SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Cellular Metabolism		
Course Code	BT 105 (T)		
Course Outcomes & Bloom's Level	**CO1-** To impart knowledge on structural, functional and dynamic aspects of biological components.**(BL1-Remember)** **CO2-** To comprehend the understanding of the metabolic pathways involving the four major metabolic compounds:**(BL2-Understand)** **CO3-** To estimate the relation of biological material to living matter and elaborate the structure and functions of different biomolecules.**(BL3-Apply)** **CO4-** To analyze the various biomolecules in biological samples**(BL4-Analyze)** **CO5-** To evaluate the applications of biomolecules in various fields **(BL5-Evaluate)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	2	3	2	2	2	1	-	-	-	2	-	-	1	-	3
CO3	3	1	1	2	1	-	-	-	-	-	-	-	3	2	3
CO4	3	2	1	1	1	-	-	-	-	2	-	-	2	3	2
CO5	2	1	1	2	1	-	-	-	-	2	-	-	2	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Biophysics and Biochemistry		
Course Code	BT-101[T]		
Course Outcomes & Bloom's Level	**CO1-** To remember the structure of various biomolecules like carbohydrates, fats, amino acids, etc.**(BL2-Understand)** **CO2-** To comprehend the biological material; and its relation to living matter and elaborate the structure and functions of different biomolecules**(BL4-Analyze)** **CO3-** To understand the importance of biophysical chemistry and its applications.**(BL2-Understand)** **CO4-** To provide experimental basis and to enable students to analyze the various biomolecules in food samples.**(BL3-Apply)** **CO5-** To evaluate the applications of biomolecules in various fields such as research and industries**(BL5-Evaluate)**		
Course Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	3	3	1	2	-	-	-	-	-	1	3	-
CO2	1	3	2	1	-	-	1	-	-	-	-	-	2	3	1
CO3	1	2	1	1	1	2	2	-	-	-	-	-	-	1	1
CO4	1	2	1	1	3	2	1	-	-	-	-	-	2	1	2
CO5	1	2	3	1	1	2	3	-	-	-	-	-	2	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	General Microbiology and Microbial Genetics		
Course Code	BT-102[T]		
Course Outcomes & Bloom's Level	**CO1-** To remember the basic concepts and view of professional and scientific communication approaches for microbiology and biotechnology settings. **(BL1-Remember)** **CO2-** To understand the gene transfer mechanisms and a detailed insight into mutations and their analysis.**(BL2-Understand)** **CO3-** To describe comprehensive understanding of sterilization processes and media preparation pipelines.**(BL2-Understand)** **CO4-** To provide experimental basis, and to enable students to analyze the basic concepts of microbial evolution, phylogeny, nutritional aspects and elements of microbial genetics.**(BL3-Apply)** **CO5-** To evaluate the genetic analysis and gene transfer mechanisms of microbes**(BL5-Evaluate)** **CO6-** To apply Appraise the current regulatory, quality control, and legal frameworks that impact biotechnology and ethical behaviors that foster positive and productive interactions in diverse microbiology and biotechnology settings.**(BL3-Apply)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	-	-	-	2	-	-	-	-	-	1	1	3
CO2	1	2	2	-	-	-	1	-	-	-	-	-	2	-	-
CO3	1	2	2	-	-	-	3	-	-	-	-	-	2	-	-
CO4	2	1	2	-	-	-	2	-	-	-	-	-	2	-	-
CO5	1	2	2	-	-	-	1	-	-	-	-	-	-	3	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Cell Biology		
Course Code	BT-103[T]		
Course Outcomes & Bloom's Level	**CO1-** Students will remember the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles**(BL1-Remember)** **CO2-** Students will understand how these cellular components are used to generate and utilize energy in cells**(BL2-Understand)** **CO3-** Students will recognize the cellular components underlying mitotic cell division**(BL2-Understand)** **CO4-** Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function.**(BL3-Apply)** **CO5-** : Students will create a model by using cell biology basics**(BL5-Evaluate)**		
