



DEPARTMENT OF BIOTECHNOLOGY

COURSE OUTCOMES – REGULATION 2017

Semester:1

C101/ HS8151/Communicative English

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| C101.1 | Communicate clearly both in the written form and orally using appropriate vocabulary and comprehend written texts to make inferences |
| C101.2 | Speak persuasively in different social contexts and write biographical details and technical documents cohesively, coherently and flawlessly using appropriate words. |
| C101.3 | Speak, read and write effectively for a variety of professional and social settings |
| C101.4 | Read descriptive, narrative, expository and interpretive texts and write using creative, critical, analytical and evaluative methods. |
| C101.5 | Listen, comprehend and respond to different spoken and written discourses/excerpts in different accents and write different genres of texts adopting various writing strategies |

C102/MA8151/Engineering Mathematics

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| C102.1 | Use both the limit definition and rules of differentiation to differentiate functions. |
| C102.2 | Apply differentiation to solve maxima and minima problems. |
| C102.3 | Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus, also evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts, in addition to determine convergence/divergence of improper integrals and evaluate convergent improper integrals. |
| C102.4 | Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables |
| C102.5 | Apply various techniques in solving differential equations. |

C103/PH8151/ Engineering Physics

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| C103.1 | Students interpret the fundamental knowledge about the elastic nature of materials and be able to choose the materials depending upon the modulus of elasticity for different applications |
| C103.2 | Identify and appreciate the advantages of optical communication using LASER |
| C103.3 | Students understand thermal conducting properties of solids and liquids and differentiate a good thermal conductor from the bad thermal conductor |
| C103.4 | Apply the knowledge of quantum mechanics and classical mechanics in addressing the problems related to science and technology |
| C103.5 | Students extend the knowledge about the crystal structures, crystal defects and crystal growth. |

C104/CY8151/ Engineering Chemistry

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| C104.1 | Comprehend the importance of water technology in the purification of water and its domestic and industrial applications... |
| C104.2 | Understand the concept of absorption in surface chemistry and catalysis and its applications. |
| C104.3 | Make use of the phase rule in identifying its application in metallurgy and manufacture of alloys |
| C104.4 | Learn the different types of industrial techniques of petroleum processing and the determination of caloric values and combustion parameters. |
| C104.5 | Empathize the fundamentals of different alternative source of energy, the generation process and batteries |

105/GE6151 Computer Programming

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| C105.1 | Elaborate the organization of digital computer and design the solution for simple computing problems using algorithm, flowchart and pseudo code.. |
| C105.2 | Apply the different looping structure to solve simple scientific and statistical problems. |
| C105.3 | Devise the solutions for simple problems using arrays and strings |
| C105.4 | Demonstrate the usage of dynamic memory allocation and pointer variables |
| C105.5 | Illustrate the concepts of structure and union with an example programs. |

C106/GE8151/ Problem solving and Python programming

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| C106.1 | Develop algorithmic solutions to simple computational problems. |
| C106.2 | Read, write and execute simple python programs. |
| C106.3 | Apply control, looping structures and functions to solve problems |
| C106.4 | Represent compound data using python lists, tuples, and dictionaries. |
| C106.5 | Read and Write data from/to files in python programs. |

107/GE8152/Engineering Graphics

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| C107.1 | Familiarize with the fundamentals and standards of Engineering |
| C107.2 | Perform freehand sketching of basic geometrical constructions and multiple views of objects. |
| C107.3 | Project orthographic projections of lines and plane surfaces. |
| C107.4 | Draw projections and section of solids and development Of surfaces. |
| C107.5 | Visualize and to project isometric and perspective sections of simple solids. |

C108/GE8161 Problem Solving And Python Programming Laboratory

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| C108.1 | Write, test, and debug simple Python programs. |
| C108.2 | Implement Python programs with conditionals and loops |
| C108.3 | Develop Python programs step-wise by defining functions and calling them. |
| C108.4 | Demonstrate the use Python lists, tuples, and dictionaries for representing compound data. |
| C108.5 | Illustrate the concepts of read and write data from/to files in Python |

