

DYAL SINGH COLLEGE, KARNAL

NAME OF THE PROGRAMME: BACHELOR OF SCIENCE IN BIOTECHNOLOGY

DURATION: THREE YEARS

SUBJECT: BIOTECHNOLOGY

PROGRAMME OUTCOMES (POs)		
PO1	Knowledge	Able to acquire theoretical and practical knowledge in fundamentals of biology in respective disciplines of plants, animals, microbes, environment and biotechnology.
PO2	Communication	Ability to communicate effectively on general and scientific topics with the scientific community.
PO3	Problem Solving	Capability of applying knowledge to solve scientific and other problems.
PO4	Individual and Team Work	To prepare youth for career and work effectively as an individual or as a member or a leader in any interdisciplinary team.
PO5	Investigation of Problems	Impart ability to critically evaluate problems and apply lateral thinking and analytical skills for professional development.
PO6	Modern Tool Usage	Ability to use and learn techniques, skills and modern tools for scientific practice that instill deep interest in biological science for the benefit of society.
PO7	Science and Society	Students will be able to understand various biological aspects and will develop into Biotech savvy integrated personalities with Scientific thinking and this will be beneficial for the society.
PO8	Life-Long Learning	Able to apply basic knowledge in their daily life and participating in learning activities throughout the life.
PO9	Environment and Sustainability	To understand application of biotechnology in health, medicine, food security for human well-being and sustainable development.
PO10	Ethics	To create awareness on ethical issues, good laboratory practices and biosafety.
PO11	Project Management	Undertaking a project with an ability to apply knowledge and understanding of the scientific principles.

PROGRAMME SPECIFIC OUTCOMES (PSOs)	
The objective of the curriculum designed for the Biotechnology course is to nurture the scientific aptitude of students for professional competency in the field of applied sciences	
PSO1	To acquaint students with Theoretical and Practical knowledge in different areas of Biotechnology.
PSO2	Critically think and correlate the biological knowledge of distribution, morphology and physiology of organisms (animals, plants and microorganisms) to techniques in aseptic procedures, isolation, identification, characterization and modifications to improve quality of life in person as well as community.
PSO3	Demonstrate an understanding of the principles of bio- techniques, and exhibit basic professional skills pertaining to biotechnology, carry out laboratory-orientated numerical calculations and analyze biological data (e.g., in enzyme kinetics, molecular structure analysis, microbiological techniques, immunological inferences)
PSO4	Scientific writing and authentic reporting, effective presentation skills and ability to work in a group with cooperation
PSO5	Pursuance of higher studies aimed towards innovational research leading to the progressive growth of the society and the nation.

B-BTY-101: INTRODUCTION TO BIOTECHNOLOGY- I

Course Objectives: The aim of this course is to introduce the basic techniques of biotechnology as well as applications of these technologies in various fields.

Course Outcomes: At the end of this course, the student will be able to:

B-BTY-101.1 Understand and demonstrate the concept of biotechnology as well as its applications in various fields such as agriculture, environment, health, industries, medicine and forensics

B-BTY-101.2 Know about the ethics and status of research in the field of biotechnology at India and World level.

CO-PO Mapping Matrix for Course Code: B-BTY-101

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-101.1	2	3	3	3	3	3	3	2	3	2	3
B-BTY-101.2	2	3	3	1	3	2	3	2	3	3	2
Average	2	3	3	2	3	2.5	3	2	3	2.5	2.5

CO-PSO Mapping Matrix for Course Code: B-BTY-101

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-101.1	2	3	3	1	3
B-BTY-101.2	2	2	1	2	3
Average	2	2.5	2	1.5	3

B-BTY-102: BIOCHEMISTRY- I

Course Objectives: The aim of this course is to introduce about various structures and functions of various biomolecules

Course Outcomes: At the end of this course, the student will be able to:

B-BTY-102.1 classify, draw structures and understand the roles of carbohydrates and amino acids in plants and animals

B-BTY-102.2 Understand the structures, properties and importance of proteins, lipids and nucleic acids

CO-PO Mapping Matrix for Course Code: B-BTY-102

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-102.1	2	3	3	2	2	2	3	3	3	2	2
B-BTY-102.2	2	3	3	2	2	2	3	3	3	2	2
Average	2	3	3	2	2	2	3	3	3	2	2

CO-PSO Mapping Matrix for Course Code: B-BTY-102

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-102.1	2	3	3	2	2
B-BTY-102.2	2	3	3	2	2
Average	4	3	3	2	2

B-BTY-201: GENERAL MICROBIOLOGY

Course Objectives: The aim of this course is the introduction of various microorganisms and techniques used for their study.