Course Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	1	-	1
CO2	2	3	2	2	2	2	-	-	-	2	-	-	1	-	3
CO3	3	1	1	2	1	-	-	-	-	-	-	-	3	2	3
CO4	3	2	1	1	1	-	-	-	-	2	-	-	2	3	2
CO5	2	1	1	2	1	-	-	-	-	2	-	-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Bioanalytical Techniques		
Course Code	BT-104[T]		
Course Outcomes & Bloom's Level	**CO1-** To remember and understand and learn the basic microscopic & centrifugation techniques **(BL1-Remember)** **CO2-** To understand the separation of components using various techniques like chromatography, electrophoresis, centrifugation etc**(BL2-Understand)** **CO3-** To utilize the separation techniques in order to distinguish the different types of molecules present in the sample.**(BL3-Apply)** **CO4-** To evaluate, identify and compare the molecules on the basis of bioanalytical techniques.**(BL4-Analyze)** **CO5-** To purify the specific protein/molecules/compound for its further utilization in food, dairy, chemical and beverage industries**(BL5-Evaluate)**		
Course Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	1	1	2	-	-	-	-	-	-	1	2	1
CO2	1	1	-	3	2	1	-	-	-	-	-	-	2	1	-
CO3	1	2	2	2	2	-	1	-	-	-	-	1	1	2	2
CO4	3	2	2	2	1	2	1	-	-	-	-	-	2	1	2
CO5	1	3	1	1	2	1	-	-	-	-	-	-	2	-	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Lab		
Course Code	BT-106[P]		
Course Outcomes & Bloom's Level	**CO1-** To provide experimental basis, and to enable students to analyze the various biomolecules in food samples.**(BL1-Remember)** **CO2-** To evaluate the applications of biomolecules in various fields such as research and industries**(BL2-Understand)** **CO3-** To provide experimental basis, and to enable students to analyze the basic concepts of microbial evolution, phylogeny, nutritional aspects and elements of microbial genetics.**(BL2-Understand)** **CO4-** To evaluate the genetic analysis and gene transfer mechanisms of microbes. **(BL3-Apply)** **CO5-** To apply Appraise the current regulatory, quality control, and legal frameworks that impact biotechnology and ethical behaviors that foster positive and productive interactions in diverse microbiology and biotechnology settings.**(BL3-Apply)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	2	-	2	2	-	-	-	-	-	1	1	-
CO2	2	2	3	2	1	-	2	-	-	-	-	-	1	2	2
CO3	1	1	1	2	3	2	3	-	-	-	-	-	-	2	1
CO4	2	1	1	-	3	1	2	-	-	-	-	-	2	2	2
CO5	3	2	2	2	1	1	-	-	-	-	-	-	3	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Lab		
Course Code	BT-107[P]		
Course Outcomes & Bloom's Level	**CO1-** Students will recognize the cellular components underlying mitotic cell division**(BL3-Apply)** **CO2-** Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function**(BL4-Analyze)** **CO3-** Students will create a model by using cell biology basics**(BL6-Create)** **CO4-** To utilize the separation techniques in order to distinguish the different types of molecules present in the sample.**(BL3-Apply)** **CO5-** To evaluate, identify and compare the molecules on the basis of bioanalytical techniques.**(BL4-Analyze)** **CO6-** To purify the specific protein/molecules/compound for its further utilization in food, dairy, chemical and beverage industries**(BL6-Create)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	1	2	-	-	-	-	-	-	-	2	1
CO2	1	2	2	2	2	2	1	-	-	-	-	-	1	2	2
CO3	1	3	-	1	3	-	1	-	-	-	-	-	2	1	2
CO4	1	-	2	1	1	1	-	-	-	-	-	-	2	1	-
CO5	2	1	2	2	3	-	-	-	-	-	-	-	1	3	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Enzyme Technology		
Course Code	BT 202 (T)		