109/GE8162 Physics and Chemistry Laboratory

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| C109.1 | The students will have the ability to test the materials by using their knowledge of Elasticity. |
| C109.2 | The students will have the ability to test the materials by using their knowledge of principles in optics |
| C109.3 | The students will have the ability to test the materials by using their knowledge of thermal physics |
| C109.4 | The students will be conversant with hands on knowledge in the quantitative chemical analysis of water quality related parameters. |
| C109.5 | The students will be conversant with hands on knowledge in the quantitative chemical analysis of cement analysis. |

Semester:2

C110/HS8251/ Technical English -II

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| C110.1 | Read technical texts and write area specific texts effortlessly |
| C110.2 | Listen and comprehend lectures and talks in their areas of specialization and write effectively for a variety of professional and social settings |
| C110.3 | Speak and write appropriately and effectively in varied formal and informal contexts. |
| C110.4 | Write effectively and persuasively and produce different types of writing such as letters, minutes, reports and winning job applications. |
| C110.5 | Communicate clearly using technical vocabulary in their professional correspondences. |

C111/ Engineering Mathematics- II

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| C111.1 | Eigenvalues and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices... |
| C111.2 | Gradient, divergence and curl of a vector point function and related identities, Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification |
| C111.3 | Analytic functions and conformal mapping Complex integration |
| C111.4 | Understand the Analytic functions and conformal mapping Complex integration |
| C111.5 | Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients |

C112/PH8253/ Physics of Materials

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| C112.1 | The students will have knowledge on the basics of properties of conducting and super conducting Materials. |
| C112.2 | The students will apply these fundamental principles to solve practical problems related to materials used for engineering applications. |
| C112.3 | The students will have knowledge on the basics of Preparation and processing of insulating and magnetic materials. |
| C112.4 | The students will have knowledge on the basics of Preparation and processing of Electronic materials. |
| C112.5 | The students will have knowledge on the basics of Preparation and processing of Ceramic and new materials. |

C113/BE8252/ Basic Civil and Mechanical Engineering

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| C113.1 | On successful completion of the course, students will be able to appreciate the civil & mechanical Engineering components of projects |
| C113.2 | On successful completion of the course, students will be able to explain the usage of construction materials and proper selection of construction materials, measures distances and area by surveying |
| C113.3 | On successful completion of the course, students will be able to identify components used in power plant cycle |
| C113.4 | On successful completion of the course, students will be able to demonstrate the working principles of petrol and diesel engine |
| C113.5 | On successful completion of the course, students will be able to elaborate the components of refrigeration and Air conditioning cycle. |

C114/BT8291/Microbiology

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| C114.1 | Students will be well versed in the basic concepts of microbiology such as isolation, characterization and identification of microorganisms |
| C114.2 | Students will be familiar with structure, multiplication, metabolism and growth characteristics of bacteria and viruses. |
| C114.3 | Students would have learnt different methods to quantitate bacterial growth, aerobic and anaerobic bioenergetics and utilization of energy for biosynthesis of important molecules. |
| C114.4 | Students would gain knowledge in host-microbe interactions, importance of microorganisms and uses of antimicrobial agents. |
| C114.5 | At end of this course, students would have learnt about the production of primary, secondary metabolites, bio-fertilizers and bio-pesticides from microorganisms and their various applications |

C115/BT8251/ Bio Chemistry

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| C115.1 | Students would have learnt the different types of biological buffers and biomolecules with their significant functions. |
| C115.2 | Students would have knowledge about the structure and the chemical reactions involved in different biochemical pathways towards the energy generation processes. |
| C115.3 | Students will be able to understand the sources and types of proteins, enzymes, vitamins, hormones etc involved in wide range of biochemical reactions. |
| C115.4 | Students will be able to understand the biochemical values of metabolic pathways in relation to metabolic clinical disorders. |
| C115.5 | Students would have learnt the key principles involved in bioenergetics of various pathways. |

C116/BT8261/ Bio Chemistry lab

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|--------|--|
| C116.1 | Students would have learnt the different types of biological buffers and biomolecules with their significant functions. |
| C116.2 | Students would have learnt the qualitative analysis of sugar to screen the susceptible individual for the problem of carbohydrate metabolic disorders. |
| C116.3 | Students will be able to estimate the various major biomolecules to understand the progression of diseases. |
| C116.4 | Students would have learnt the basic analytical chromatography methods, TLC to analyse the samples for the presence of various lipid molecules. |
| C116.5 | Students would have gained the basic concepts for working in biochemistry lab and its statistical concepts. |

