



Biotechnology of Department Govt. V.Y.T. PG Autonomous College, Durg(C.G.)



Vision

To create integrated human resource development programme feathered with Undergraduate, Postgraduate and Doctoral courses to fulfil the need of research, development, teaching and industry at both global and local level

Mission

- To popularize the subject among common stakeholders
- To develop skilled human resource by both theoretical and intense hands-on training programme
- To develop an environment for research activities
- To carry out large scale extension programmes for society especially for Chhattisgarh viz., Screening of sickle cell, Anaemia, Rare genetic disease identification and so on.

Program Specific Outcomes (PSOs): B.Sc. Biotechnology (BBT)

- The outcome of Undergraduate Programme in Biotechnology will be development of skill and knowledge among students in the field of Cell Biology, Microbiology, Biochemistry, Immunology, Biophysics, Recombinant DNA Technology.
- Orientation of students towards self employment through skills of Biotechnology.
- To make students more competent to meet the need of Biotechnology based industry.

Course Outcomes of B.Sc. Biotechnology

B.Sc. Part I

BBT01 - Biochemistry, Biostatistics and Computers

Upon successful completion of the course students will be able to –

CO 1: To get acquainted scope of Biochemistry and about Carbohydrates and Lipids Structural & functional concept.

CO 2: Development of knowledge about protein and enzyme's mechanism and action.

CO 3: Development of knowledge about metabolism and hormones.

CO 4: Development of basic knowledge about statistical applications in biological science.

CO 5: Development of basic knowledge about computer applications in biological science.

BBT02 - Cell Biology and Microbiology

Upon successful completion of the course students will be able to –

CO 1: Development of prokaryotic and eukaryotic cellular concepts.

- CO 2: Understanding about cellular organization, division and cycle.
CO 3: Understanding about classical genetics.
CO 4: Attainment of knowledge about microbial organization and its application
CO 5: Understanding about bacteria, mycoplasma and viruses.

BBTL01 Lab Course B.Sc. Part I

Upon successful completion of the lab course students will be able to –

- CO 1: Understanding about media preparation for microbial culture.
CO 2: Understanding about microbial culture techniques and their characterization.
CO 3: Understanding about factors behind microbial growth.
CO 4: Technical soundness about biochemical estimation and characterization.
CO 5: Skill development for interpretation of science by using statistical tools and computer applications.

B.Sc. Part II

BBT03 - -MOLECULAR BIOLOGY AND BIOPHYSICS

Upon successful completion of the course students will be able to –

- CO 1: Enhancement of knowledge about nucleic acids, plasmids and transposons.
CO 2: Attainment of knowledge about DNA replication, mutation and DNA Repair..
CO 3: Understanding about Genetic Code and Central Dogma of Genetics.
CO 4: Attainment of knowledge about concepts of biophysics and its applications in various instrumentation.
CO 5: Development of Knowledge about DNA Fingerprinting, Biosensors and Radioisotope techniques.

BBT 04 - RECOMBINANT DNA TECHNOLOGY

Upon successful completion of the course students will be able to –

- CO 1: Development of understanding about concept of DNA Recombinant Technology and related enzymes..
CO 2: Understanding about Gene Library and Hybridization.
CO 3: Skill development related to Molecular Markers, PCR and understanding of Human Genome Project.
CO 4: Development of concepts related to gene transfer, gene therapy and stem cell technology.
CO 5: Skill Development of Bioinformatics related to Genomics and Proteomics.

BBTL-02 Lab Course B.Sc. Part II

Upon successful completion of the lab course students will be able to –

- CO 1: Skill development about DNA, RNA isolation and quantification.
CO 2: Expertise in photometric instrument operation.
CO 3: Development of Knowledge of proteomics and genomics based experimentation..
CO 4: Development of expertise in chromatographic techniques..
CO 5: Development of skill of Bioinformatics for Genomics and proteomics interpretation.

B.Sc. Part III

BBT05 - GENERAL BIOTECHNOLOGY

Upon successful completion of the course students will be able to –

- CO 1: Skill development related to plant tissue culture and molecular markers.
CO 2: Knowledge of organogenesis and cryopreservation..
CO 3: Understanding about application of biotechnological tools for environmental remediation.
CO 4: Skill development related to Biofertilizers, Biopesticides and knowledge about environmental problems.
CO 5: Fermentation technology based entrepreneurship development.

BBT06 – IMMUNOLOGY

Upon successful completion of the course students will be able to –

- CO 1: Understanding about concepts of Immunology.
CO 2: Understanding about cellular organization and mechanism of immune system.
CO 3: Understanding of immunological applications in medical science.
CO 4: Application of immunological products for pathogen remedies.
CO 5: Understanding applications of immunology in medical science.

