

**PRATHYUSHA ENGINEERING COLLEGE**  
**DEPARTMENT OF BIOTECHNOLOGY**  
**Course Outcomes**

Regulation-2013

SEM	SUB/SUB CODE	COURSE OUTCOME
I	HS6151-Technical English - I	Able to speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
		Able to speak cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
		Able to read different genres of texts adopting various reading strategies.
		Able to listen/view and comprehend different spoken discourses/excerpts in different accents.
	MA6151 -Mathematics - I	Able to equip students to have basic knowledge and understanding in field of matrix, integral and differential calculus.
	PH6151- Engineering Physics - I	Able to have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.
	CY6151- Engineering Chemistry - I	Able to gain knowledge on polymer chemistry, thermodynamics, spectroscopy, phase rule and nano materials which will provide a strong platform to understand the concepts on these subjects for further learning
	GE6151- Computer Programming	Able to Design C Programs for problems. Able to Write and execute C programs for simple applications
	GE6152- Engineering Graphics	Able to perform free hand sketching of basic geometrical constructions and multiple views of objects.
		Able to do orthographic projection of lines and plane surfaces.
		Able to draw projections and solids and development of surfaces.
		Able to prepare isometric and perspective sections of simple solids.
	GE6161- Computerpractices Laboratory	Able to demonstrate computer aided drafting. Able to Apply good programming design methods for program development. Able to Design and implement C programs for simple applications. Able to Develop recursive programs.
	GE6162- EngineeringPractices Laboratory	Able to fabricate carpentry components and pipe connections including plumbing works.
		Able to use welding equipments to join the structures.
		Able to fabricate electrical and electronics circuits.

	<b>GE6163- Physics And Chemistry Laboratory – I</b>	<p>The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.</p> <p>The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.</p>
II	<b>HS6251- Technical English II</b>	Able to speak convincingly, express their opinions clearly, initiate a discussion, negotiate, and argue using appropriate communicative strategies.
		Able to write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
		Able to read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentation.
		Able to listen/view and comprehend different spoken excerpts critically and infer unspoken and implied meanings.
		The course will also serve as a prerequisite for post graduate and specialized studies and research
	<b>MA6251 - Mathematics – II</b>	<p>To provide the concepts of differential equations and its applications</p> <p>To provide necessary mathematical support and confidence to tackle real life problems.</p>
	<b>PH6252 Physics Of Materials</b>	Able to have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.
	<b>CY6252- Chemistry For Technologists</b>	<p>Able to gain knowledge on polymer chemistry, thermodynamics, spectroscopy, phase rule and nano materials will provide a</p> <p>strong platform to understand the concepts on these subjects for further learning</p>
	<b>BT6201- Biochemistry</b>	<p>Able to correlate biochemical processes with biotechnology applications.</p> <p>Able to understand the production methodology of different biological components</p> <p>Able to implement the fundamental knowledge for the future research activities</p>
	<b>BT6202- Microbiology</b>	<p>Able to develop understanding in the area of Microbiology particularly to identify microbes, their structure, their metabolism and their industrial applications</p> <p>students will be able to apply their knowledge gained in the research area for microbial strain improvement</p>
	<b>BT6211- Biochemistry Laboratory</b>	<p>To purify the proteins and to measure the concentration of the proteins present in the source.</p> <p>To identify the biomolecules from the given sources</p>
	<b>BT6212- Microbiology Laboratory</b>	Ability to identify and isolate the microorganism from different sources