Course Outcomes: At the end of this course, the student will be able to:

B-BTY-201.1 Demonstrate various techniques of microbiology such as microscopy, sterilization and staining

B-BTY-201.2 Classify as well as understand the structures and concept of various bacteria and viruses also the diseases associated with these.

CO-PO Mapping Matrix for Course Code: B-BTY-201

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-201.1	2	3	3	3	3	3	3	3	2	3	3
B-BTY-201.2	2	3	3	3	3	3	3	3	3	3	3
Average	2	3	3	3	3	3	3	3	2.5	3	3

CO-PSO Mapping Matrix for Course Code: B-BTY-201

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-201.1	2	3	3	2	3
B-BTY-201.2	2	3	3	2	3
Average	2	3	3	2	3

B-BTY-202: BIOCHEMISTRY-II

Course Objectives: The aim of this course is to understand the basic concept of enzymes, vitamins, hormones and carbohydrate, lipids and amino acid metabolism

Course Outcomes: At the end of this course, the student will be able to:

B-BTY-202.1 Know about the classification of enzyme, concept of enzyme kinetics as well as structure and functions of various vitamins and hormones.

B-BTY-202.2 Understand the various pathways involved in the metabolism of carbohydrates, lipids and amino acids.

CO-PO Mapping Matrix for Course Code: B-BTY-202

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-202.1	2	3	3	3	3	2	3	3	2	2	3
B-BTY-202.2	2	3	3	3	3	2	3	3	2	2	3
Average	2	3	3	3	3	2	3	3	2	2	3

CO-PSO Mapping Matrix for Course Code: B-BTY-202

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-202.1	2	3	3	2	3
B-BTY-202.2	2	3	3	2	3
Average	2	3	3	2	3

B-BTY-203: PRACTICAL (SEMESTER I & II)

Course Objectives: The aim of this course is to learn the concepts of biotechnology, biochemistry, microbiology and enzymology by practical experimentation.

Course Outcomes: At the end of this course, the student will be able to:

B-BTY-203.1 Demonstrate the working of various instruments and techniques used in biotechnology as well as will be able to analyze carbohydrates, proteins, lipids and vitamins from a sample both qualitatively and quantitatively

B-BTY-203.2 prepare nutrient media and will be able to estimate the total count of microorganisms from a sample

CO-PO Mapping Matrix for Course Code: B-BTY-203

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-203.1	3	3	3	3	3	3	3	3	3	2	3
B-BTY-203.2	3	3	3	3	3	2	3	3	3	3	3
Average	3	3	3	3	3	2.5	3	3	3	2.5	3

CO-PO Mapping Matrix for Course Code: B-BTY-203

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-203.1	3	3	3	2	3
B-BTY-203.2	3	3	2	3	3
Average	3	3	2.5	2.5	3

B-BTY- 301: IMMUNOLOGY

Course objectives: To introduce the basic concept of Immunology.

Course outcomes:

B-BTY-301.1 Conceptualize how the innate and adaptive immune responses coordinate to fight invading pathogens.

B-BT-301.2 Understand and describe antigen, antibodies interactions, and generation of immune cells responses, and hybridoma technology for the production of monoclonal antibodies, recombinant antibodies, and different types of vaccines.

