SAPTHAGIRI
College of Engineering
Creating Tomorrow

Sapthagiri College of Engineering

(Affiliated to Visvesvaraya Technological University, Belagavi & Approved by AICTE, New Delhi)
#14/5, Chikkasandra, Hesaraghatta Main Road, Bengaluru – 560057
Phone: 080-28372800/1/2 www.sapthagiri.edu.in Fax: 080-28372797

Department of Biotechnology

1.3.1 Institution integrates cross-cutting issues relevant to Gender, Environment and Sustainability, Human Values and Professional Ethics into the Curriculum

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

The program educational objectives of Bachelor of Engineering in Biotechnology at Sapthagiri College of Engineering are broadly defined on following four counts.

PEO 1: Students will be in lucrative professionals in different sectors of Biotechnology fields with high proficiency in multidisciplinary tasks.

PEO 2: Operate technically at competent level in concocting problems of biotechnology and utilize the knowledge to develop Biological processes and Bio-techniques.

PEO 3: Students will endure higher education with harmonious combination of the skills of engineering, management & life science

PEO 4: Students will inculcate Socio-ethical values, exhibit professionalism, team spirit for lifelong learning and well-being of society and mankind.

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PROGRAM SPECIFIC OUTCOMES (PSO)

At the end of the B.E Biotechnology engineering program, the students are expected to have developed the following program specific outcomes.

PSO 1: The graduates will have the ability to plan, analyze, design, execute and contribute to the field of biotechnology and allied industries designing ,developing and providing solutions for product/processes/technology development.

PSO 2: The graduates of Biotechnology engineering program will have the ability to take up employment, entrepreneurship, research and development for sustainable society.

PSO 3: The graduates will be able to pursue opportunities for personal and professional growth, higher studies, demonstrate leadership skills and engage in lifelong learning by active participation in the Biotechnology profession.

PSO 4: The graduates will be able to demonstrate professional integrity and an appreciation of ethical, environmental, regulatory and issues related to Biotechnology.

PROGRAM OUTCOMES (POs)

Program outcomes are narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge and behavior. Graduation of **Bachelor of Biotechnology** program at Sapthagiri College of Engineering will attain the following program outcomes **in the field of Biotechnology.**

PO 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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PO 3. 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.

PO 4. 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.

PO 5. 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.

PO 6. 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.

PO 7. 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.

PO 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10. 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.

PO 11. 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.

PO 12. 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.

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Courses that integrates with Gender, Environment and Sustainability, Human Values and Professional Ethics into the Curriculum.

Sl. No.	Subject	Subject Code	Curriculum	Deployment Strategy and Tool	PO	PSO	CO	Cross-cutting issues integrated
1	Unit operations	15BT32	Principles of various unit operations like size reduction, sedimentation, filtration and mixing required for waste water treatment	Chalk and Talk method PPT	PO1,2,3,4,5,7,8, 9,10,11	PSO1,2,4	C0-(1-5)	**Environmental Sustainability**
2	Biochemistry	15BT33	Understand the basic types of chemical reactions and biomolecules as solution for environmental pollution	Chalk and Talk method PPT	PO1,2,3,7,9,11, 12	PSO1,2,3,4	C0-(1-4)	**Environmental Sustainability**
3	Microbiology [illegible]	15BT34	To understand useful soil microorganisms required to [illegible] be used in biodegradation process	Chalk and Talk method PPT	PO1,2,3,4,5,6,7, 8,9,10,11,12	PSO1,2,3,4	CO-(1-3)	**Environmental Sustainability**
4	Cell biology and Genetics	15BT35	Will be able to understand genetics and population genetics to incorporate human values	Chalk and Talk method PPT	PO1,2,3,4,8,9,11	PSO1,2,3,4	CO-(1-4)	**Human values**
5	Unit Operations Lab	15BTL37	Principles of various unit operations like size reduction, sedimentation, filtration and mixing required	Chalk and Talk method	PO1,2,3,4,5,7,8, 9,11	PSO1,2,4	CO-(1-4)	**Environmental Sustainability**

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			for waste water treatment	PPT				
6	Microbiology Lab	15BTL38	Isolation and identification of helpful microorganisms for the treatment of waste water	Chalk and Talk method PPT	PO1,2,3,4,5,6,7, 8,9,10	PSO1,2,4	CO-(1-4)	Environmental Sustainability
7	Constitution of India, Professional Ethics and Human Rights	17CPH39/49	Understand Engineering & Professional ethics and responsibilities of Engineers.	Chalk and Talk method PPT	PO1,2,3,4,6,8,11 ,12	PSO3,4	CO-(1-5)	Human Value and Professional ethics
8	Bioprocess Principles and Calculations	15BT44	Solve problems related to material and energy balance to give solutions for bioprocess development of various biomaterial used for solving issues related to environment	Chalk and Talk method PPT	PO1,2,3,4,5,6,7, 8,9,10,11,12	PSO1,2,3,4	CO-(1-4)	Environmental Sustainability
9	Bio kinetics and Bio reaction Engineering	15BT51	To determine enzyme activity, To study the fundamentals of Microbial growth kinetics and its stoichiometry applicable for the process of bioremediation	Chalk and Talk method PPT	PO 1,2,3,5,6,7	PSO1,2,4	CO-(1-5)	Environmental Sustainability
10	Genetic Engineering and application	15BT52	Summarize the applications of genetic engineering for the welfare of mankind & society	Chalk and Talk method	PO 1,2,3,5,8,11,12	PSO1,2,3,4	CO-(1-5)	Human Value and Professional ethics