III	MA6351-Transforms And Partial Differential Equations	Able to introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
		Able to acquaint the student with Fourier transform techniques used in wide variety of situations.
		Able to introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.
BT6301- Stoichiometry And Fluid Mechanics	Able to solve problems related to units and conversions and fit the given data using the methodologies	
	Able to solve problems related to material and energy balance concepts and design reactors for biochemical processes	
	Able to apply their knowledge in the field of biochemical engineering from the principles of thermodynamics.	
	Able to acquire knowledge related to fluid statics and dynamics, agitators and applications of various pumps.	
BT6302- Bioorganic Chemistry	Able to learn the basics principles of chemical Bonding, stereochemistry of Bio-organic molecules and their kinetics, mechanisms of reactions and catalysis.	
BT6303 Cell Biology	Able to understand cell organisation of microbes, plants animals and their functions. The course is also a prerequisite for other biology related subjects	
	Able to identify the plant and animal cells structures	
	Able to do multiple changes in the given plant and animal cells for a new development	
BT6304-Basic Industrial Biotechnology	Able to apply basic biotechnological principles, methods and models to solve biotechnological tasks.	
	Able to identify and debate the ethical, legal, professional, and social issues in the field of biotechnology.	
	Able to design and deliver useful modern biotechnology products to the Society.	
GE6351 Environmental Science And Engineering	Able to introduce an important aspect which improves environmental protection.	
	Able to create public awareness of environment in young stage.	
	Able to eliminate ignorance and incomplete knowledge that has lead to misconceptions	
	Able to create awareness on development and improvement in standard of living that has lead to serious environmental disasters	
BT6311 Cell Biology Laboratory	Able to understand the basic techniques to work with cells	
	Able to demonstrate working principles of Microscopy	
	Able to understand and perform cell staining techniques	
	Able to identify the various stages of mitosis	
BT6312 Bioorganic Chemistry Laboratory	Able to develop skills on synthesis of biologically important component.	

IV	<b>BT6401 Analytical Methods And Instrumentation</b>	Able to have a better understanding of spectroscopy and the separation techniques used for biological products.
	<b>BT6402 Applied Thermodynamics For Biotechnologists</b>	Ability to explain the theoretical concepts of thermodynamics and how it applies to energy conversion in technological applications and biological systems.
		Able to demonstrate the capability to analyze the energy conversion performance in a variety of modern applications in biological systems.
		Able to design and carry out bioprocess engineering experiments, and analyze and interpret fundamental data to do the design and operation of bioprocesses.
		Able to describe the criteria when two phases coexist in equilibrium and the vapour liquid equilibrium calculations microbial growth and product formation.
	<b>BT6403 Heat Transfer Operations</b>	Able to understand the purpose of mixing and agitation, types of agitators, scale up of agitators and dimensional analysis.
		Able to know different modes of heat transfer, different laws and terms used for design purpose and industrial applications, steady state and transient conduction
		Able to know the concept of forced and natural convection, boiling and condensation and radiation heat transfer
		Able to know heat exchangers and its design, NTU concepts, evaporators and its types
	<b>BT6404 Enzyme Technology And Biotransformation</b>	Able to impart knowledge on enzyme and enzyme reactions will be the key step in to proceed towards various concepts in biotechnology.
		Able to impart theoretical and practical aspects of kinetics will provide the importance and utility of enzyme kinetics towards research.
		Able to learn the process of immobilization has been increased steadily in food, pharmaceutical and chemical industries and thus this study will provide simple and easy method of implementation.
		Able to know the ideas on Processing, Production and Purification of enzymes at an industrial scale will be helpful to work technologically.
	<b>BT6405 Bioprocess Principles</b>	Able to handle the bioreactors
Able to design bioreactors.		
Ablity to measure the kinetics of the biological process		
<b>BT6411 chemical Engineering Laboratory</b>	Able to have knowledge on the basic principles of chemical engineering	
	Able to apply the skill of material balance and energy balance in unit operations unit process of chemical engineering and biotechnology	
	Able to analyze the principles of chemical engineering and its applications in chemical, mechanical and biological perspectives	
	Able to understand the design and working principles of fluid moving machinery and transport phenomena.	
<b>BT6412 Instrumental Methods Of Analysis Laboratory</b>	Able to visualize and interpret the theory of spectroscopic methods by hands on experiments.	
V	<b>BT6501 Protein</b>	Able to analyze the various interactions in protein makeup.

