



TULSIRAMJI GAIKWAD-PATIL College of Engineering and Technology

Wardha Road, Nagpur - 441108

Accredited with NAAC A+ Grade

Approved by AICTE, New Delhi, Govt. of Maharashtra

(An Autonomous Institution Affiliated to RTM Nagpur University)



Department of Biotechnology

Teaching Scheme and Syllabus

of

8th Semester B.Tech Biotechnology

(From Academic Year 2024-25)



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Department of Biotechnology

Vision of Institute

To emerge as a learning Centre of Excellence in the National Ethos in domains of Science,
Technology and Management.

Mission of Institute

1. To strive for rearing standard and stature of the students by practicing high standards of professional ethics, transparency and accountability.
2. To provide facilities and services to meet the challenges of Industry and Society.
3. To facilitate socially responsive research, innovation and entrepreneurship.
4. To ascertain holistic development of the students and staff members by inculcating knowledge and profession as work practices.



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Department of Biotechnology

Vision of the Department

To produce competent Entrepreneurs, Researchers and industry ready Professionals in
Biotechnology through quality education

Mission of the Department

1. To impart quality technical education and unique interdisciplinary research by merging science and technology
2. To make students aware about techniques of modern biotechnology and industrial advancements
3. To Inculcate Social and Ethical values in the students and empower them through imparting of knowledge and skills in biotechnology

Program Education Objectives (PEO)

1. Develop Biotechnology graduates as human resource with technical competencies and strong foundation of science and engineering.
2. Acquire fundamental knowledge of mathematics, Biosciences and engineering to analyze, design and implement solutions to the Biotechnological problems.
3. Understand emerging concepts and trends in Biotechnology and allied fields.
4. Apply various tools to develop innovative systems for the bioprocesses.



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Program Outcomes (PO)

- 1. Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. 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.
- 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.
- 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.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and software tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- 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.
- 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.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 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.
- 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.
- 12. Lifelong learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Program Specific Outcomes (PSO)

PSO-1: Ability to apply the acquired knowledge and recent techniques to come up with ideas in the domains of Bioprocess Engineering, Bioinformatics and Biopharmaceuticals.

PSO-2: Ability to utilize their proficiency and skills in solving real life problems in Diagnostics Genetic Engineering and Fermentation Technology using recent technologies.

PSO-3: Analyzing the impact of Biotechnology Engineering solutions in the societal and human context to create productive human resource for the country.

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Scheme of Instructions: Fourth Year B. Tech in Biotechnology Semester VIII

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs./Wk	Course Credits	EXAM SCHEME				
									CT1	CT2	CA	ESE	TOTAL
1	PROJECT	BT4801	Industry based Project/ Industry Internship	-	-	26	26	13	-	-	75	75	150
2	PCC	BT4802	Comprehensive Viva-Voice	-	-	-	-	2	-	-		100	100
3	HSMC	BT4803	Extra/Co-Curricular Activities/ Competitive Exams	2	-	-	2	2	-	-	100	-	100
4	MCC	BAU4808	Project based Science, Technology, Social, Design and Innovation	2			2	Audit	-	-	-	-	-
Total				4	-	26	30	17	-	-	175	175	350

L- Lecture T-Tutorial P-Practical CT1- Class Test 1 CT2- Class Test 2 CA- Continuous Assessment
ESE- End Semester Examination (For Laboratory: End Semester Performance)

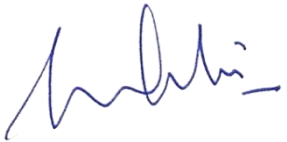
Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	BS (Biological Sc.)	PCC (Professional Core courses)	PEC (Professional Elective Courses)	OEC (Biological Sc.)	Project (Project /Seminar/ Industrial Training)	MCC (Mandatory Courses)
Credits	2	-	-	-	2			13	Yes
Cumulative Sum	14	18	14	16	51	18	14	18	--

Progressive Total Credits: 146+ 17= 163


BOS Chairman
Head
Department Of Biotechnology
Tulsiramji Gaikwad Patil Collage Of
Engineering & Technology, Nagpur


Dean Academics
Tulsiramji Gaikwad-Patil
College Of Engineering
and Technology, Nagpur


Vice-Principal
Tulsiramji Gaikwad-Patil
College Of Engineering &
Technology, Nagpur.


