bioinformatics	3	0	2	4	Engineering	BIA03
22	BIA12	Advanced Drug delivery system	3	0	2	4	Engineering Sciences	-

23	CSA22	Applied Medical Image Processing	3	0	2	4	Engineering	-
24	BIA13	Big Data Analytics	3	0	2	4	Engineering	-
25	BIA14	Computational Biology	3	0	2	4	Engineering	BIA03
26	CSA10	Software Engineering	3	0	2	4	Engineering	-
27	BIA15	Systems Biology	3	0	2	4	Engineering	-
28	BIA16	Tissue Engineering	3	0	2	4	Engineering	BIA20
29	BIA17	Chromatographic techniques	3	0	2	4	Engineering Sciences	-
30	BIA07	PERL Programming and BIOPERL	3	0	2	4	Engineering	-
31	BIA18	Metabolic Engineering	3	0	2	4	Engineering	-
32	BIA19	Cancer Biology	3	0	2	4	Engineering Sciences	BIA02
33	BIA20	Stem cell Biology	3	0	2	4	Basic Sciences	BIA02
34	BIA21	Gene Therapy	3	0	2	4	Engineering	BIA05
35	BIA22	Drug Design and Patenting	3	0	2	4	Engineering Sciences	-
36	BIA23	Bio Spectroscopy	3	0	2	4	Engineering Sciences	-
37	BIA24	Genetic Algorithms	3	0	2	4	Engineering	BIA05
38	BIA25	Genetic Counselling	3	0	2	4	Engineering	-
39	BTA29	Animal Therapeutics	3	0	2	4	Engineering	BIA22
40	BMA02	Anatomy and Human Physiology	3	0	2	4	Basic Sciences	-
41	BTA30	Instrumental Method of Analysis	3	0	2	4	Engineering Sciences	
42	BTA31	Fermentation Technology	3	0	2	4	Engineering	BTA03
43	BTA32	Good Manufacturing and Laboratory Practice	3	0	2	4	Engineering	
44	ECA36	Digital Image Processing	2	1	2	4	Engineering	-
45	ITA15	Blockchain Technology	3	0	2	4	Engineering	-
46	ITA23	Virtual Reality	3	0	2	4	Engineering	-
47	BTA33	Hospital Internship	3	0	2	4	Engineering	

48	BTA34	Research Internship	3	0	2	4	Engineering	
OPEN ELECTIVES [MAX OF TWO COURSES]								
49	CEA59	Geographical Information System	3	0	2	4	Engineering	-
50	CEA82	Environmental Laws	3	0	2	4	HSMC	-
51	CEA83	Global Climate Change	3	0	2	4	Engineering Sciences	-
52	CSA41	Internet of Things	3	0	2	4	Engineering	-
53	UBA30	Aptitude and Competency Skills	3	1	0	4	HSMC	-
54	UBA31	Foreign Language	4	0	0	4	HSMC	-
55	UBA32	Intellectual Property Rights	4	0	0	4	HSMC	-
56	UBA33	Principles of Management	4	0	0	4	HSMC	-
57	UBA34	Total Quality Management	4	0	0	4	HSMC	-
58	UBA35	Cyber Law	4	0	0	4	HSMC	-
59	UBA36	Organizational Behaviour	4	0	0	4	HSMC	-
60	UBA37	Multi Cuisine Cooking	4	0	0	4	HSMC	-
61	UBA38	Indian Music System	4	0	0	4	HSMC	-
62	UBA39	Short Film Making	4	0	0	4	HSMC	-
63	UBA40	Introduction to Art and Aesthetics	4	0	0	4	HSMC	-
64	UBA41	Classical and Western Dance	4	0	0	4	HSMC	-
65	UBA42	Art and Creativity	4	0	0	4	HSMC	-
66	UBA43	Economic Policies of India	4	0	0	4	HSMC	-
67	UBA44	ICT for Development	4	0	0	4	HSMC	-
68	UBA45	Life Science	4	0	0	4	Basic Sciences	-
69	UBA46	Operations Research	4	0	0	4	Engineering Science	-
		Total			**32**			

OPTIONAL COURSES [NOT CONSIDERED FOR CGPA]

S. No	Course Code	Course Title	L	T	P	C	Minor Specialization	Course Prerequisite
1	SPIC1	Project 1	0	0	0	2	-	Nil
2	SPIC2	Project 2	0	0	0	2	-	Nil
3	SPIC6	Technical Publication	0	0	0	3	-	Nil
		TOTAL				**7**		