Course Outcomes & Bloom's Level	**CO1-** To acquire fundamental knowledge on enzymes and their importance in biological reactions**(BL1-Remember)** **CO2-** To understand and ability to difference between a chemical catalyst and bio catalyst.**(BL2-Understand)** **CO3-** to apply the role of enzymes in clinical diagnosis and industries.**(BL2-Understand)** **CO4-** analyze methods for production, purification, characterization and immobilization of enzymes**(BL2-Understand)** **CO5-** To evaluate the current and future trends of applying enzyme technology**(BL3-Apply)** **CO6-** To develop biotechnological products for the commercialization purpose.**(BL4-Analyze)**		
Course Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✕	**SDG (Goals)**	SDG4(Quality education)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	3	3	1	3	2	1	1	1	3	3	1	3	2
CO2	2	1	2	2	1	3	3	1	1	1	3	1	2	2	3
CO3	2	3	1	1	3	3	2	1	3	3	1	2	3	1	2
CO4	2	3	2	3	3	1	1	1	2	1	1	2	1	1	2
CO5	3	1	3	2	1	3	3	1	1	1	1	2	2	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Molecular Biology		
Course Code	BT 203(T)		
Course Outcomes & Bloom's Level	**CO1-** To observe and understand the types of DNA and its replication among prokaryotes & eukaryotes.**(BL1-Remember)** **CO2-** To understand the transcription process in prokaryotes and eukaryotes. **(BL2-Understand)** **CO3-** To compare and distinguish the functions of various enzymes involves in transcription process of prokaryotes as well as eukaryotes.**(BL3-Apply)** **CO4-** To describe and summarize the RNA modifications in eukaryotes.**(BL4-Analyze)** **CO5-** To study and conclude the genetic behavior based on the genetic code in a particular organism.**(BL5-Evaluate)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	2	-	-	-	2	-	-	1	-	1
CO2	2	3	2	2	2	2	-	-	-	2	-	-	1	-	3
CO3	3	1	1	2	1	-	-	-	-	-	-	-	3	2	3
CO4	3	2	1	1	1	-	-	-	-	2	-	-	2	3	2
CO5	2	1	1	1	1	-	-	-	-	2	-	-	2	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Immunotechnology		
Course Code	BT 204 (T)		
Course Outcomes & Bloom's Level	**CO1-** To remember the structure of various Immunological Barriers of the body**(BL1-Remember)** **CO2-** To understand the Different cells & proteins involved in Immune system**(BL2-Understand)** **CO3-** To understand the connection of immune system failure & disorders**(BL2-Understand)** **CO4-** To apply the use of Proteins & receptors in antibody formation**(BL3-Apply)** **CO5-** To evaluate the applications of Antigens & Antibodies in Diagnostic & Medical Research**(BL5-Evaluate)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✕	**SDG (Goals)**	SDG3(Good health and well-being)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	3	1	3	1	2	3	1	2	3	1	1	2
CO2	1	1	2	1	3	2	3	2	3	1	2	3	1	2	3
CO3	1	2	2	3	4	3	3	1	3	1	2	2	1	2	1
CO4	2	2	1	2	2	2	2	3	2	2	1	1	2	2	1
CO5	2	3	3	1	1	3	1	3	1	3	3	1	3	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Applied Biotechnology & Microbiology		
Course Code	BT-201[T]		
Course Outcomes & Bloom's Level	**CO1-** To understand professional and scientific communication approaches for microbiology and biotechnology settings.**(BL2-Understand)** **CO2-** Demonstrate comprehensive understanding of organizational processes and product development pipelines**(BL2-Understand)** **CO3-** Distinguish among diverse methods and technologies and their applications in microbiology and biotechnology**(BL3-Apply)** **CO4-** Appraise the current regulatory, quality control, and legal frameworks that impact biotechnology and ethical behaviors that foster positive and productive interactions in diverse microbiology and biotechnology settings.**(BL4-Analyze)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	2	1	2	1	-	-	-	-	-	2	2	1