C117/GE8261/ Engineering Practice Laboratory

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| C117.1 | Ability to fabricate carpentry components |
| C117.2 | Pipe connections including plumbing works |
| C117.3 | Ability to use welding equipments to join the structures. |
| C117.4 | Ability to fabricate electrical circuits. |
| C117.5 | Ability to fabricate electronics circuits. |

C201/ MA8353 Transforms and partial differential equations

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| C201.1 | Students would get familiarize about the Fourier series to generate a sequence of waves |
| C201.2 | Students would have learnt about the Fourier Transform to a sequence non parabolic waves to a general function. |
| C201.3 | Students will be familiar with the construction of partial differential equation and finding methods to solve it |
| C201.4 | Students would gain knowledge about the applications of PDE in Chemical Engineering |
| C201.5 | Students would have acquired knowledge on Z Transforms for a 3D model and its solution |

Semester:3

C202/ BT8301 Stoichiometry

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| C202.1 | To know in detail about units and dimensions, conversion of units and composition of mixtures and solutions. |
| C202.2 | To understand the gas laws and its application. |
| C202.3 | To know in detail about material balance and it's application to various unit operations. |
| C202.4 | To apply energy balance in the calculation of heat loss or heat consumption |
| C202.5 | To apply material balance to the process involving chemical reaction |

C203/ BT8302 Applied Thermodynamics for Biotechnologist

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| C203.1 | To describe the knowledge on thermodynamic law and properties of fluids |
| C203.2 | To understand the concept of solution thermodynamics |
| C203.3 | To understand the phase equilibria in liquid liquid and solid –solid equilibria |
| C203.4 | To understand the concept of chemical reaction equilibria |
| C203.5 | To apply the thermodynamic description of microbial growth and product formation |

C204/ BT8303 Basic industrial Biotechnology

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| C204.1 | At the end of the course, the students will be able to explain the steps involved in the production of bioproducts and methods to improve modern biotechnology |
| C204.2 | At the end of the course, the students will be able to apply basic biotechnological principles and methods to solve biotechnological tasks |
| C204.3 | At the end of the course, the students will be able to identify and debate the ethical, legal, professional, and social issues in the field of biotechnology. |
| C204.4 | At the end of the course, the students will be able to design and deliver useful modern biotechnology products to the society |
| C204.5 | Upon successful completion of this course, the students will be able to apply basic biotechnological models to solve biotechnological tasks |

C205/ BT8304 Bio organic chemistry

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| C205.1 | This course module will help the biotechnology students to know about basic knowledge about the elements of atom, charges and their bonding rule. |
| C205.2 | The students would be able to understand various types of reaction mechanisms. |
| C205.3 | The students would have learnt the kinetic and thermodynamic properties of the various reactions. |
| C205.4 | The students would be able to understand catalytic reactions with the presence of coenzymes, protons and metal ions etc. |
| C205.5 | The students will acquire knowledge about basic principles of chemical bonds, sequence DNA, peptides and also to synthesis peptides and various bio-organic compounds. |

C206/BT 8303 Cell Biology

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| C206.1 | Upon completion of the course in Bioprocess Principles, graduates Would have deeper understanding of cell at structural and functional level |
| C206.2 | Upon completion of this course, graduates would have broad knowledge on the molecular interaction between cells. |
| C206.3 | Upon completion of this course, graduates would have understand the concepts of membrane transportation for all type of molecules. |
| C206.4 | Upon successful completion of this course, graduates Would demonstrate a clear understanding of the signal transduction, secondary messengers. |
| C206.5 | Upon successful completion of this course, graduates Would develop skill on working principles of microscopy and identification of cell types |

C207- BT8361 Microbiology laboratory

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| C207.1 | learn different culture media preparation and sterilization technique |
| C207.2 | Study microbes by microscope and staining techniques |
| C207.3 | Study different quantification method |
| C207.4 | Gain knowledge about different assays |
| C207.5 | Study effects of different parameters on microbial growth |