CO-PO Mapping Matrix for course code: B-BTY-301

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-301.1	3	3	2	3	3	2	2	2	2	3	2
B-BTY-301.2	3	2	3	3	2	3	2	2	2	2	2
Average	3	2.5	2.5	3	2.5	2.5	2	2	2	2.5	2

CO-PSO Mapping Matrix for course code: B-BTY-301

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-301.1	3	3	2	3	3
B-BTY-301.2	3	2	3	3	3
Average	3	2.5	2.5	3	3

B-BTY- 302: MOLECULAR BIOLOGY

Course objectives: To introduce the basic concept of Molecular Biology

Course outcomes:

B-BTY-302.1 Elaborate the central dogma of life, the general principles of gene organization and describe the structure and functions of proteins involved in replication and repair mechanisms

B-BT-302.2 Give an insight of the process of gene expression, mechanism of transcription, post-transcriptional processing of RNA in prokaryotes; Describe and correlate the concept of genetic code and mechanism of translation in prokaryotes

CO-PO Mapping Matrix for course code: B-BTY-302

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-302.1	3	3	2	3	3	2	2	2	2	3	2
B-BTY-302.2	3	2	3	3	2	3	2	2	2	2	2
Average	3	2.5	2.5	3	2.5	2.5	2	2	2	2.5	2

CO-PSO Mapping Matrix for course code: B-BTY-302

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-302.1	3	3	2	3	3
B-BTY-302.2	3	2	3	3	3
Average	3	2.5	2.5	3	3

B-BTY- 401: Recombinant DNA Technology

Course objectives: To introduce the basic concept of Recombinant DNA Technology

Course outcomes:

B-BTY-401.1 Give insight of the principles and applications of the molecular tools used in recombinant DNA technology

B-BT-401.2 Elaborate the process and applications of genetic engineering in animals

CO-PO Mapping Matrix for course code: B-BTY-401

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-401.1	3	3	2	3	3	2	2	2	2	3	2
B-BTY-401.2	3	2	3	3	2	3	2	2	2	2	2
Average	3	2.5	2.5	3	2.5	2.5	2	2	2	2.5	2

CO-PSO Mapping Matrix for course code: B-BTY-401

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-401.1	3	3	2	3	3
B-BTY-401.2	3	2	3	3	3
Average	3	2.5	2.5	3	3

B-BTY- 402: Bioinformatics

Course objectives: The aim of this course is to introduce the students to the basics of bioinformatics. This includes teaching the basis of the biological system via information and technology.

Course outcomes:

B-BTY-402.1 Know about basic tools and concepts of Bioinformatics and their significance in applied and basic Biology. They will also learn application of various bioinformaticstools

B-BTY-402.2Develop concept of sequence alignment, matrix, algorithms and tools to generate more accurate predictions of various Biological data.Have overview about molecular level phylogenetics, Proteomics, Genomics and Human Genome Project.

CO-PO Mapping Matrix for course code: B-BTY-402

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-402.1	3	3	2	3	3	2	2	2	2	3	2
B-BTY-402.2	3	2	3	3	2	3	2	2	2	2	2
Average	3	2.5	2.5	3	2.5	2.5	2	2	2	2.5	2

CO-PSO Mapping Matrix for course code: B-BTY-401

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-402.1	3	3	2	3	3
B-BTY-402.2	3	2	3	3	3
Average	3	2.5	2.5	3	3

B-BTY- 403: Practical (Sem III +IV)

Course objectives: The aim of this course is to introduce the students how to apply the theoretical knowledge in the practical world.

Course outcomes:

B-BTY-403.1 Isolate DNA from plants and bacteria, plasmid DNA.

B-BTY-403.2Perform various tests to identify infectious diseases and blood typing immunoassays such as Western Blotting, ELISA for diagnosis of various diseases.

CO-PO Mapping Matrix for course code: B-BTY-403

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-403.1	3	3	2	3	3	2	2	2	2	3	2
B-BTY-403.2	3	2	3	3	2	3	2	2	2	2	2
Average	3	2.5	2.5	3	2.5	2.5	2	2	2	2.5	2

CO-PSO Mapping Matrix for course code: B-BTY-404

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-403.1	3	3	2	3	3
B-BTY-403.2	3	2	3	3	3
Average	3	2.5	2.5	3	3

B-BTY- 501: Animal Biotechnology

Course objectives: The aim of this course is to introduce the students to animal Biotechnology

Course outcomes:

B-BTY-501.1 exhibit the knowledge of the basic concepts of animal biotechnology; animal cell and tissue culture technology, principles and applications

B-BTY-501.2 Elaborate the techniques and applications of invitro fertilization and transgenic animals. Describe the techniques of transfection and applications in production of vaccines and gene therapy.