<b>Structure Function And Proteomics</b>	Able to be familiar with different levels of protein structure.
	Able to know the role of functional proteins in various field of study.
	Able to practice the latest application of protein science in their research.
<b>BT6502 Bioprocess Engineering</b>	Able to develop the skills of the students in the area of Bioprocess Engineering
	Able to design a suitable bioreactors for the given process
	Ability to identify the difference between ideal and nonideal reactors.
<b>BT6503 Mass Transfer Operation</b>	Able to demonstrate about gas -liquid, vapour- liquid and solid- liquid and liquid-liquid equilibrium.
	Able to classify and use the accurate engineering correlations of diffusion and mass transfer coefficients to model a separation process.
	Able to investigate a multi-stage equilibrium separation processes, simultaneous phase equilibrium and mass balances in continuous separation processes (absorbers, strippers, and distillation columns) and sizing continuous separation units.
	Able to design and construct with operating principles of process economics of separating equipments
<b>BT6504 Molecular Biology</b>	Able to describe the basic structure and biochemistry of nucleic acids.
	Able to identify the principles of DNA replication, transcription and translation and explain how they relate to each other.
	Able to discuss clearly about gene organization and mechanisms of control the gene expression in various organisms.
<b>BT6511 Bioprocess Laboratory – I</b>	Able to handle the bioreactors
	Able to isolate and separate the protein samples.
	Ablity to measure the kinetics of the biological process
<b>BT6512 Molecular Biology Laboratory</b>	Able to demonstrate knowledge and understanding of the principles underpinning important techniques in molecular biology.
	Able to demonstrate knowledge and understanding of applications of these techniques.
<b>VI BT6601 Total Quality Management For Biotechnologists</b>	Able to know the basic knowledge of total quality management principles and concepts of Current Biotech Industries.
	Able to know the customer orientated quality and leadership and continuous improvement process
	Able to know the six sigma concept methodology and application and the TQM tools.
	Able to know the design of quality systems of ISO auditing in the field of Biotechnology
<b>BT6602 Immunology</b>	Able to create awareness on pathogenicity to various pathogens
	Able to create awareness on tumour, allergy and hypersensitivity reactions.
<b>BT6603 Genetic Engineering And Genomics</b>	Able to learn how to clone commercially important genes.
	Able to learn how to produce the commercially important recombinant proteins.
	Able to have knowledge on gene and genome sequencing techniques.

<b>BT6604 Chemical Reaction Engineering</b>	Able to design and conduct an experimental investigation in order to determine rate equations.
	Able to demonstrate an ability to solve material and energy balances in order to analyze the performance of a reactor.
	Able to demonstrate an experimental data using standard statistical methods to establish quantitative results.
	Able to design a reactor for bio based products to achieve production and yield specifications.
<b>BT6611 Genetic Engineering Laboratory</b>	Able to describe the main principles, methods for preparation and cloning of DNA in various organisms.
	Able to express clearly about the gene amplification and methods for analysis of DNA, such as hybridization, restriction analysis and gene expressions.
	Able to use genetic and biotechnological techniques to manipulate genetic materials and develops new and improved living organisms.
<b>BT6612 Bioprocess Laboratory II</b>	Ability to investigate, design and conduct experiments, analyze and interpret data, and apply the laboratory skills to solve complex bioprocess engineering problems.
	Graduates become creative, innovative and adaptable engineers as leaders or team members in their organizations and society.
	Graduates perform competently in chemical and bioprocess industries and become important contributors to national development.
	Graduates will demonstrate advancement in their careers through increasing professional responsibility and continued life-long learning.
<b>GE6562 Employability Skills</b>	Able to Participate in conversations both formal and informal, attend phone calls and interviews successfully.
	Able to read different types of texts.
	Able to Listen to, and understand foreign accents.
<b>BT6611 Genetic Engineering Laboratory</b>	Able to describe principles, methods for preparation and cloning of DNA in various organisms.
<b>VII BT6701 Bioinformatics And Computational Biology</b>	Able to use bioinformatics tools with programming skills.
	Able to apply computational based solutions for biological perspectives.
	Able to utilize information available in biological and related databases
<b>BT6702 Downstream Processing</b>	Able to define the fundamentals of downstream processing for product recovery.
	Able to understand requirements for successful operations of downstream processing.
	Able to describe the components of downstream equipment and explain the purpose of each.
	Able to apply principles of various unit operations used in downstream processing and enhance problem solving techniques