C208 -BT 8311 Cell biology laboratory

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| C208.1 | Gain knowledge about morphology of microbes |
| C208.2 | Study sterilization process and safety |
| C208.3 | Apply the concept of staining technique |
| C208.4 | Study blood cells and its structure |
| C208.5 | Study different stages of cells |

C209- HS8381 Interpersonal Skills/Listening and Speaking

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| C209.1 | Speak effectively on various academic topics and respond to questions. |
| C209.2 | Converse effectively with the use of conversation starters and discourse markers. |
| C209.3 | Listen and respond to various academic dialogues and discussions. |
| C209.4 | Participate confidently and appropriately in informal and formal conversations and group discussions. |
| C209.5 | Use a range of presentation tools like PPT, Videos, and Charts etc. to make an engaging presentation. |

Semester:4**C210-BT8401 Fluid Mechanics and Heat Transfer Operations**

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| C210.1 | To know in detail about fluid statics, fluid dynamics and measurement of fluid flow |
| C210.2 | To know in detail about flow of fluids through packing and pumping devices for fluids. |
| C210.3 | To understand about the concept of conduction heat transfer, law of heat conduction and its application |
| C210.4 | To understand the concept of natural and forced convection, boiling and condensation |
| C210.5 | To know in detail about radiation heat transfer and heat transfer equipments |

C211 BT8402 Molecular Biology

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| C211.1 | By the end of this course, students should be able to understanding of Basic structure and biochemistry Nucleic acids and proteins. |
| C211.2 | Upon completion of this course, the students would be able to understand the the principles of DNA replication . |
| C211.3 | Upon successful completion of this course, the students will be able to understand structure of RNA and RNA synthesis. |
| C211.4 | By the end of this course, students should be able to describe the transcription and translation and explain how to relate to each other. |
| C211.5 | By the end of this course, students should be able to demonstrate the ability to carry out mechanism of control the gene expression in various mechanism. |

C212 BT8403 Enzyme Technology and Biotransformations

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| C212.1 | To describe about the enzyme and its classification, reaction in order to proceed towards various concepts in biotechnology |
| C212.2 | To understand about the enzyme kinetics which will provide the importance and utility of enzyme towards research |
| C212.3 | To discuss about the enzyme immobilization techniques and its application in food, pharmaceutical and chemical industries |
| C212.4 | To elaborate about production and purification of enzyme at industrial scale |
| C212.5 | To explain about the biotransformation application of enzyme |

C213 BT8404 Bioprocess Principles

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| C213.1 | Upon completion of the course in Bioprocess Principles, graduates apply engineering principles to systems containing biological catalysts to meet the needs of the society. |
| C213.2 | Upon completion of this course, graduates will be able to convert the promises of molecular biology and genetic engineering into new processes to make bio-products in economically feasible way. |
| C213.3 | Upon completion of this course, graduates will be able to design the sterilization equipment based on the thermal death kinetics. |
| C213.4 | Upon successful completion of this course, graduates will able to interpret the kinetics of living cells and to develop a strategy to solve the issues emerging during fermentation processes |
| C213.5 | Upon successful completion of this course, graduates will have learnt to enhance the biological materials to improve its usefulness by finding the optimal formulation materials to facilitate product production |

C214- GE8291 Environmental Science and Engineering

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| C214.1 | Students would have gained a clear knowledge on the existence of various ecosystems and the conservation of biodiversity. |
| C214.2 | Students would have a clear understanding that public awareness of environment is at infant stage. |
| C214.3 | Students would realize that ignorance and incomplete knowledge has lead to misconceptions |
| C214.4 | Development and improvement in standard of living has lead to serious environmental disasters. |
| C214.5 | The impact of population growth on the environment and human health would be realized. |

C215- MA8391 Probability and Statistics and partial differential equations

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| C215.1 | The students will have a fundamental knowledge of the concepts of probability |
| C215.2 | The students will have knowledge of standard distributions which can describe real life phenomenon. |
| C215.3 | The students will have the notion of statistical techniques used in management problems. |
| C215.4 | The students will have the notion of sampling distributions used in management problems. |
| C215.5 | The students will have knowledge of statistical quality control |