CO2	1	1	2	2	-	1	-	-	-	-	1	-	1	3	2
CO3	1	2	2	2	1	1	1	-	-	-	-	-	1	1	2
CO4	3	2	1	1	2	1	-	-	-	-	-	-	1	1	1
CO5	1	2	-	2	2	3	-	-	-	-	-	-	2	3	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	LAB COURSE III		
Course Code	BT 206		
Course Outcomes & Bloom's Level	**CO1-** To impart knowledge on structural, functional and dynamic aspects of biological components**(BL1-Remember)** **CO2-** To understand ability to difference between a chemical catalyst and biocatalyst**(BL2-Understand)** **CO3-** To apply the role of enzymes in clinical diagnosis and industries**(BL3-Apply)** **CO4-** To analyze the various biomolecules in biological samples**(BL4-Analyze)** **CO5-** To evaluate the applications of biomolecules in various fields**(BL5-Evaluate)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	2	-	-	-	2	-	-	1	-	1
CO2	2	3	2	-	2	2	-	-	-	2	-	-	1	-	3
CO3	3	1	1	-	1	-	-	-	-	-	-	-	3	-	3
CO4	3	2	1	-	1	-	-	-	-	2	-	-	2	-	2
CO5	2	1	1	-	1	-	-	-	-	2	-	-	2	-	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	LAB COURSE IV		
Course Code	BT 207		
Course Outcomes & Bloom's Level	**CO1-** To observe and understand the types of DNA and its replication among prokaryotes & eukaryotes.**(BL1-Remember)** **CO2-** To understand the Different cells & proteins involved in Immune system**(BL2-Understand)** **CO3-** To compare and distinguish the functions of various enzymes involves in transcription process of prokaryotes as well as eukaryotes.**(BL3-Apply)** **CO4-** To apply the use of Proteins & receptors in antibody formation**(BL3-Apply)** **CO5-** To evaluate the applications of Antigens & Antibodies in Diagnostic & Medical Research**(BL5-Evaluate)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	2	3	2	2	2	1	-	-	-	2	-	-	1	-	3
CO3	3	1	1	2	1	-	-	-	-	-	-	-	3	2	2
CO4	3	2	1	1	1	-	-	-	-	2	-	-	2	3	2
CO5	2	2	1	1	1	-	-	-	-	2	-	-	2	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Open Elective 1 : Bioinformatics		
Course Code	BT 205 (T)		
Course Outcomes & Bloom's Level	**CO1-** The course prepares the student to understand the basic concepts of Bioinformatics, its applications and future prospects.**(BL1-Remember)** **CO2-** The subject Bioinformatics is designed for post graduate students of biotechnology for understanding of basic concepts of each and every division of Bioinformatics along with its applications in other fields**(BL2-Understand)** **CO3-** The course aims to provide experimental basis, and to enable students to acquire a specialized knowledge and understanding.**(BL3-Apply)** **CO4-** The course aims to provide basis of analyzing the applications of Bioinformatics in various fields of research and industries.**(BL3-Apply)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	-	2	-	-	-	-	-	-	-	1	2	-
CO2	1	2	-	-	-	3	-	-	-	-	-	-	1	2	-
CO3	1	2	-	1	-	-	-	-	-	-	-	-	1	2	-
CO4	1	2	-	-	-	-	1	-	-	-	-	-	1	2	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Stem cell biology		
Course Code	BT-205 (T)		
Course Outcomes & Bloom's Level	**CO1-** To remember the basics of stem cell structure and properties.**(BL1-Remember)** **CO2-** To understand the techniques involved in the culturing of functional stem cell. **(BL2-Understand)** **CO3-** To apply the bioengineering and development of mammalian stem cells in the laboratory**(BL3-Apply)** **CO4-** To interpret the various applications of stem cells in treating various diseases**(BL4-Analyze)** **CO5-** To Justify the industrial approach to stem cells. Ethical and Legal issues: and Guidelines in conducting human stem cell research.**(BL5-Evaluate)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	2	3	2	2	2	1	-	-	-	2	-	-	1	-	3
CO3	3	1	1	2	1	-	-	-	-	-	-	-	3	2	3
CO4	3	2	1	1	1	-	-	-	-	2	-	-	2	3	2