BBTL-03 Lab Course B.Sc. Part III

Upon successful completion of the lab course students will be able to –

- CO 1: Practical skill development of plant tissue culture.
CO 2: Practical knowledge of environmental analysis.
CO 3: Knowledge of food preservation.
CO 4: Knowledge about commercial exploitation of microorganisms.
CO 5: Skill development of immunology based medical diagnostics..

Program Specific Outcome (PSO): M.ScBiotechnology

By the end of this program, the students will be able:

- To disseminate holistic knowledge of life science with biotechnological approach among students.
- To develop expertise in the field of Cell Science, Microbial Science, Biochemistry, Statistical applications, Molecular Biology, Biotechnological approach to environment, Enzymatic and Immunological applications, Nano-biotechnology, Drug designing, Genetic Engineering, Plant Science, Animal Cell Science, Clinical Research, Bioinformatics applications and Bioprocess Engineering.
- To develop skill to undertake independent research approach and to accomplish it.
- To develop skill to make them self-reliance by the application of biotechnological approach.
- To develop skill for entrepreneurship and to fill the gap between industry and academia.

Course Outcomes of M.Sc. Biotechnology

Semester I

MBT 101 CELL & INHERITANCE BIOLOGY

After successful completion of course the students will be able to –

- CO1: Understanding about Cell Cycle, Signaling, Communication and Cancer.
- CO 2: Exhaustive knowledge about cell membrane and cell organelles structure and functions.
- CO3: Skill development for gene mapping, pedigree analysis and phylogenetic interpretation.
- CO 4: Concept development related to gene origin, duplication, convergence, drift and its frequency in population.

MBT102- MICROBES AND MICROBIAL GENETICS

After successful completion of course the students will be able to –

- CO1: Development of understanding for microbial taxonomy and hierarchy.
- CO 2: Knowledge of pathogenesis caused by bacteria, viruses, fungi, protistans and prions.
- CO3: Concept development related to microbial genomics and proteomics.
- CO 4: Knowledge development of transposons, transduction, conjugation and quorum sensing.

MBT103- BIOMOLECULES

After successful completion of course the students will be able to –

- CO1: Understanding about world of proteins.
- CO 2: Understanding about carbohydrates, lipids and glycoconjugates.
- CO3: Knowledge development about nucleic acid, PPP, Metabolism and integration of metabolism.
- CO 4: Concept development related to metabolism and biosynthesis of amino acids and fatty acids.

MBT104- BIOSTATISTICS

After successful completion of course the students will be able to –

- CO1: Development of understanding about principle and arrangement of statistical data.
- CO 2: Understanding about central tendencies and dispersion.
- CO3: Skill development related to test of significance..
- CO 4: Skill development related to probability, correlation and regression.

MBT 105E - MICROBIAL PHYSIOLOGY & GENETICS

After successful completion of course the students will be able to –

- CO1: To disseminate the holistic knowledge of microbial cell structure, growth, metabolism, reproduction and inheritance.
- CO 2: To development the expertise in the field of microbial physiology and genetics.
- CO3: To develop expertise in the field of traditional knowledge, Risk Factor Assessment and toxicological study.
- CO 4: To develop skill to undertake independent research approach and to accomplish it.

MBT 106E - EPIDEMIOLOGICAL METHODS IN HEALTH MANAGEMENT

After successful completion of course the students will be able to –

- CO1: Development of skill to understand the spread of Epidemic diseases.

CO 2: To develop understanding about economics of human epidemiological studies.

CO3: To develop expertise in the field of demographical studies related to epidemiology.

CO 4: To develop understanding for environmental, societal and human behavioral factors affecting epidemiological studies.

MBTL 01- LAB COURSE-I

After successful completion of course the students will be able to –

CO1: Skill development for application of tools related to cytological examinations.

CO 2: Development of knowledge for chromosomal observation.

CO3: .Technical advancement of microbial culture

CO 4: Knowledge development about biochemical characterization of microbes.

MBTL 02- LAB COURSE-II

After successful completion of course the students will be able to –

CO1: Skill development related to titrimetric and colorimetric determination.

CO2: Knowledge development about biochemical characterization SDS PAGE/Blotting/techniques for proteomics.

CO3: Knowledge of electrophoresis based estimation

CO 4: Expertise development in biochemical estimation.

Semester II

MBT201- MOLECULAR BIOLOGY

After successful completion of course the students will be able to –

CO1: Development of understanding for DNA replication, Mutation, Transcription and Translation.