C216 BT8411 Chemical Engineering Laboratory for Biotechnologists

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| C216..1 | Upon completion of this practical course, the students will be able to gain knowledge on measurement of fluid flow |
| C216.2 | Upon completion of this practical course, the students will understand the design and working Principle of fluid moving machinery. |
| C216.3 | Upon completion of this practical course, the student will be able to understand energy balance unit process of chemical energy and biotechnology |
| C216.4 | Upon the completion of this course, the student will be able to apply the skill of material balance in unit operation. |
| C216.5 | Upon completion of this course, the student will be able to analyze the principle of chemical engineering and its application in chemical mechanical and biological respective. |

C217 BT8412 Molecular Biology Laboratory

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| C217.1 | By the end of this course, students understand the main principles, methods for preparation and cloning of DNA in various organisms. |
| C217.2 | By the end of this course, students gain knowledge and understanding of the principles underpinning important techniques in molecular biology. |
| C217.3 | By the end of this course, students gain knowledge and understanding of applications of these techniques. |
| C217.4 | By the end of this course, students understand and able to carry out laboratory experiments and interpret the results. |
| C217.5 | By the end of this course, students understand the hazardous chemicals and safety precautions in case of emergency. |

C218 HS8461 Advanced Reading and Writing

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| C218.1 | Read and evaluate different types of texts critically and predict content. |
| C218.2 | Write different types of essays using appropriate discourse markers. |
| C218.3 | Display critical thinking in various professional contexts. |
| C218.4 | Write winning job applications. |
| C218.5 | Prepare technical documents like project proposals and statement of purpose |

Semester:5**C301/ BT 8501 Mass transfer operations**

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| C301.1 | To know in detail about concept of diffusion mass transfer and its co efficient |
| C301.2 | To know the concept of absorption and desorption and design of absorbers |
| C301.3 | To know in detail about distillation process and its analysis |
| C301.4 | To know the concept of extraction and leaching and its industrial application |
| C301.5 | To know in detail about adsorption isotherms and drying mechanism |

C302/ BT 8502 Analytical Methods and Instrumentation

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| C302.1 | The students after completing the course would be aware of components of optical instruments signal to noise ratio - types of optical instruments – Principle of Fourier Transform and optical Measurements. |
| C302.2 | The students would be aware of Theory of fluorescence and Phosphorescence - Theory of Infrared absorption spectrometry – IR instrumentation – Theory of Raman spectroscopy . |
| C302.3 | The students would be aware of NMR-spectrometers Mass spectrometer - Electron paramagnetic resonance instrumentation |
| C302.4 | The students would be aware of - Liquid chromatography – Partition chromatography – Adsorption chromatography – Ion exchange chromatography -size exclusion chromatography- Affinity chromatography. |
| C302.5 | The students would be aware of potentiometry- reference electrode and Scanning probe microscopes |

C303/ BT 8503 Protein Engineering

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| C303.1 | By the end of this course, students should be able to understanding of Basis of bonds, energies, building blocks of proteins |
| C303.2 | Upon completion of this course, the students would be able to design protein architecture |
| C303.3 | Upon successful completion of this course, the students will be able to understand the tertiary structure of proteins |
| C303.4 | By the end of this course, students should be able to describe the main principles, methods structure-function relationship of proteins |
| C303.5 | By the end of this course, students should be able to demonstrate the ability to carry out current status OF proteomics |

C304/ BT 8591 Bioprocess engineering

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| C304.1 | To select appropriate bioreactor configurations and operation modes based upon the nature of bioproducts and cell lines and other process criteria |
| C304.2 | To understand Plan a research career or to work in the biotechnology industry with strong foundation about bioreactor design and scale-up. |
| C304.3 | To Integrate research lab and Industry; identify problems and seek practical solutions for large scale implementation of Biotechnology |
| C304.4 | To understand modeling and simulation of bioprocesses so as to reduce costs and to enhance the quality of products and systems. |
| C304.5 | To apply bioprocess technology in the recombinant cell cultivation of bacteria and yeast |