	required in multi-factorial manufacturing environment in a structured and logical fashion.
<b>BT6703 Creativity, Innovation And New Product Development</b>	Able to have gained knowledge on various issues related to Patents, Quality, Creativity, Innovation, New Product Development, Planning and Evaluation.
<b>BT6711 Downstream Processing Laboratory</b>	Will be able to acquire knowledge for the separation of whole cells and other insoluble ingredients from the culture broth.
	Able to learn cell disruption techniques to release intracellular products Learned various techniques like evaporation, extraction, precipitation, membrane separation for concentrating biological products.
	Able to learn the basic principles and techniques of chromatography to purify the biological products and formulate the products for different end uses.
<b>BT6712 Immunology Laboratory</b>	Able to have knowledge on immunological /clinical tests.
	Able to isolate lymphocytes and monocytes.
<b>BT6713 Bioinformatics Laboratory</b>	Able to understand basic commands in UNIX OS
	Able to apply Perl programming to develop bioinformatics tools.
	Able to understand different biological databases.
	Able to carry out sequence and phylogenetic analysis

*P. Dhasarathan*

Dr.P.DHASARATHAN M.Sc., M.Tech., Ph.D.,  
Head, Department of Biotechnology  
Prathyusha Engineering College  
Tiruvallur-602025, Tamilnadu, IN

# PRATHYUSHA ENGINEERING COLLEGE

## DEPARTMENT OF BIOTECHNOLOGY

### COURSE OUTCOMES

#### REGULATION-2017

SEM	SUB/SUB CODE	COURSE OUTCOME
	<b>HS8151-Communicative English</b>	<p>Ability to develop the basic reading and writing skills of first year engineering and technology students.</p> <p>Ability to help learners develop their listening skills, which will, enable them listen to lectures and comprehend them by asking questions; seeking clarifications.</p> <p>Ability to help learners develop their speaking skills and speak fluently in real contexts.</p> <p>Ability to help learners develop vocabulary of a general kind by developing their reading skills</p>
I	<b>MA 8151 – Engineering Mathematics – I</b>	<p>Ability to achieve conceptual understanding and to retain the best traditions of traditional calculus.</p> <p>Ability to provide the basic tools of calculus mainly for the purpose of modelling the engineering problems mathematically and obtaining solutions.</p> <p>Ability to deals with topics such as single variable and multivariable calculus in the understanding of science, engineering, economics and computer science, among other disciplines.</p>
I	<b>PH8151- Engineering Physics</b>	<p>Ability to gain knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.</p>
I	<b>CY8151- Engineering Chemistry</b>	<p>Ability to make the students conversant with boiler feed water requirements, related problems and water treatment techniques.</p> <p>Ability to develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.</p> <p>Ability to understand the preparation, properties and applications of engineering materials.</p> <p>Ability to gain knowledge on the types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.</p> <p>Ability to apply the principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.</p>
I	<b>GE8151- Problem Solving and Python Programming</b>	<p>Ability to know the basics of algorithmic problem solving</p> <p>Ability to define, read and write simple Python programs.</p> <p>Ability to develop Python programs with conditionals and loops and call them.</p> <p>Ability to apply Python data structures – lists, tuples, dictionaries.</p> <p>Ability to obtain the input/output with files in Python.</p>
I	<b>GE8152- Engineering Graphics</b>	<p>Ability to perform free hand sketching of basic geometrical constructions and multiple views of objects.</p>