CO-PO Mapping Matrix for course code: B-BTY-501

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-501.1	3	3	2	3	3	2	2	2	2	3	2
B-BTY-501.2	3	2	3	3	2	3	2	2	2	2	2
Average	3	2.5	2.5	3	2.5	2.5	2	2	2	2.5	2

CO-PSO Mapping Matrix for course code: B-BTY-501

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-501.1	3	3	2	3	3
B-BTY-501.2	3	2	3	3	3
Average	3	2.5	2.5	3	3

B-BTY- 502: Plant Biotechnology

Course objectives: The aim of this course is to introduce the students to Plant Biotechnology

Course outcomes:

B-BTY-502.1 Elaborate the basic concept of plant tissue culture, different aseptic conditions, culture media and their supplements

B-BTY-502.2 Describe different types of plant culture (tissue, organ and protoplast) and various techniques such as micropropagation, totipotency, somaclonal variation, their applications and limitations.

CO-PO Mapping Matrix for course code: B-BTY-502

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-502.1	3	3	2	3	3	2	2	2	2	3	2
B-BTY-502.2	3	2	3	3	2	3	2	2	2	2	2
Average	3	2.5	2.5	3	2.5	2.5	2	2	2	2.5	2

CO-PSO Mapping Matrix for course code: B-BTY-502

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-502.1	3	3	2	3	3
B-BTY-502.2	3	2	3	3	3
Average	3	2.5	2.5	3	3

B-BTY-601: MICROBIAL BIOTECHNOLOGY

Course Objectives: The aim of this course is to create a general understanding of microbial technology including the role of microbes in biotechnology and their application in various industries.

Course Outcomes: At the end of this course, the student will be able to:

B-BTY-601.1 Understand the basic techniques of isolation and cultivation of microbes, their growth kinetics and microbial bioreactors

B-BTY-601.2 Know the applications of microbes in production of various industrial products, agriculture medicine and bioremediation.

CO-PO Mapping Matrix for Course Code: B-BTY-301

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-601.1	2	3	3	2	3	3	3	3	3	3	2
B-BTY-601.2	2	3	3	3	3	3	3	3	3	3	2
Average	2	3	3	2.5	3	3	3	3	3	3	2

CO-PO Mapping Matrix for Course Code: B-BTY-301

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-601.1	2	3	3	2	3
B-BTY-601.2	2	3	3	2	3
Average	2	3	3	2	3

B-BTY-602: PRACTICAL (SEMESTER V & VI)

Course Objectives: The aim of this course is to develop practical skill and acquaint with recent knowledge and techniques in the field of microbial biotechnology and enzymology

Course Outcomes: At the end of this course, the student will be able to:

B-BTY-602.1 learn and perform the basics of microbial culturing, its applications and enzyme action through various experiments

B-BTY-602.2 Imbibe the value of team spirit and as well as work independently to write and manage their research experimentation.

CO-PO Mapping Matrix for Course Code: B-BTY-302

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-601.1	3	3	3	3	3	3	3	3	3	2	3
B-BTY-601.2	3	3	3	3	3	2	3	3	3	3	3
Average	3	3	3	3	3	2.5	3	3	3	2.5	3

CO-PO Mapping Matrix for Course Code: B-BTY-302

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-601.1	3	3	3	2	3
B-BTY-601.2	3	2	3	3	3
Average	3	2.5	3	2.5	3

B-BTY-603: PROJECT (IN-HOUSE)

Course Objectives: The aim of this course is to provide practical understanding and hands-on training of various techniques of biotechnology by undertaking a research based problem

Course Outcomes: At the end of this course, the student will be able to:

B-BTY-603.1 imbibe the knowledge of practical applications of biotechnology

B-BTY-603.2 learn to work in a team and will be able to write a project report scientifically.

CO-PO Mapping Matrix for Course Code: B-BTY-603

Cos#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
B-BTY-603.1	3	2	3	3	3	3	3	3	3	3	3
B-BTY-603.2	3	3	3	3	3	2	3	3	3	3	3
Average	3	2.5	3	3	3	2.5	3	3	3	3	3

CO-PO Mapping Matrix for Course Code: B-BTY-603

Cos#	PSO1	PSO2	PSO3	PSO4	PSO5
B-BTY-603.1	3	3	3	3	3
B-BTY-603.2	2	3	2	3	3
Average	2.5	3	2.5	3	3



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