CO2: Knowledge development about Recombination, inheritance of non-genomic DNA and cancer.

CO3: Knowledge development about molecular chaperons, epigenetic mechanism, and gene regulation.

CO 4: Development of understanding about Evolution of RNA, its catalytic role and contribution in evolution of genome and its regulation.

MBT202- ENVIRONMENTAL BIOTECHNOLOGY

After successful completion of course the students will be able to –

CO1: Skill development for Biotechnological approach of environmental protection.

CO2: Skill development for management and treatment for industrial waste water.

CO3: Skill development for xenobiotics and solid waste treatment.

CO4: Development of knowledge about legal aspects of environmental protection and patenting.

MBT203: ENZYMOLOGY

After successful completion of course the students will be able to –

CO1: Development of knowledge about Enzyme nomenclature, enzyme assays, coenzymes, cofactors and factors affecting enzyme activities.

CO2: Development of knowledge about enzyme catalytic mechanisms and kinetics.

CO3: Skill development for industrial production of enzymes, biocatalysis.

CO4: To develop research aptitude related to enzyme production through case studies.

MBT204: IMMUNOLOGY

After successful completion of course the students will be able to –

- CO1: Understanding about cellular organization, Ag-Ab & Leucocyte migration of immune components.
- CO2: Understanding about B & T Cell expression and about complement system.
- CO3: Attainment of knowledge related to cytokines, MHC , and cytotoxic responses.
- CO4: Attainment of immune based medically significant knowledge related to hypersensitivity, transplantation and vaccines.

MBTL 03- LAB COURSE-I

After successful completion of course the students will be able to –

- CO1: Skill development related to RNA/DNA isolation, purification and blotting.
- CO2: Skill development related to .Taq DNA Polymerase, titration, transduction and conjugation.
- CO3: Skill development related to environmental assessment.
- CO4: Skill development related to environmental cleaning by using microbes.

MBTL 04- LAB COURSE-II

After successful completion of course the students will be able to –

- CO1: Attainment of knowledge related to application of proteins and enzymes..
- CO2: Understanding of enzymatic kinetics and immobilization.
- CO3: Skill development related to Ag-Ab interactions.
- CO4: Knowledge about conjugation of immune system for medical application.

ELECTIVE COURSE: SEMESTER-II

MBT205E- MEDICAL AND ENVIRONMENTAL BIOTECHNOLOGY

After successful completion of course the students will be able to –

- CO1: Attainment of knowledge related to pathogens, genetic disorders and therapeutic applications.
- CO2: Knowledge about etiology of Bacterial/Fungal/ Viral and Protozoan diseases.
- CO3: Understanding about biotechnological application for remedies of air, water and soil pollutions.
- CO4: Understanding about environmental clearing by using biotechnological applications.

Lab Course for MBT205E

After successful completion of course the students will be able to –

- CO1: Practical knowledge related to immunological diagnosis.
- CO2: Practical knowledge of pathogen diagnosis at molecular level.
- CO3: Practical knowledge about environmental assessments.
- CO4: Understanding about aerobic and anaerobic microbial role for environmental corrections.

Semester III

MBT301-INSTRUMENTATION, NANO-BIOTECHNOLOGY AND DRUG DESIGNING

After successful completion of course the students will be able to –

CO1: Practical understanding of analytical instrumentation.

CO2: Understanding about Microscopy, crystallography, ELISA and cryopreservation for biological applications.

CO3: Attainment of knowledge related to Nano-Science.

CO4: Concept development about Drug designing.

MBT302- GENETIC ENGINEERING

After successful completion of course the students will be able to –

CO1: Molecular understanding related to tools, primers, and hybridization for genetic engineering.

CO2: Understanding about vector, transfection and recombinant clones.

CO3: Understanding about genomic library, molecular markers and genomic sequencing.

CO4: Understanding about Gene therapy, Gene Silencing and CRISPR Cse-9 Technology for gene editing.

MBT303- PLANT BIOTECHNOLOGY

After successful completion of course the students will be able to –

CO1: Attainment of knowledge related to various techniques of plant tissue culture.

CO2: Understanding about plants transformation technology.

CO3: Development of knowledge related to Transgenic improvement of crops.

CO4: Understanding about bioreactor and sustainable exploitation of secondary metabolites.

MBT304- EXTERNAL PROJECT

After successful completion of course the students will be able to –

CO1: Practical skill development for industrial need.

CO2: Attainment of perfection related to industrial application.

CO3: Enhancement of hands on training for industrial application.

CO4: Skill development for quality control to meet the need of industry.

