

**Four Year Undergraduate Program (2024-28)**  
**Department of Biotechnology**  
**Course Curriculum**

**Part A: Introduction**

Program: Bachelor in Life Sciences Diploma/Degree/Honors)	Semester: IV Sem	Session: 2024-2025
Course Code	BTSE-02-P	
Course Title	Bioprocess Engineering	
Course Type	Discipline-Specific Elective (DSE)--Practical	
Pre-requisite (if any)	As per program	
Course Learning Outcomes (CLO)	After completing this practical course, the students will be able to - <ul style="list-style-type: none"> <li>• Isolate and maintain industrially significant microbes.</li> <li>• Develop skills for alcoholic production.</li> <li>• Develop skills for acid production.</li> <li>• Develop skills for antibiotic and enzyme production.</li> </ul>	
Credit Value	01 Credits Credit =30 Hours Laboratory or Field learning/Training	
Total Marks	Max. Marks: 50	Min Passing Marks: 20

**Part B: Content of Course (Theory)**

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	Topic (Course content)	No. of Period
Lab./Field Training/ Experiment Contents of Course	<ol style="list-style-type: none"> <li>1. Isolation of industrially important microorganisms for microbial process.</li> <li>2. Determination of thermal death point (TDP) and thermal death time (TDT) of microorganisms.</li> <li>3. Comparative studies of ethanol production using different substrates.</li> <li>4. Microbial production of citric acid using <i>Aspergillus niger</i>.</li> <li>5. Microbial production of antibiotics (<i>Penicillin</i>)</li> <li>6. Production and estimation of alkaline protease.</li> </ol>	30
Keywords	Fermentation, bioreactors, fermentation-based production, mineral beneficiation.	

**Part C - Learning Resource**

**Text Books, Reference Books, Other Resources -**

**Text book-** Industrial Biotechnology- D Das

- Industrial Microbiology- A.H. Patel.

**Reference Book-**

- Wastewater Engineering- Treatment, Disposal & Reuse. Metall and Eddy, Inc., Tata Mcgraw Hill, N. Delhi.
- Microbiology- Pelczar&Pelczar.
- Environmental Biotechnology, PrathamVashishith. Dominant Publishers And Distributors, N.Delhi.
- Principles of Fermentation Technology; Stanburry.
- Industrial Microbiology; Casida.

**Online resources-** <https://archive.nptel.ac.in/courses/102/105/102105058/>

[http://www.ndl.gov.in/he\\_document/nptel/downloads\\_new\\_lecturenotes\\_102105058\\_102105058](http://www.ndl.gov.in/he_document/nptel/downloads_new_lecturenotes_102105058_102105058)

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**Four Year Undergraduate Program (2024-28)**  
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**Part A: Introduction**

Program: Bachelor in Life Sciences (Degree/Honors)		Semester: IV Sem	Session: 2024-2025
1	Course Code	BTSE-02-T	
2	Course Title	Bioprocess Engineering	
3	Course Type	Discipline Specific Elective course (DSE)	
4	Pre-requisite (if any)	As per program	
5	Course Learning Outcomes (CLO)	After completing this course, the students will be able to - <ul style="list-style-type: none"> <li>• Understand the prerequisite of bioprocess engineering.</li> <li>• Develop skills for the operation of bioreactors.</li> <li>• Develop skills for industrial production.</li> <li>• Understand the geological exploitation by the process of bioprocess engineering.</li> </ul>	
6	Credit Value	03 Credits (Credit = 15 Hours - learning & observation)	
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

**Part B: Content of Course (Theory)**

Total No. of Teaching-learning Periods (01 Hr. per period)- 45 Periods (45 Hours)		
Unit	Topic (Course content)	No. of Period
I	<b>Concept of bioprocess engineering</b> <ol style="list-style-type: none"> <li>1. Introduction to bioprocess engineering.</li> <li>2. Isolation, preservation, and maintenance of industrial microorganisms.</li> <li>3. Media for industrial fermentation.</li> <li>4. Kinetics of microbial fermentation.</li> </ol>	12 (12 Hrs)
II	<b>Bioreactors</b> <ol style="list-style-type: none"> <li>1. Types of fermentation processes.</li> <li>2. Operations of bioreactors.</li> <li>3. Measurement and control of bioprocess parameters.</li> <li>4. Downstream processing.</li> </ol>	11 (11 hrs)
III	<b>Bioproducts</b> <ol style="list-style-type: none"> <li>1. Production of alcohol, acids and solvents.</li> <li>2. Production of antibiotics.</li> <li>3. Production of amino acids.</li> <li>4. Whole cell immobilization for industrial application.</li> </ol>	11 (11 hrs)
IV	<b>Microbial role and regulation</b> <ol style="list-style-type: none"> <li>1. Application of microbes in mineral beneficiation.</li> <li>2. Application of microbes for oil recovery.</li> <li>3. Quality control, quality assurance and standard operating procedures of fermenter.</li> <li>4. Good manufacturing practices.</li> </ol>	11 (11 hrs)

Keywords	Fermentation, bioreactors, fermentation-based production, mineral beneficiation.
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▪ **Part C - Learning Resource**

Text Books, Reference Books, Other Resources -