C305/ BT 8003 Principles of food processing

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|--------|--|
| C305.1 | Upon successful completion of this course, graduates would facilitate different constituents present in food and microorganism involved in processing of food. |
| C305.2 | Upon successful completion of this course, graduates attain knowledge in various food colorants and additives used in industries |
| C305.3 | Graduates gained knowledge about the microorganisms, which spoil food and food borne diseases |
| C305.4 | Upon successful completion of this course, graduates would be known the principles and different preservations techniques of food |
| C305.5 | Upon successful completion of this course, graduates would be known the variety of unit operations in modern food processing and impact of the process on food quality |

C306/ OML552 Microscopy

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| C306.1 | Able to understand the physics behind the microscopy. |
| C306.2 | Ability to describe the principle, construction and working of light microscopy. |
| C306.3 | Ability to appreciate about electron microscopy. |
| C306.4 | Ability to understand about the important of sample preparation technique. |
| C306.5 | Ability to identify the appropriate spectroscopy technique for chemical analysis. |

C307/ BT 8511 Bioprocess lab I

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| C307.1 | Explain about Enzyme kinetics and characterization and how to use them for practical applications. |
| C307.2 | Evaluate the growth kinetics of microorganisms and become adept with medium optimization techniques. |
| C307.3 | Determine an experimental objective, understand the theory behind the experiment, and operate the relevant equipment safely. |
| C307.4 | Demonstrate good lab citizenry and the ability to work in team. |
| C307.5 | Apply bioprocess techniques |

C308/ BT 8512 Analytical Methods and Instrumentation Laboratory

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|--------|---|
| C308.1 | Upon completion of this practical course, the students could visualize and interpret the theory of absorption spectroscopy |
| C308.2 | Upon completion of this practical course, the students would visualize and interpret the theory of Lambert's law |
| C308.3 | Upon completion of this practical course, the student will be able to understand energy balance unit process of chemical energy and biotechnology |
| C308.4 | Upon completion of this practical course, the students would visualize and interpret the theory of nephelometry and Turbidity. |
| C308.5 | Upon completion of this practical course, the students would visualize and interpret the theory of chromatography |

C309/ HS8581 Professional Communication

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|--------|--|
| C309.1 | Cultivate intercultural communication skills, to guide students in making appropriate and responsible decisions, to develop leadership traits and soft skills and to create a desire to fulfill individual goals and team goals. |
| C309.2 | Help the learners acquire listening and speaking skills through lab based activities, and enable them to introduce themselves and make effective presentations. |
| C309.3 | Guide learners to evaluate their thinking skills, acquire listening and speaking skills and enable them to involve in group participation. |
| C309.4 | Teach various formats of interview, answering techniques, body language and paralinguistic skills. |
| C309.5 | Clarify and prioritize learners' objectives and goals, to contribute and work as a team by creating more leadership opportunities. |

Semester:6**C310/ BT8651 Bioinformatics**

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| C310.1 | Upon completion of this course, students will be able to develop bioinformatics tools and operating system. |
| C310.2 | Upon completion of this course, students will be able to apply computational based solutions for biological perspectives. |
| C310.3 | Upon completion of this course, students will be able to understand the evolutionary relationship between species and protein structures |
| C310.4 | Upon completion of this course, students will be able to understand the various machine learning techniques to identify the codon changes and also drug designing approach |
| C310.5 | Upon completion of this course, students will be able to develop programming skills. |

C311- BT8601 Genetic Engineering

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| C311.1 | By the end of this course, students should be able to demonstrate knowledge and understanding of Basis of Recombinant DNA technology |
| C311.2 | Upon completion of this course, the students would be able to design and conduct an DNA libraries |
| C311.3 | Upon successful completion of this course, the students will be able to understand the sequencing and amplification of DNA |
| C311.4 | By the end of this course, students should be able to describe the main principles, methods for organisation and structure of genomics |
| C311.5 | By the end of this course, students should be able to demonstrate the ability to carry out current status and genome sequencing projects |

