COURSE STRUCTURE

Master of Science

(Semester I)

Department of Botany

Under

Choice Based Credit System (CBCS)

Faculty of Science
Gokul Science College
University Campus, State Highway-41,
Siddhpur - 384151, Dist. Patan, Gujarat, INDIA, Mobile : 9510973863
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Master of Science Program outcomes (PO)

PO No.	Program Outcome Description
PO1	Advanced Subject Knowledge: Graduates will demonstrate advanced knowledge and expertise in their specialized field, including a comprehensive understanding of advanced concepts and theories.
PO2	Research Proficiency: Students will develop advanced research skills, including the ability to design and conduct independent research, analyze data, and draw meaningful conclusions.
PO3	Critical Analysis and Synthesis: Graduates will demonstrate advanced critical thinking abilities, the capacity to analyze complex scientific problems, synthesize information from diverse sources, and propose innovative solutions.
PO4	Scholarly Communication: Students will possess advanced skills in scientific writing, oral presentation, and effective communication of research findings to scientific and non-scientific audiences.
PO5	Independent Thinking: Graduates will exhibit independent thinking and creativity in problem-solving, research design, and the development of novel approaches in their field of specialization.
PO6	Leadership and Collaboration: Students will develop leadership skills and the ability to collaborate effectively with diverse teams, providing guidance and fostering a collaborative research environment.
PO7	Advanced Technology and Techniques: Graduates will be proficient in utilizing advanced technology, tools, and techniques specific to their discipline to enhance research and analysis capabilities.
PO8	Ethical Research Practices: Students will adhere to high ethical standards in research, ensuring the responsible conduct of research, integrity, and respect for intellectual property rights.
PO9	Continuous Learning and Adaptability: Graduates will demonstrate a commitment to continuous learning, keeping pace with emerging trends and technologies, and adapting to new challenges in their field.
PO10	Contribution to the Field: Students will make significant contributions to their specialized field, actively participating in conferences, publishing research, and advancing scientific knowledge through their research work.

M.Sc. Botany:

PSO No.	Program Specific Outcome Description
PSO1	Advanced Botanical Knowledge and Research: Graduates of the M.Sc. Botany program will acquire advanced knowledge and expertise in the field of plant biology, including plant physiology, genetics, ecology, and biodiversity. They will engage in advanced research, exploring specialized areas of botanical study.
PSO2	Plant Conservation and Ecological Restoration: Graduates will contribute to plant conservation efforts, developing strategies for the preservation and restoration of plant species and ecosystems. They will apply advanced techniques and technologies to assess plant diversity, monitor ecological changes, and promote sustainable management practices.

Semester I

Subject Code	Subject Name	Teaching Scheme (Hours)			Credits	Theory Marks		Tutorial/ Practical Marks		Total Marks
		Theory	Tutorial	Practical		ESE	IA	CSE	Viva	
MBOT111DSC	STUDY OF LIFE FORMS - I AND PLANT PATHOLOGY	4	0	0	4	70	20	10	0	100
MBOT112DSC	PRINCIPLES OF BIOCHEMISTRY	4	0	0	4	70	20	10	0	100
MBOT113DSC	PRINCIPLES OF CELL BIOLOGY	4	0	0	4	70	20	10	0	100
MBOT114DSC	GENETICS AND EVOLUTION	4	0	0	4	70	20	10	0	100
MBOT115SE	BIODIVERSITY	2	0	0	2	35	10	5	0	50
MBOT116PRA	PRACTICAL PAPER -I	0	0	6	3	0	0	0	75	75
MBOT117PRA	PRACTICAL PAPER -II	0	0	6	3	0	0	0	75	75

MBOT111DSC - Study of Life forms - I and Plant Pathology

Course title:	**Study of Life forms - I and Plant Pathology**	**Course code:**	**MBOT111DSC**
Course type:	Discipline Specific Course	**Course credit:**	04

Teaching Examination Scheme:

Teaching (Hours/week)			**Examination Scheme**			
Lecture	Tutorial	Practical	Internal		External	Total
			Mid	CE		
15×4=60	00	90	20	10	70	100

Pre-requisite: Having passed B. Sc Botany examination from recognized university.