Principal
Tulsiramji Gaikwad Patil College Of
Engineering and Technology, Nagpur



Department of Biotechnology

Fourth Year B.Tech Biotechnology (Eighth Semester)

BAU4808: Project Based Science, Technology, Social, Design and Innovation

Teaching Scheme			Examination Scheme	
Lectures	2 Hr / Week		ESE	-
Tutorial	-		CIE	-
Practical	-		Total	-
Theory Credits: Audit			Duration of Exam: -	

Course Objectives

The Objectives of this course is:

1. To develop participants' ability to apply interdisciplinary methods combining science, technology, social sciences, design, and innovation to solve complex real-world problems.
2. To equip participants with skills for effective project-based learning, including planning, execution, and iterative design processes to foster innovation.
3. To encourage participants to design and implement socially responsible and sustainable solutions addressing societal challenges ethically and environmentally

Course Contents

Unit I	Foundations of Science and Technology <ul style="list-style-type: none">• Basics of scientific inquiry and method. Introduction to key technological concepts and tools.
Unit II	Introduction to Interdisciplinary Thinking <ul style="list-style-type: none">• Definition of interdisciplinary thinking and its significance in solving complex problems.• Exploration of diverse fields such as natural sciences, social sciences, humanities, and engineering. Case studies highlighting successful interdisciplinary projects.
Unit III	Social Perspectives and Ethics <ul style="list-style-type: none">• Societal impacts of science and technology.• Ethical considerations in innovation and design. Discussions on diversity, equity, and inclusion in STEM. (Science, technology, engineering, and mathematics)
Unit IV	Design Thinking and Innovation <ul style="list-style-type: none">• Principles of design thinking.• Prototyping and iteration techniques. Design challenges and exercises.
Unit V	Project Development and Implementation <ul style="list-style-type: none">• Identifying and scoping real-world problems.• Iterative project development with milestones. Project Presentation and Reflection <ul style="list-style-type: none">• Final project presentations. Reflection on learning outcomes and future applications.





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Text Books	
T.1	Design Thinking for Innovation: Research and Practice: by Walter Brenner (Editor), FalkUebernicket (Editor) (2016)
T.2	Introduction to Interdisciplinary Studies: 3rd Edition (2019) Allen F. Repko - University of Texas at Arlington (Retired) Rick Szostak - University of Alberta Canada Michelle Phillips Buchberger - Miami University of Ohio, USA
T.3	Professional Ethics & Human Values by Dr. M. R. Suchitra and Dr. S. Parthasarathy. 2020
Reference Books	
R.1	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation (Hardcover) by Tim Brown. 2009
R.2	Investigating Interdisciplinary Collaboration: Theory and Practice across Disciplines, Frickel, Scott Rutgers University Press, 2016


Useful Links	
1	https://nptel.ac.in/courses/108108113
2	https://nptel.ac.in/courses/108106193

Course Outcomes		CL	Hours
BAU4808.1	Integrate scientific principles and technological tools to solve complex problems.	3	2
BAU4808.2	Develop design thinking skills and apply them to innovate solutions.	6	2
BAU4808.3	Employ ethical considerations in innovation and design.	3	2
BAU4808.4	Apply design Thinking Methods and Tools	3	2
BAU4808.5	Identify ethical, cultural, and societal implications of technology and innovation.	5	2

 **BOS Chairman**
 Department Of Biotechnology
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 **Dean Academics**
 Tulsiramji Gaikwad-Patil
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 **Vice-Principal**
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