

Department of Bio-Technology & Chemistry

## St. Xavier's College, Ranchi

### Certificate Course on Industrial Bioprocess Technology

(Duration: 30 Hours)

#### **About the Course**

Bioprocess technology is the industrial application by using the living organism or their components to produce valuable product e.g. enzymes, organic acid, antibiotics, fermented food etc. The major advantages of bioprocesses over traditional chemical processes are that they are simple, cost effective, require only few steps reaction conditions, more specific and efficient in term of products, and produce renewable by-products.

The aim of this course is to reduce the gap between academicians and industry by providing research and job opportunity in industries. This course will provide the students a short training programme related to fermentation and industrial products. This certificate course including, hands-on-training, practical and industrial visits will defiantly provide a mile-stone for industrial job opportunity.

#### **Learning Outcomes**

After the completion of course, the students will have ability to know:

1. Industrial bioprocess Technology by using living cells under optimal environmental condition for production of useful by-products e.g. Alcohol, enzymes, fermented food products, antibiotic production etc.
2. Optimization of culture media with different parameter for enhanced production of industrial products.
3. Industrial visits will give a basic lay-out to understand products formation.
4. The students will come to know the downstream (purification) process.

## Course Content

S. No.	Topic	Hours
<b>Theoretical Session (12 hours)</b>		
<b>1.</b>	<b>Introduction of Bioprocess Technology</b> <ul style="list-style-type: none"> <li>History of bioprocess Technology.</li> <li>Steps involved in products formation in industries.</li> </ul>	<b>2 hours</b>
<b>2.</b>	<b>Production process using Microbial strain and growth Kinetics</b> <ul style="list-style-type: none"> <li>Growth kinetics in batch culture</li> <li>Diauxic growth</li> <li>Primary and Secondary Metabolite</li> <li>Growth associated, Growth non-associated and mixed growth associated product formation.</li> </ul>	<b>2 hours</b>
<b>3.</b>	<b>Type of bioreactors and design</b> <ul style="list-style-type: none"> <li>Batch bioreactor</li> <li>Continuous bioreactor (Chemostat and Turbidostatic)</li> <li>Determination of <math>K_L a</math></li> <li>Solid-State fermentation</li> </ul>	<b>2 hours</b>
<b>4.</b>	<b>Immobilization of cells and enzymes for product formation</b> <ul style="list-style-type: none"> <li>Methods of cells and enzyme immobilization</li> <li>Significance of Dam Kohler number</li> </ul>	<b>2 hours</b>
<b>5.</b>	<b>Product purification or downstream processing</b> <ul style="list-style-type: none"> <li>Rotatory drum filtration</li> <li>Coagulation and Flocculation</li> <li>Cell disruption and extraction</li> <li>Salting- in and Salting-out</li> <li>Chromatography</li> <li>Drying and lyophilization</li> </ul>	<b>2 hours</b>
<b>6.</b>	<b>Production of few useful industrial products</b> <ul style="list-style-type: none"> <li>Production of Alcohol and Lactic acid</li> </ul>	<b>2 hours</b>
<b>Practical Session (18 hours)</b>		

1.	Microbial growth kinetics	2 hours
2.	Production of industrial important products.	4 hours
3.	Immobilization technique for product formation and kinetics	2 hours
4.	Optimization technique for enhanced production of industrial products	4 hours
5.	Methods use in downstream processing e.g. enzyme purification	4 hours
6.	Synthesis of nano-particle and application	2 hours
	Industrial Visit (separate fee has to be paid for industrial visit purpose)	

**Note:** For any query contact to course coordinator (Dr. Shiv Shankar Prasad, Department of Biotechnology) Contact: 9162183612 (WhatsApp No.).