MBTL05 -LAB COURSE-I

After successful completion of course the students will be able to –

CO1: Skill development related to use and application of instruments for biotechnological exploration.

CO2: Skill development related to genomic analysis.

CO3: Skill development about nano-particle synthesis, characterization and applications..

CO4: Skill development related to advanced microscopy.

MBTL06- LAB COURSE-II

After successful completion of course the students will be able to –

CO1: Skill development related to genomic analysis by using molecular markers.

CO2: Practical competency for DNA Labeling and gene amplification..

CO3: Skill development related to plant tissue culture.

CO4: Practical competency related to genetic improvement of plants.

ELECTIVE COUSE FOR SEMESTER-III

MBT 305E - GENOMICS AND PROTEOMICS

After successful completion of course the students will be able to –

CO1: Understanding about application of genomics.

CO2: Understanding about transcriptomics and genomic expression.

CO3: Understanding about proteomics and its application.

CO4: Understanding about proteome analysis and its application for disease control.

Lab Course for MBT305E

After successful completion of course the students will be able to –

CO1: Skill development to understand mutation and signaling.

CO2: Skill development for pathway experiment network analysis.

CO3: Skill development for Gene Set Enrichment analysis.

CO4: Capability to understand and apply Omics.

Semester IV

MBT401- ANIMAL CELL SCIENCE AND TECHNOLOGY

After successful completion of course the students will be able to –

CO1: Understanding about media for animal cell culture.

CO2: Understanding about techniques of various animal cell cultures.

CO3: Attainment of knowledge for preservation and application of cell culture.

CO4: Attainment of knowledge related to application of cell culture.

MBT402- CLINICAL RESEARCH AND BIOINFORMATICS

After successful completion of course the students will be able to –

CO1: Understanding about clinical research and its regulatory affairs.

CO2: Attainment of knowledge related to genetic, pharmaco-epidemeologic and diagnostic research.

CO3: Understanding about genomic database browsing.

CO4: Attainment of knowledge related to genomic mapping and phylogenetic analysis.

MBT403- BIOPROCESS ENGINEERING AND TECHNOLOGY

After successful completion of course the students will be able to –

CO1: Attainment of knowledge about bioprocess engineering and its kinetics.

CO2: Development of knowledge related to fermentation technology and its application.

CO3: Development of knowledge related to effluent treatment, immobilization techniques and biominning.

CO4: Attainment of knowledge related to production of drugs, amino acids and bio-pharmaceuticals.

MBT404- EXTERNAL PROJECT

After successful completion of course the students will be able to –

CO1: Practical skill development for industrial need.

CO2: Attainment of perfection related to industrial application.

CO3: Enhancement of hands on training for industrial application.

CO4: Skill development for quality control to meet the need of industry.

MBTL07- LAB COURSE I

After successful completion of course the students will be able to –

CO1: Skill development related to microbial life cycle.

CO2: Skill development related to industrial applications of microbes.

CO3: Practical knowledge related to clinical research for any.drugs

CO4: Skill development related to DNA Sequencing, Immuno assays and Kinetic analysis.

MBTL08- LAB COURSE II

After successful completion of course the students will be able to –

CO1: Skill development related to Lab and Media preparation for animal tissue culture

CO2: Skill development related to different cell culture techniques.

CO3: Skill development related to sorting and cryopreservation of cultured cells

CO4: Skill development related to applications of cultured cells.

ELECTIVE COURSE FOR SEMESTER-III

MBT405E- HETEROLOGOUS EXPRESSION AND DOWN STREAM PROCESSING

After successful completion of course the students will be able to –

CO1: Development of Knowledge related to recombinant protein production by using recombinant microorganisms and bioreactors.

CO2: Attainment of knowledge of downstream processing for industrial production of recombinant proteins.

CO3: Attainment of knowledge for industrial production by using microorganisms.

CO4: Development of idea about pharmaceutical and food processing industry by using enzyme technology.

Lab Course for Elective course MBT405E

After successful completion of course the students will be able to –

CO1: Skill development about industrially viable cell immobilization.

CO2: Skill development for commercially viable products

CO3: Knowledge of Molecular Sieve Chromatography.

CO4: Skill development for alcohol production.

Program Specific Outcome (PSO): DIPLOMA COURSE

By the end of this program, the students will be able:

- Empowerment of knowledge of students with the basic concept in epidemiology.
- Dissemination of holistic knowledge of epidemiology.
- Advancement of expertise for field assessment and risk factor assessment.

- Will help in the management of epidemics in society.