CO5	2	1	1	2	1	-	-	-	-	2	-	-	2	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Genetic Engineering		
Course Code	BT 301 (T)		
Course Outcomes & Bloom's Level	**CO1-** To remember the role of all the enzymes used in the DNA editing**(BL1-Remember)** **CO2-** To understand the method of creating new molecules such as DNA & RNA**(BL2-Understand)** **CO3-** To understand the importance Nucleic acid editing tools **(BL2-Understand)** **CO4-** To apply the understanding of creation of new DNA, RNA & Protein and its use in different Fields.**(BL3-Apply)** **CO5-** To evaluate the applications of in various fields such as research, Agriculture, Pharmaceutical industries**(BL5-Evaluate)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓	**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	-	-	2	1	-	-	-	-	1	1	3
CO2	1	2	2	-	-	-	2	1	-	-	-	-	2	1	2
CO3	2	3	2	-	-	-	1	2	-	-	-	-	2	1	2
CO4	2	3	1	-	-	-	2	2	-	-	-	-	3	2	2
CO5	3	1	3	-	-	-	3	3	-	-	-	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Plant Biotechnology		
Course Code	BT 302(T)		
Course Outcomes & Bloom's Level	**CO1-** To understand and recall the basic terms, techniques, historical landmarks of plant tissue culture**(BL1-Remember)** **CO2-** To understand the establishment of callus and suspension cultures**(BL2-Understand)** **CO3-** To observe and differentiate the behavior of various explants towards the different types of nutrient media**(BL3-Apply)** **CO4-** To standardize the techniques and nutrient media for the growth and development of in vitro cultures using techniques like single cell culture, protoplast culture, anther culture, etc**(BL6-Create)** **CO5-** To develop in vitro regenerated and transgenic plantlets using various tools and techniques of plant tissue culture.**(BL5-Evaluate)**		
Course Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓	**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG12(Responsible consuption and production) SDG15(Life on land)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	2	2	1	-	-	-	-	-	-	1	2	2
CO2	1	-	2	3	1	-	-	-	-	-	-	-	2	1	3
CO3	1	2	1	3	-	2	1	-	-	-	1	-	-	2	1
CO4	2	2	3	1	1	2	1	-	-	-	-	-	2	3	2
CO5	1	1	1	-	2	1	-	-	-	-	1	-	1	3	1
CO6	1	2	1	2	3	-	-	-	-	-	-	-	-	2	1

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Animal Biotechnology		
Course Code	BT 303 (T)		
Course Outcomes & Bloom's Level	**CO1-** The course prepares the student to understand the Animal Biotechnology: and how does it interact with living and non-living molecules**(BL1-Remember)** **CO2-** The subject Fundamental of Animal Biotechnology is designed to under graduate students of biotechnology for understanding of basic concepts of each and every part of Animal Biotechnology and their types.**(BL2-Understand)** **CO3-** The course aims to provide experimental basis, and to enable students to acquire a specialized knowledge and understanding.**(BL3-Apply)** **CO4-** The course aims to provide basis of analyzing the applications of Animal Biotechnology in various fields such as research and industries for the production of diff. therapeutic product and stem cell technology also use for treatment of different diseases.**(BL4-Analyze)** **CO5-** To apply the understanding of Animal Biotechnology in evaluation in various Biological Samples and to evaluate the applications of Animal Biotechnology in various fields such as research and industries**(BL5-Evaluate)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓	**SDG (Goals)**	SDG4(Quality education)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	3	1	3	3	1	1	1	3	1	-	-	-
CO2	2	3	3	2	1	3	1	2	2	3	3	1	-	-	-
CO3	3	3	1	1	3	3	3	2	1	1	3	2	-	-	-
CO4	2	1	2	1	3	1	1	3	2	2	3	1	-	-	-
