



# SYLLABUS

<b>Course Title</b>	<b>PHARMACEUTICAL BIOTECHNOLOGY</b>	
<b>Course Code</b>	PH501	
<b>Course Credit</b>	Lecture	: 3
	Practical	: 2
	Tutorial	: 0
	Total	: 5
<b>Course Objectives</b>		
<p>On the completion of the course, students will be able to:</p> <ul style="list-style-type: none"> <li>▪ To understand the basics concepts of biotechnology and to elaborate scope of biotechnology based products as compared to chemically derived products.</li> <li>▪ To learn various strategies involved in microbial biotechnology industries.</li> <li>▪ To provide knowledge regarding production of antibiotic, organic acid, vitamins, amino acid and industrial alcohol.</li> </ul>		
<b>Detailed Syllabus</b>		
<b>Sr. No.</b>	<b>Name of Chapter &amp; Details</b>	<b>Hours Allotted</b>
	<b>Section-I</b>	
<b>1</b>	<b>Introduction to biotechnology</b>	<b>02</b>

2	<p><b>Genetic recombination:</b></p> <p>Transformation conjugation, protoplast fusion, gene cloning and their applications, monoclonal antibodies. Study of drug produced by biotechnology, viz. activase, humulin etc.</p>	08
3	<p><b>Immunology and Immunological Preparation:</b></p> <p>Immunity, primary and secondary defense mechanism, interferon, principles of immunology, antigen antibody reactions and application, preparations of vaccines, toxoids, standardization and storage.</p>	07
4	<p><b>Blood Products and Plasma Substitutes:</b> Collection, processing and storage of whole human blood, concentrated human RBCs, dried human plasma, formulation and storage consideration for blood products.</p>	04
5	<p><b>Surgical Products:</b> List of surgical products, surgical instrumentation and accessory, introduction of surgical products.</p>	02
	<p><b>Section-II</b></p>	
6	<p><b>Microbial Transformation :</b></p> <p>Introduction, types of reactions mediated by microorganisms, design of biotransformation processes, selection of organisms, biotransformation process and its improvements with special reference to steroids.</p>	06
7	<p><b>Immobilization of Enzymes:</b></p> <p>Techniques of immobilization, factors affecting enzyme kinetics, study of enzymes such as hyaluronidase, penicillinase, streptokinase, streptodornase, amylases and proteases etc., Immobilization of bacteria,</p>	06

	applications.	
<b>8</b>	<b>Fermentation Techniques:</b> Screening of organism, preparation and preservation of master culture, design of fermentor, various parameters and media used for fermentation, recovery of fermentation products flowsheets penicillin, streptomycin, vit. B2, vit. B12.	<b>10</b>

### Pharmaceutical Biotechnology-I (Practical)

1. Microbiological assay of antibiotics.
2. Preparation of vaccines.
3. Standardization of vaccines.
4. Preparation of mutant by Gradient plate method.
5. Preparation of mutant by Velvet replicate .
6. Design of fermentor and demonstration of fermentation process and instrument.
7. Study of shake flask technique.
8. Production of alcohol using Bakers yeast.
9. Extraction of citric acid from fermented mass.
10. Studies of effect of environmental factors on growth of microorganism.
11. Other practicals covering syllabus aspects.

### Instructional Method and Pedagogy:

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
- Surprise tests/Quizzes/Seminar/Tutorials will be conducted .
- The course includes a laboratory, where students have an opportunity to build an

appreciation for the concepts being taught in lectures.

#### **Students Learning Outcomes:**

- Know the concepts of biotechnology.
- Understand in detail the structure, functions and characteristics of enzymes and enzyme kinetics.
- Apply knowledge in various strategies involved in biotechnology industries.
- Know behaviour of immune system and molecules involved therein towards development of diagnostic methods and vaccines.

#### **Text Books:**

1. Foundations in Microbiology by Patil Ulhas.
2. Hugo & Russell's Pharmaceutical Microbiology by Denyar S.P ,Editor.
3. Pharmaceutical Microbiology : Experiments and Techniques by Kokare Chandrakant R.
4. A Text Book of Pharmaceutical Microbiology by Shah. Dushyant and Shah Yamini.
5. Pharmaceutical Microbiology by Kar Ashutosh.
6. Microbiology Fundamentals and Application by Purohit S.S .

#### **Reference Books:**

1. Textbook of Microbiology by Tortora.
2. Bergeys manual of Systematic Bacteriology, Williams and Wilkins- A Waverly company.

3. Microbiology, Pelczar/Chan Kreig Tata McGraw Hill edn.
4. Industrial microbiology. Fourth edn, Prescott and Dunn. CBS publishers and distributors.
5. Principles of fermentation technology. Second edn. P. F. Stanbury, A. Whiteshaker and S. J. Hall Aditya Books Pvt Ltd. New Delhi.

#### **Additional Resources**

- Soft copies pharmaceutical biotechnology books are available on <http://www.pharmatext.org>
- Latest information regarding pharmaceutical biotechnology are available on <http://www.pharmainfo.net> and in [mypharmaguide.com](http://mypharmaguide.com).