		Ability to develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.
		Ability to expose them to existing national standards related to technical drawings.
I	<b>GE8161-Problem Solving and Python Programming Laboratory</b>	Ability to write, test and debug simple Python programs.
		Ability to implement Python programs with conditionals and loops.
		Ability to apply the functions for structuring Python programs.
		Ability to represent compound data using Python lists, tuples, dictionaries.
		Ability to read and write data from/to files in Python.
I	<b>BS8161-Physics and Chemistry Laboratory</b>	Ability to learn different experiments to test basic understanding of physics concepts.
		Ability to apply the concepts in optics, thermal physics, properties of matter and liquids.
II	<b>HS8251- Technical English</b>	Ability to develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
		Ability to foster their ability to write convincing job applications and effective reports.
		Ability to develop their speaking skills to make technical presentations, participate in group discussions.
		Ability to strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialization.
II	<b>MA8251 – Engineering Mathematics – II</b>	Ability to understand the topics such as Matrix Algebra, Vector Calculus, Complex Analysis and Laplace Transform.
		Ability to understand powerful tools to handle practical problems arising in the field of engineering.
		Ability to understand vector calculus for modelling the various laws of physics.
		Ability to apply the various methods for complex analysis and Laplace transforms for efficiently solving the problems that occur in various branches of engineering disciplines.
II	<b>PH8254 Physics Of Materials</b>	Able to gain knowledge on phase diagrams and various material processing methods,
		Ability to acquire knowledge on basics of conducting materials, superconductors and their applications
		Ability to get knowledge on the functioning of semiconducting materials and their applications in LED and solar cells,
		Ability to understand the functioning of various dielectric and magnetic materials ,
		Ability to have the necessary understanding on various advanced materials.
II	<b>BE8252-Basic Civil and Mechanical Engineering</b>	Ability to impart basic knowledge on Civil and Mechanical Engineering.
		Ability to familiarize the materials and measurements used in Civil Engineering.

		Ability to provide the exposure on the fundamental elements of civil engineering structures.
		Ability to enable the students to distinguish the components and working principle of power plant units, IC engines, and R & AC system.
II	<b>BT8251- Biochemistry</b>	<p>Ability to apply the fundamental knowledge on structure and properties of carbohydrates in biological concepts.</p> <p>Ability to apply the structure of biomolecules to solve the biological problem.</p> <p>Ability to analyze the metabolic pathways of the major biomolecules relevance to clinical conditions.</p> <p>Ability to select and assess the importance of intermediary metabolism and its regulation in biotechnology</p> <p>Ability to correlate biochemical process with biotechnology applications.</p>
II	<b>BT8291- Microbiology</b>	<p>Ability to develop understanding the principles of Microbiology to emphasize structure and biochemical aspects of various microbes particularly to identify microbes.</p> <p>Ability to solve the problems in microbial infection and their control.</p>
II	<b>BT8261-Biochemistry Laboratory</b>	<p>Ability to learn and understand the principles behind the qualitative and quantitative estimation of biomolecules.</p> <p>Ability to identify the biomolecules and laboratory analysis of the same in the body fluids.</p>
II	<b>GE8261 - Engineering Practices Laboratory</b>	<p>Ability to fabricate carpentry components and pipe connections including plumbing works.</p> <p>Ability to use welding equipments to join the structures.</p> <p>Ability to carry out the basic machining operations and make the models using sheet metal works.</p> <p>Ability to illustrate on centrifugal pump, air conditioner, operations of smithy, foundary and fittings</p> <p>Ability to carry out basic home electrical works and appliances to measure the electrical quantities</p> <p>Ability to elaborate on the components, gates, soldering practices.</p>
II	<b>MA8353-Transforms And Partial Differential Equations</b>	<p>Ability to understand how to solve the given standard partial differential equations.</p> <p>Ability to solve differential equations using Fourier series analysis which plays a vital role in engineering applications.</p> <p>Ability to Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.</p> <p>Ability to understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.</p> <p>Ability to use the effective mathematical tools for the solutions</p>

		Ability to know the various aseptic techniques and sterilization methods.
		Ability to develop the minimum skills to work on several important techniques for the study of microorganisms in the laboratory.
III	<b>BT8311 Cell Biology Laboratory</b>	Able to understand the basic techniques to work with cells
		Able to demonstrate working principles of Microscopy
		Able to understand and perform cell staining techniques
		Able to identify the various stages of mitosis
III	<b>HS8381 Interpersonal Skills/Listening and Speaking</b>	Ability to listen and respond appropriately.
		Ability to provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
		Ability to improve effective presentations skills
		Ability to participate confidently and appropriately in conversations both formal and informal.
IV	<b>MA8391- Probability and Statistics</b>	Ability to understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
		Ability to understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
		Ability to apply the concept of testing of hypothesis for small and large samples in real life problems.
		Ability to apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.
		Ability to have the notion of sampling distributions and statistical techniques used in engineering and management problems.
IV	<b>BT8401- Fluid Mechanics and Heat Transfer Operations</b>	Ability to understand the purpose of fluids in state kinematic and dynamic equilibrium.
		Ability to understand the fluidization phenomenon.
		Ability to know different modes of heat transfer, different laws and terms used for design purpose and industrial applications, steady state and transient conduction
		Able to know the concept of forced and natural convection, boiling and condensation and radiation heat transfer
		Able to know heat exchangers and its design, NTU concepts, evaporators and its types
IV	<b>BT8402- Molecular Biology</b>	Ability to describe the basic structure and biochemistry of nucleic acid, proteins and discriminate between them.
		Ability to identify the principles of DNA replication, transcription translation and explain how they relate to each other.
		Ability to understand clearly about the gene organization and mechanisms of controlling the gene expression in various