CO5	3	3	2	2	1	3	3	1	1	1	1	2	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Bioprocess Engineering		
Course Code	BT304 (T)		
Course Outcomes & Bloom's Level	**CO1-** The course prepares the student to understand the basic concepts of Bioprocess Engineering, its applications and future prospects.**(BL1-Remember)** **CO2-** The subject Bioprocess Engineering is designed for post graduate students of biotechnology for understanding of basic concepts of each and every division of the subject along with its applications in other fields. **(BL2-Understand)** **CO3-** The course aims to provide experimental basis, and to enable students to acquire a specialized knowledge and understanding.**(BL3-Apply)** **CO4-** The course aims to provide basis of analyzing the applications of Bioprocess Engineering in various fields of research and industries**(BL3-Apply)** **CO5-** The course aims to provide basis of design, production and purification of bioproducts produced through research and in industries.**(BL3-Apply)**		
Course Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	-	-	-	-	-	-	-	-	1	1	-
CO2	1	2	1	-	-	-	-	-	-	-	-	-	1	2	-
CO3	1	2	2	-	-	-	-	-	-	-	-	-	1	2	-
CO4	1	2	2	-	-	-	-	-	-	-	-	-	1	2	-
CO5	1	2	1	-	-	-	-	-	-	-	-	-	1	2	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Lab Course V		
Course Code	BT306 (P)		
Course Outcomes & Bloom's Level	**CO1-** To standardize the techniques and nutrient media for the growth and development of in vitro cultures using techniques like single cell culture, protoplast culture, anther culture, etc.**(BL3-Apply)** **CO2-** To develop in vitro regenerated and transgenic plantlets using various tools and techniques of plant tissue culture.**(BL4-Analyze)** **CO3-** To understand and develop new varieties of genetically modified crops in order to increase the production **(BL5-Evaluate)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG13(Climate action) SDG15(Life on land)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	2	1	1	-	-	-	-	-	-	3	2	2
CO2	2	2	1	1	2	2	11	-	-	-	-	1	1	3	2
CO3	1	1	1	2	3	-	-	-	-	-	-	-	1	1	2
CO4	-	-	-	-	`	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Lab Course-VI		
Course Code	BT307(P)		
Course Outcomes & Bloom's Level	**CO1-** The course aims to provide basis of analyzing the applications of Bioprocess Engineering in various fields of research and industries.**(BL3-Apply)** **CO2-** The course aims to provide basis of design, production and purification of bioproducts produced through research and in industries**(BL4-Analyze)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG4(Quality education)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	-	-	-	-	-	1	2	-	-	-	-	-
CO2	1	1	-	-	-	-	-	-	1	1	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Research Methodology		
Course Code	BT-305 (T)		
Course Outcomes & Bloom's Level	**CO1-** The course prepares the student to understand the basic concepts of Research Methodology, its applications in experimental design and future prospects.**(BL1-Remember)** **CO2-** The subject Research Methodology is designed for post graduate students of Food Technology for describing the basic concepts of each and every division of the subject along with its applications in other fields. **(BL2-Understand)** **CO3-** The course aims to provide experimental basis, and to enable students to acquire a specialized knowledge and understanding of data and its applications in experimental verification.**(BL3-Apply)** **CO4-** The course aims to provide basis of analyzing the applications of Research Methodology in various fields of research and industries**(BL3-Apply)** **CO5-** The course aims to provide basis of experimental design, computer applications and use of statistical tools in research and industries.**(BL3-Apply)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG2(Zero hunger) SDG4(Quality education) SDG6(Clean water and sanitation) SDG8(Decent work and economic growth)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	-	-	2	-	-	-	-	-	-	2	-	2