C312/ BT8691 Applied Chemical Reaction Engineering

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| C312.1 | To know in detail about kinetics or reaction, types of c hemical reaction and stuent will be able t write the rate equation for any type of reaction |
| C312.2 | To know about the Ideal reactors and their performance equation. Student will be able to gain knowledge in the design of chemical reactor |
| C312.3 | To know in detail about non ideal flow, RTD studies and non ideal flow models |
| C312.4 | To understand about catalytic reaction, non catalytic reaction and models for non catalytic reaction |
| C312.5 | To know in detail about trickle bed slurry reactor, fluidized bed reactor and tank reactor |

C313/- BT8005 Animal Biotechnology

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|--------|--|
| C313.1 | By the end of this course, students should be able to understanding To Understand the animal cell culture, animal diseases and its diagnosis |
| C313.2 | Upon completion of this course, the students would be able to understand the knowledge for therapy of animal infections |
| C313.3 | Upon successful completion of this course, the students will be able to understand to Know the concepts of micromanipulation technology and ITS Importance |
| C313.4 | By the end of this course, students should be able to the knowledge gained in this section to apply in the field of clinical research. |
| C313.5 | By the end of this course, students should be able to to apply concept in the field of transgenic animal and stem cell to produce the animals. |

C314/ BT8009 Biopharmaceutical Technology

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| C314.1 | Upon successful completion of this course, graduates would attain knowledge in grasping the current regulatory acts and safety norms of the modern pharmaceutical industries , the legal steps involved in progressing a new drug to market. |
| C314.2 | Upon successful completion of this course, graduates would be used to understand and evaluate different pharmaceutical parameters |
| C314.3 | Upon successful completion of this course, graduates attain knowledge on commercial bulk drug production processes |
| C314.4 | Upon successful completion of this course, graduates attain knowledge and understanding of different dosage manufacturing processes. |
| C314.5 | Upon successful completion of this course, graduates understand the mechanism of different therapeutic products |

C315/- BT8017 Biofuel

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|--------|--|
| C315.1 | By the end of this course, students will be able to generation of biofuels |
| C315.2 | By the end of this course students will be able to understand biodiesel production and sources used |
| C315.3 | By the end of this course students will be able to attain knowledge in environmental aspects of ethanol as a biofuel |
| C315.4 | By the end of this course students will be able to gain knowledge about biogas and limitations |
| C315.5 | By the end of this course students will be able to gain knowledge about Life-Cycle environmental impacts of biofuels |

C316/BT8611 Bioprocess Laboratory II

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| C316..1 | Graduates gain ability to investigate, design and conduct experiments, analyze and interpret data, |
| C316.2 | apply the laboratory skills to solve complex bioprocess engineering problems. |
| C316.3 | Graduates become creative, innovative and adaptable engineers as leaders or team members in their organizations and society. |
| C316.4 | Graduates perform competently in chemical and bioprocess industries and become important contributors to national development. |
| C316.5 | Graduates will demonstrate advancement in their careers through increasing professional responsibility and continued life-long learning. |

C317/ BT8612 Genetic Engineering Laboratory

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| C318.1 | By the end of this course, students understand the main principles, methods for preparation plasmid DNA |
| C218.2 | By the end of this course, students understand the main principles, methods for cloning of DNA and transform into various organisms. |
| C318.3 | By the end of this course, students understand clearly about the gene amplification and methods for analysis of DNA, such as ligation and , restriction analysis |
| C318.4 | By the end of this course, students understand the genetic and biotechnological techniques to manipulate genetic materials and gene expression |
| C318.5 | By the end of this course, students understand the expressed protein confirmation by blotting technique |

Semester:7

C401/ GE8077 Total Quality Management

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| C401.1 | Evaluate the principles of quality management and to explain how these principles can be applied within quality management systems. |
| C401.2 | Identify the key aspects of the quality improvement cycle and to select and use appropriate tools and techniques for controlling, improving and measuring quality. |
| C401.3 | Critically appraise the organizational, communication and teamwork requirements for effective quality management. |
| C401.4 | Critically analyze the strategic issues in quality management, including current issues and developments, and to devise and evaluate quality implementation plans. |
| C401.5 | Calculations involved in the use of old and new quality management tools and quality management to manufacturing and services processes. |