		organisms.
		Ability to articulate the applications of molecular biology in the modern world.
IV	<b>BT8403 Enzyme Technology And Biotransformation</b>	Able to impart knowledge on enzyme and enzyme reactions will be the key step in to proceed towards various concepts in biotechnology.
		Able to impart theoretical and practical aspects of kinetics will provide the importance and utility of enzyme kinetics towards research.
		Able to learn the process of immobilization has been increased steadily in food, pharmaceutical and chemical industries and thus this study will provide simple and easy method of implementation.
		Able to know the ideas on Processing, Production and Purification of enzymes at an industrial scale will be helpful to work technologically.
IV	<b>BT8404 Bioprocess Principles</b>	Ability to apply engineering principles to systems containing biological catalysts to meet the needs of the society.
		Ability to convert the promises of molecular biology and genetic engineering into new processes to make bio-products in economically feasible way.
		Ability to measure the kinetics of the biological process
IV	<b>GE8291 Environmental Science and Engineering</b>	Able to introduce an important aspect which improves environmental protection.
		Able to create public awareness of environment in young stage.
		Able to eliminate ignorance and incomplete knowledge that has lead to misconceptions
		Able to introduce an important aspect which improves environmental protection.
		Able to create awareness on development and improvement in standard of living that has lead to serious environmental disasters
IV	<b>BT8411 Chemical Engineering Laboratory for Biotechnologists</b>	Able to have knowledge on the basic principles of chemical engineering
		Able to apply the skill of material balance and energy balance in unit operations unit process of chemical engineering and biotechnology
		Able to analyze the principles of chemical engineering and its applications in chemical, mechanical and biological perspectives
		Able to understand the design and working principles of fluid moving machinery and transport phenomena.
IV	<b>BT8412- Molecular Biology Laboratory</b>	Ability to demonstrate knowledge and understanding of the principles underpinning important techniques in molecular biology.
		Ability to demonstrate knowledge and understanding of applications of these techniques.
		Ability to demonstrate the ability to carry out laboratory experiments and interpret the results.
		Ability to create awareness of the hazardous chemicals and safety

V	BT8511 Bioprocess Laboratory – I	Ability to explain about enzyme kinetics and characterization and how to use them for practical applications.
		Ability to evaluate the growth kinetics of microorganisms and become adept with medium optimization techniques.
		Ability to determine an experimental objective, understands the theory behind the experiment, and operates the relevant equipment safely.
		Ability to demonstrate good lab citizenry and the ability to work in team.
V	BT8512 Analytical Methods And Instrumentation Laboratory	Ability to visualize and interpret the theory of spectroscopic methods by hands on experiments.
		Ability to acquire experience in the purification by performing chromatography
V	HS8581 Professional Communication	Ability to make effective presentations.
		Ability to participate confidently in Group Discussions.
		Ability to attend job interviews and be successful in them.
		Ability to develop adequate Soft Skills required for the workplace
V	BT8651 Bioinformatics	Ability to develop bioinformatics tools with programming skills.
		Ability to apply computational based solutions for biological perspectives.
		Ability to pursue higher education in this field.
		Ability to adopt life-long learning of applied biological science.
		Ability to predict the 3D structure and support tool development.
VI	BT8601 Genetic Engineering	Ability to apply their knowledge to clone commercially important genes.
		Ability to analyze DNA libraries to produce commercially important recombinant proteins.
		Ability to compare gene and genome sequencing techniques.
		Ability to correlate various genome mapping techniques.
		Ability to adopt the techniques such as microarray, analysis of gene expression and proteomics
VI	BT8691 Chemical Reaction Engineering	Ability to Write the rate equation for any type of reaction.
		Ability to design reactors for heterogeneous reactions and optimize operating conditions.
		Ability to Relate and calculate the conversions, concentrations and rates in a reaction and identify, formulate and solve chemical engineering problems.
VI	BT8005 Animal Biotechnology	Ability to understand the animal cell culture, animal diseases and its diagnosis
		Ability to gain the knowledge for therapy of animal infections
		Ability to know the concepts of micromanipulation technology and transgenic animal technology
		Ability to apply the knowledge gained in this section to apply in the field of clinical research
VI	BT8010 Bio entrepreneurship	Ability to determine relevant licensing and regulatory issues for specific small business plan
		Ability to enrich the marketing plan component for specific bio-industry