Course Outcomes of Diploma Course

DCBT101- CONCEPTS OF EPIDEMIOLOGY

After successful completion of course the students will be able to –

- CO1: Empowerment of knowledge about disease surveillance and morbidity.
- CO2: Understanding about diagnostics, cross sectional and cohort study.
- CO3: Understanding about case study, randomized trial and risk estimation.
- CO4: Understanding about genetic, environmental, public policy and professional issues related to epidemics.

Lab Course

After successful completion of course the students will be able to –

- CO1: Skill development about case stud, cross sectional study and cohort study.
- CO2: Skill development about randomized trials.
- CO3: Skill development about health hazard assessment.
- CO4: Skill development about screening programme.

Program Specific Outcome (PSO): PhD Biotechnology

By the end of this program, the students will be able:

- Understanding of basic concept of research methodology.
- Understanding about use of instruments in research work.
- Understanding statistical application in research interpretation.
- Understanding about ethics of research.

Course Outcomes of PhD Biotechnology

PAPER I: RESEARCH METHODOLOGY, ADVANCED TOOLS AND TECHNIQUES, QUANTITATIVE DATA ANALYSIS, AND COMPUTER FUNDAMENTALS

After successful completion of course the students will be able to –

- CO1: Development of ability of selection of research topic.
- CO2: Familiarization with tools and techniques for research work.
- CO3: Development of skill for standardization and interpretation of data.
- CO4: Familiarization with computer application in research work.

PAPER II: REVIEW OF LITERATURE & SEMINAR

After successful completion of course the students will be able to –

- CO1: Development of ability of selection to search for literature.
- CO2: Understanding about research content writing skill..
- CO3: Understanding about presentation skill of research content.
- CO4: Understanding about ethics related research work.

VBT: Value Added Courses

VBT101- SCIENTIFIC VALIDATION OF TRADITIONAL KNOWLEDGE

PSO (PROGRAMME SPECIFIC OUTCOME) FOR VBT101

- Empowerment of students with traditional knowledge.
- Scientific validation of traditional knowledge.
- Enhancement of application and commercial viability about traditional knowledge.
- Entrepreneurship enhancement.

Course Outcomes of VBT101

CO1: Understanding about ethnomedicinal uses and significance.

CO2: Generation of medicinal knowledge from traditional healers.

CO3: Quantification of secondary metabolites as lead compound for pharmacological applications.

CO4: Understanding of pharmacokinetic and pharmacodynamic features of traditional medicines.

Lab Course for VBT101

CO1: Skill development about antimicrobial and antitoxicant features of plants.

CO2: Skill development about quantitative identification of lead compounds.

CO3: Skill development related to application of instrumentation.

CO4: Development of *in vivo* and *in vitro* validation.

VBT102- GENOMIC ANALYSIS OF GENETIC DISEASES

PSO (PROGRAMME SPECIFIC OUTCOME) FOR VBT102

- Enhancement of understanding about genomic diseases.
- Development of ability to understand Mendelian and Non-Mendelian genomic diseases.
- Development of ability to examine, identify and create awareness about genetic diseases.
- Enhancement of ability for scientific evaluation and to take control measure about genetic diseases.

Course Outcomes of VBT102

➤ CO1: Understanding and assessment ability about Hemoglobinopathies of society.

➤ CO2: Contribution prospects in Genome wide Association.

➤ CO3: Development of ability for genomic analysis.

➤ CO4: Understanding about genome variation and its impact.

➤ Lab Course for VBT101

➤ CO1: Skill development related to genomic analysis by electrophoretic methods.

➤ CO2: Skill development about genomic analysis up to PCR level..

➤ CO3: Skill development about genome sequencing and interpretations.

➤ CO4: Empowerment of skill about societal awareness.

VBT103- BIOFERTILIZER AND BIOPESTICIDE PRODUCTION

PSO (PROGRAMME SPECIFIC OUTCOME) FOR VBT103

- Knowledge attainment about environmental friendly biofertilizer and biopesticide development..
- Enhancement of identification of natural sources for biofertilizer production.
- Enhancement of identification of natural sources for biopesticide production.
- Application of biotechnological tools for biofertilizer and biopesticide development.

Course Outcomes of VBT103

- CO1: Understanding about biofertilizers and biopesticides.
- CO2: Improvement of microbes and their application for biofertilizer and biopesticides.
- CO3: Improvisation of nitrogen fixation technology.
- CO4: Improvisation of biological pest control system..

Lab Course for VBT101

- CO1: Skill development for biofertilizer production.
- CO2: Skill development for microorganism culture, competency development for biofertilizers.
- CO3: Skill development for biopesticide production.
- CO4: Skill development for extraction of plant source and animal source for biopesticide development.