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				You Tube PPT				
11	Biotechnology for sustainable environment	15BT563	Understand the impact of recovery, recycle of the useful resources from wastes by adopting advanced techniques to demonstrate the need for sustainable 12development.	Chalk and Talk method PPT	PO2,3,7,8	PSO1,2,4	CO-(1-4)	**Environmental Sustainability**
12	Genetic engg.& Immunotechnology Lab	15BTL57	Summarize the applications of genetic engineering for the welfare of mankind & society	Chalk and Talk method PPT	PO6,7,8,12	PSO1,2,4	CO-(1-3)	**Human Value**
13	Bio business and Entrepreneurship	15BT61	Understand the concepts of bioethics, biosafety and Regulatory norms	Chalk and Talk method PPT	PO6,8,11	PSO1,2,4	CO-(1-4)	**Human Value and Professional ethics**
14	Bioprocess control and automations	15BT62	Implemenation of PID controllers for sustained consumption of oxygen for the aerobic degradation process used in treatment of waste water	Chalk and Talk method PPT	PO1,2,3,4,5,6,7, 8,9,10,11,12	PSO1,2,3,4	CO-(1-5)	**Environmental Sustainability**
15	Bioprocess equipment Design and CAED	15BT64	Designing a bioreactors for the process of waste water treatment	Chalk and Talk method PPT	PO1,2,3,4,5,7,9, 10,12	PSO1,2,3,4	CO-(1-4)	**Environmental Sustainability**

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16	Bioprocess control and Automation Lab	15BTL67	Implementation of PID controllers for sustained consumption of oxygen for the aerobic degradation process used in treatment of waste water	Chalk and Talk method PPT	PO1,2,3,4,5,7,8, 11	PSO1,2,4	CO-(1-5)	**Environmental Sustainability**
17	Fermentation Technology	15BT71	Downstream process technologies for the production of biological molecules to create a sustainable environment	Chalk and Talk method PPT	PO 1,2,3,4,7,12	PSO1,2,3,4	CO-(1-4)	**Environmental Sustainability**
18	Genomics and Proteomics	15BT72	Application of human genome project in addressing social ethical issues	Chalk and Talk method You tube PPT	PO1,2,3,4,8,9,11	PSO1,2,4	CO-(1-4)	**Human Value and Professional ethics**
19	Lab to Industrial Scaling	15BT743	Describe the upstream & downstream processes used in fermentation industry for the production of biomolecules required for detoxification of environmental pollutants	Chalk and Talk method You Tube PPT	PO1,2,3,4,5,6,7, 8,9,10,11,12	PSO1,2,3,4	CO-(1-5)	**Environmental Sustainability**
20	Forensic science	15BT752	Educate the students about the professional ethics and code of conduct in professionalism	Chalk and Talk method PPT	PO1,2,4,6,8,10	PSO1,2,4	CO-(1-5)	**Human Value and Professional ethics**

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21	Fermentation Technology	15BTL76	Downstream process technologies for the production of biological molecules to create a sustainable environment	Chalk and Talk method PPT	PO1,2,3,4,7,11	PSO1,2,3,4	CO-(1-3)	**Environmental Sustainability**
22	Project Phase 1	15BTL78	Apply engineering, management and ethical principles for Project management and finance. Understand the impact of the engineering solutions in societal and environmental contexts for Sustainable development with commit to professional ethics.	PPT	PO1,2,3,4,5,6,7, 8,9,10	PSO1,2,3,4	CO-(1-5)	**Environmental Sustainability** **Human Value and Professional ethics**
23	Regulatory affairs in Biotechnology	15BT82	Comprehend the various regulatory guidelines and rules as well as the organizations governing the same	Chalk and Talk method PPT	PO1,2,3,4,6,7,8, 11,12	PSO1,2,4	CO-(1-5)	**Human Value and Professional ethics**
24	Environmental biotechnology	15BT833	Environmental sustainability by using bioremediation Biodegradation and by biolcaching process	Chalk and Talk method PPT	PO1,2,3,4,7,9,11	PSO1,2,4	CO-(1-5)	**Environmental Sustainability**
25	Internship/professional Practice	15BT84	Analyze and design solutions for engineering problems and to Demonstrate apt workplace attitude and ethics.	PPT	PO1,2,3,4,5,6,7, 8,9,10	PSO1,2,3,4	CO-(1-4)	**Human Value and Professional ethics**

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26	Project work Phase 2	15BT85	Apply engineering, management and ethical principles for Project management and finance. Understand the impact of the engineering solutions in societal and environmental contexts for Sustainable development with commit to professional ethics.	PPT	PO1,2,3,4,5,6,7, 8,9,10	PSO1,2,3,4	CO-(1-5)	**Environmental Sustainability** **Human Value and Professional ethics**
27	Seminar	15BTL86	Prepare power point presentation (PPT), communicate and answer the queries on the topic like environmental sustainability, Good laboratory Practices, Professional ethics and Human Values	PPT	PO1,2,3,4,5,6,7, 8,9,10	PSO1,2,3,4	CO-(1-5)	**Environmental Sustainability** **Human Value and Professional ethics**

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