

**Department of Biotechnology**  
**Delhi Technological University, Delhi-42**  
**Programme: M.Tech (IBT)**

<b>SEMESTER I</b>	
	<b>IBT-501 (Bioenergy)</b>
<b>CO</b>	<b>Statement</b>
<b>1</b>	To gain understanding on the global energy scenario, and biofuel production
<b>2</b>	To understand the concepts of bio-ethanol production
<b>3</b>	To impart knowledge on the production of biohydrogen by agricultural residues
<b>4</b>	To gain understanding on the concepts of biodiesel production
<b>5</b>	To understand the concepts of applied bioenergy with reference to Indian context
	<b>IBT-503 (Industrial Plant Biotechnology)</b>
<b>CO</b>	<b>Statement</b>
<b>1</b>	Understanding the basic principles of plant tissue culture and techniques
<b>2</b>	Knowledge of production means and mass cultivation using tissue culturing
<b>3</b>	Imparting Knowledge about various techniques used for genetic modifications in plants
<b>4</b>	Knowledge of applicability of transgenics in solving various issues faced by humanity
<b>5</b>	Learning of regulatory issues and ethical concerns involved in plant genetic engineering
	<b>IBT- 5401(Bioinstrumentation)</b>
<b>CO</b>	<b>Statement</b>
<b>1</b>	Discuss the principle of centrifugation and its types.
<b>2</b>	List uses of electrophoretic techniques underlying electrophoresis systems.
<b>3</b>	Discuss chromatographic methods.
<b>4</b>	Explain spectroscopic and diffraction techniques.
<b>5</b>	Define optical techniques like microscopy.
	<b>IBT-5301 (Industrial Microbiology and Fermentation Technique)</b>
<b>CO</b>	<b>Statement</b>
<b>1</b>	Understand the basics of Inoculum Development and Media Preparation
<b>2</b>	Compare and contrast Process technology for Primary and Secondary metabolites
<b>3</b>	Summarize the Sterilization and Cell growth kinetics
<b>4</b>	To gain insight of the Fermentation Process
<b>5</b>	Understand the design of Fermenter and its control
	<b>SEMESTER II</b>
	<b>IBT-502 (Functional Genomics &amp; Proteomics)</b>

<b>CO</b>	<b>Statement</b>
1.	To appraise various DNA sequencing and genome editing technologies
2.	To understand the fundamentals of transcriptomics and to appraise various gene expression profiling and knock out techniques
3.	To comprehend genome-wide protein analysis and protein engineering techniques
4.	To get insight into various techniques for isolation and analysis of DNA-protein and protein-protein complexes
5.	To appraise the concept of personalized medicine based on pharmacogenomics
<b>IBT-504 (Bioprocess Engineering &amp; Reactor Design)</b>	
<b>CO</b>	<b>Statement</b>
1	Understand the basics of media design and sterilization kinetics.
2	Summarize the metabolic stoichiometry and microbial Growth kinetics.
3	Compare and contrast the type and design of bioreactor.
4.	To gain knowledge about Instrumentation and its control.
5.	To gain insight to the working of downstream processes at an industrial scale.
<b>IBT-5402 (Advanced Environmental Biotechnology)</b>	
<b>CO</b>	<b>Statement</b>
1	Basic concepts of environment, EIA and sustainable development
2	Introduction to environmental pollution, types
3	Understanding water pollution, collection of water samples, water analysis
4	Basic terminology of waste management, treatment and vermiculture
5	Innovative strategies for sustainable development
<b>IBT-5308 (Biopharmaceuticals)</b>	
<b>CO</b>	<b>Statement</b>
1	Knowledge about drug development and its industrial aspects
2	Understanding of mechanism underlying drug action and metabolism.
3	Analysing reaction process and requirements for drug manufacturing.
4	Learning categories of drugs and therapeutics.
5	Evaluating concerns related to drug safety and toxicity.
<b>IBT-5202 (Nanobiotechnology)</b>	
<b>CO</b>	<b>Statement</b>
1	Understand the basics concepts of nanosciences and its applications.
2	Illustrate the synthesis process and mechanism of nanomaterials.
3	Applications of different types of nanomaterials and its compositions.
4	Illustrate the applications of Nanobiotechnology.
5	Understanding the toxicological effects of nanomaterials and its management.
<b>IBT-6405 (Vaccine Technology)</b>	
<b>CO</b>	<b>Statement</b>
1.	Understand the fundamental principles of vaccine development.
2.	Outline the concept of adaptive immunity and vaccination for disease prevention
3.	Analyze the impact of vaccine technology on public health, exploring the dynamics of different types of vaccines.

4.	Develop critical thinking skills to address emerging challenges and advancements in vaccine technology.
5.	Evaluate the safety and efficacy of vaccines and regulatory directives in clinical trials.
	<b>IBT-6301 (Industrial WasteWater Treatment)</b>
<b>CO</b>	<b>Statement</b>
1.	Introduction to wastewater and its sources
2.	Impact of wastewater on environment & biodiversity
3.	Treatment of wastewater- Primary & Secondary
4.	Water pollution & its mitigation
5.	Sustainable strategies for industrial wastewater treatment
	<b>IBT- 6201(Bioethics, Biosafety &amp; IPR)</b>
<b>CO</b>	<b>Statement</b>
1	Outline the basics of Intellectual Property Rights,
2	Summarize patents and understand the process of applying, requirement
3	Identify the need of biosafety and other regulatory framework for the safety of living organisms.
4	Discuss the relationship between IPR and biosafety benefits of transgenics
5	List ethical issues related to healthcare; medicine, food; agriculture, genetic engineering, and testing.
6	Classify all the BSL levels and discuss the importance of GMOs and LMOs