CO2	1	2	3	2	3	2	-	-	-	-	-	-	1	2	3
CO3	1	2	2	2	2	2	-	-	-	-	-	-	2	2	1
CO4	1	2	2	1	2	-	-	-	-	-	-	-	2	2	1
CO5	1	2	2	1	2	1	-	-	-	-	-	-	2	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Agriculture Biotechnology and IPR		
Course Code	BT 305 (T)		
Course Outcomes & Bloom's Level	**CO1-** To define and contrast the terms agriculture and agricultural biotechnology**(BL1-Remember)** **CO2-** To understand the techniques, skills, and modern engineering tools necessary for engineering practice in agriculture biotechnology**(BL2-Understand)** **CO3-** To define the concept of utilizing plants for production of vaccines and production of biofertilizers**(BL2-Understand)** **CO4-** To apply the knowledge of engineering principles of agriculture biotechnology to living entities for societal welfare**(BL3-Apply)** **CO5-** The students will be able to develop the relationship between science and society and will be able to give justification for biotechnological manipulation of plants for human use**(BL4-Analyze)**		
Course Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✓	**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	1	2	-	-	-	-	-	1	2	3	2
CO2	1	-	2	3	-	3	2	-	-	-	-	-	1	2	2
CO3	1	3	1	3	1	1	1	1	-	-	-	-	-	1	2
CO4	2	1	2	2	1	-	2	-	-	-	-	-	2	2	1
CO5	2	3	1	2	2	2	1	-	-	-	-	-	3	2	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Research Project		
Course Code	BT401		
Course Outcomes & Bloom's Level	**CO1-** To provide students with the fundamental tools and practical skills required to generate competent and highly qualified post graduates. **(BL2-Understand)** **CO2-** To acquaint the students with the principles of biosafety and ethical perspectives of biotechnological systems.**(BL2-Understand)** **CO3-** To develop students' ability to apply knowledge and skills to solve theoretical and practical problems in biology and biotechnology.**(BL5-Evaluate)** **CO4-** To provide students with the basis for the life-long self-learning in an attempt to keep up with the continuous quick changes in the field of biotechnology. **(BL3-Apply)** **CO5-** To equip students with the necessary critical theoretical background, develop the analytical, and basic research skills that will help students to pursue higher education in reputed institutes at both national and international levels**(BL4-Analyze)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	1	1	-	1	-	-	-	-	-	-	2	2
CO2	1	1	2	1	2	2	1	-	-	-	-	-	2	3	1
CO3	1	2	2	2	2	2	2	-	-	-	-	-	1	2	2
CO4	1	2	1	1	2	2	2	-	-	-	-	-	1	1	1
CO5	3	-	1	1	-	-	2	-	-	-	-	-	1	3	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SOS-MSc_Biotechnology

Course mapping with relevance to the local, regional, national, and global developmental needs

Title of the Course	Research Report and Presentation		
Course Code	BT402		
Course Outcomes & Bloom's Level	**CO1-** Dissertation, Works As Skills Development In Students.**(BL3-Apply)** **CO2-** Increases Their Mental Ability.**(BL4-Analyze)** **CO3-** Express Their Opinion And Thoughts**(BL5-Evaluate)** **CO4-** Enhancing Writing Skills And Knowledge.**(BL6-Create)**		
Course Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education)

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	2	-	-	-	-	-	-	-	-	-	1	-	2
CO2	1	1	1	3	2	-	-	-	-	-	-	-	2	2	3
CO3	2	1	1	2	1	-	1	-	-	-	-	-	2	2	3
CO4	1	1	1	1	2	-	1	-	-	-	-	-	2	1	1
CO5	1	2	3	1	1	-	-	-	-	-	-	-	1	3	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-