		Ability to defend business reports in a professional manner.
		Ability to frame strategies for professional development and advancement.
		Ability to develop and manage the business ethics.
I	<b>BT8017 Biofuel</b>	Ability to understand the generation of bio fuels, energy security, environmental and economic sustainability.
		Ability to analyze the raw materials and technologies needed for biodiesel production and apply them.
		Ability to analyze the production of bio ethanol and apply them for pilot scale.
		Ability to apply the technologies for bio hydrogen bio methane production.
		Ability to analyze the other fuels development by pyrolysis and its life cycle assessment.
VI	<b>BT6612 Bioprocess Laboratory II</b>	Ability to investigate, design and conduct experiments, analyze and interpret data, and apply the laboratory skills to solve complex bioprocess engineering problems.
		Ability to become creative, innovative and adaptable engineers as leaders or team members in their organizations and society.
		Ability to perform competently in chemical and bioprocess industries and become important contributors to national development.
		Ability to will demonstrate advancement in their careers through increasing professional responsibility and continued life-long learning.
VI	<b>BT8612 Genetic Engineering Laboratory</b>	Ability to describe the main principles, methods for preparation and cloning of DNA in various organisms.
		Ability to express clearly about the gene amplification and methods for analysis of DNA, such as hybridization, restriction analysis and gene expressions.
		Ability to use genetic and biotechnological techniques to manipulate genetic materials and develops new and improved living organisms.
VII	<b>GE8077 Total Quality Management</b>	Ability to know the basic knowledge of total quality management principles and concepts
		Ability to apply the tools and techniques of quality management to manufacturing and services processes.
		Ability to know the six sigma concept methodology and application and the TQM tools.
		Ability to know the design of quality systems of ISO auditing
VII	<b>BT8751 Downstream Processing</b>	Ability to define the fundamentals of downstream processing for product recovery.
		Ability to understand requirements for successful operations of downstream processing.
		Ability to describe the components of downstream equipment and explain the purpose of each.
		Ability to apply principles of various unit operations used in downstream processing and enhance problem solving techniques

VII	BT8791 Immunology	Ability to create awareness would be aware of immune system structure and functions.
		Ability to create awareness of immunity to various pathogens
		Ability to create awareness of the principles behind the production of therapeutic/ diagnostic molecules.
		Ability to create awareness awareness of the concepts and mechanism behind tumour development, allergy and hyper sensivity reactions.
VII	BT8711 Downstream Processing Laboratory	Will be able to acquire knowledge for the separation of whole cells and other insoluble ingredients from the culture broth.
		Ability to learn cell disruption techniques to release intracellular products Learned various techniques like evaporation, extraction, precipitation, membrane separation for concentrating biological products.
		Ability to learn the basic principles and techniques of chromatography to purify the biological products and formulate the products for different end uses.
VII	BT8712 Immunology Laboratory	Ability to have awareness of immune system cells and tissues.
		Ability to have knowledge on immunological /clinical tests.
		Ability to isolate lymphocytes and monocytes.
		Ability to identify various immune system cells.

*P. Dharmarathna*

P. DHASARATHAN M.Sc., M.Tech., Ph.D.,  
 Head, Department of Biotechnology  
 Prathyusha Engineering College  
 Tiruvallur-602025, Tamilnadu, INDIA