C402/ BT8751 Downstream Processing

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| C402.1 | Upon successful completion of this course, the students will be able to define the fundamentals of downstream processing for product recovery. |
| C402.2 | Upon successful completion of this course, the students will be able to understand the requirements for successful operations of downstream processing. |
| C402.3 | Upon successful completion of this course, the students will be able to describe the components of downstream equipments and explain the purpose of each. |
| C402.4 | Upon successful completion of this course, the students will be able to apply principles of various unit operations used in downstream processing and enhance problem solving techniques required in multi-factorial manufacturing |
| C402.5 | Upon successful completion of this course, the students will be able to understand the concepts of freeze drying and crystallization processes. |

C403/ BT8791 Immunology

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| C403.1 | The students after completing the course would be aware of immune system structure and functions. |
| C403.2 | The students would be aware of immunity to various pathogens |
| C403.3 | The students would be aware of the concepts and mechanism behind tumor development, allergy and hypersensitivity reactions. |
| C403.4 | The students would be aware of the concepts and mechanism behind Transplantation, allergy and hypersensitivity reactions. |
| C403.5 | The students would be aware of the production of Monoclonal antibodies and Classification of Vaccines. |

C404/ BT8018 Plant Biotechnology

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| C404.1 | By the end of this course, students should be able to understanding of Organization Of Genetic Material Of Plant Cells |
| C404.2 | Upon completion of this course, the students would be able to understand the structure and function of chloroplast & mitochondria |
| C404.3 | Upon successful completion of this course, the students will be able to understand nitrogen fixation and nitrogenase activity |
| C404.4 | By the end of this course, students should be able to describe the main principles, of Agrobacterium & viral vectors related diseases |
| C404.5 | By the end of this course, students should be able to demonstrate the ability to carry out plant tissue culture techniques |

C405/ BT8026 Stem Cell Technology

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| C405.1 | The student can be able to understand the various types, properties and sources of stem cell. |
| C405.2 | This course will help the student to understand the plant stem cell and animal stem cell. |
| C405.3 | The student can be able to understand the stem cell differentiation and the factors influencing. |
| C405.4 | This course will help the student to understand the regeneration of stem cell and analyzing of stem cell on experimental methods |
| C405.5 | Upon completion of this course the student will understand the ethical issues posed to stem cells and its application |

C406/ OME754 Industrial Safety

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| C406.1 | This course will help the student to know the various hazardous that are exposed in industries. |
| C406.2 | These courses will the student to understand the various chemical hazards that are exposed in industries. |
| C406.3 | Upon completion of this course the student will understand the environmental control and protection of various hazardous. |
| C406.4 | This course will help the student to study the various method involved in the hazard analysis. |
| C406.5 | Upon completion of this course the student can understand the various norms involved in safety regulations |

C407/ BT8711 Downstream Processing Laboratory

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| C407.1 | Students acquire knowledge for separation of whole cells and other soluble ingredients from culture broth |
| C407.2 | Students gain information on cell disruption techniques to release intracellular products |
| C407.3 | Students learn several techniques like evaporation, extraction, precipitation and membrane separation for concentrating of biological products |
| C407.4 | Students would be able to understand the concept of chromatography for separation and purification of biological products |
| C407.5 | Students attain information on spray drying and freeze drying for final product packaging |

C408/ BT8712 Immunology Laboratory

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| C408.1 | By the end of this course the students would be aware of immune system cells and tissues. |
| C408.2 | By the end of this course the students would have knowledge on immunological and clinical tests |
| C408.3 | By the end of this course the students would be able to isolate lymphocytes and monocytes |
| C408.4 | By the end of this course the students would be able to identify various immune system cells. |
| C408.5 | By the end of this course the students would be able to know Immuno-electrophoresis and immunofluorescence |

Semester:8**C409/ BT8811 Project work**

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| C409.1 | Demonstrate safe laboratory practices and handle the equipment safely to ensure personal, product and environmental safety |
| C409.2 | The student may develop skills to manage creative teams and project process effectively ,also write and publish results efficiently |
| C409.3 | The student may develop a leadership effectiveness in organizations and apply theoretical concepts to industrial problems with team work |
| C409.4 | The students may acquire concepts to apply advanced bimolecular engineering tools to solve pharmaceutical/food/agri problems |
| C409.5 | The student may develop a tool to for the betterment of the society |