Rationale: On completion of this course the student will be able to Identify true fungi and algae demonstrate the principles and application of plant pathology in the control of plant disease.

Course Objective:

1. To discuss important results on Thallus organization, Nutrition, lifecycle and classification of fungi.
2. To discuss important results on Host-Pathogen relationships and Disease cycle and control measures of plant diseases.
3. Increase the awareness and appreciation of human friendly viruses, bacteria, algae and their economic importance

Course Outcome:

After successful completion of the course, the student will be able to…….

CO 1	Understand the characteristics, structure, and economic importance of viruses and bacteria
CO 2	Explore knowledge about characters, structure, reproduction, and importance of algae
CO 3	Learn the basics of the cellular organization of fungi and classification, and the importance of fungi
CO 4	Study plant pathology and the control of disease

Unit	Description in detail	Credit	Weightage
I	**Virus and Bacteria**	1	25 %
	Virus: General Characters and Types of Virus (On the basis of Genome), Ultra structure of Virons (Symmetry: Helical and Complex). Economic Importance of Virus.		
	Bacteria: General Characters and classification of Bacteria (Based on Flagella), Nutrition and Reproduction in Bacteria, Ultra structure of Bacteria.		
	Cyanobacteria: Salient features		
	Economic Importance of Bacteria.		
II	**Phycology (Algae)**	1	25 %
	Algae: General Characters and Classification of Algae by Smith		
	Thallus organization in Algae. Reproduction in Algae		
	Salient features of Chlorophyta, Charophyta, Phaeophyta and Rhodophyta		
	Economic Importance of Algae: Algal blooms, Algal biofertilizer, Algae in Industry.		
III	**Mycology (Fungi)**	1	25 %
	General Characters and Classification of Fungi by Ainsworth.		
	Cellular Organization (Unicellular and Multicellular), Nutrition in fungi. Reproduction in Fungi, Heterothallism.		
	General account of Zygomycotina, Ascomycotina, Basidomycotina and Deutromycotina.		
	Economic Importance of Fungi: In Industry, Medicine and bio-control agent		
IV	**Plant Pathology**	1	25 %
	Plant Pathology: Classification of plant diseases (on the basis of host and origin)		
	General Symptoms of plant diseases		
	Dissemination of plant diseases (Direct and Indirect). Defense mechanism (Morphological and Bio-Chemical).		
	Plant pathogens: Symptoms, Diseases cycle, Control measures: Bacterial (Bacterial blight of paddy) and Fungal (Late blight of Potato, Tikka disease in Groundnut & Powdery mildew of Cucurbits).		

Reference Books:

1. Sharma, P. D. (2011) Microbiology. Rastogi Publication. Meerut.
2. Pelczar M. J, Chan E. C. Sand Krieg N. R. (2004) Microbiology, Tata McGraw – Hall Publishing Company Ltd. New Delhi.
3. Hait G; Bhattacharya K and Ghosh A. K. (2008) A Text Book of Botany,Vol-I, New Central Book Agency (P) Ltd. Kolkata. SinghV; Pande P. Cand Jain D. K. (2008-09) A Taxt Book of Botany, rastogi Publication, Meerut.
4. Barsanti L, Gualtieri P (2006) Algae: Anatomy, Biochemistry and Biotechnology, CRC Press, Taylor and Francis, Boca Raton.
5. Bold H C, Wynne M J (1985) Introduction to the Algae, 2nd edition, Prentice-HallInc, New Jersey.
6. Kumar H D (1999) Introductory Phycology, 2nd edition, Affiliated East-West Press Pvt. Ltd., New Delhi. Fritsch F E (1935) The Structure and Reproduction of the Algae, Vol I, Cambridge University Press, Cambridge.
7. Fritsch F E (1945) The Structure and Reproduction of the Algae, Vol II, Cambridge University Press, Cambridge.
8. Lee R E (2008) Phycology, 4th edition, Cambridge University Press, Cambridge.
9. South G R, Whittick A (1998) Introduction to Phycology, Blackwell Scientific Publication, London.
10. Webster John (1980) Introduction to fungi, Cambridge University Press, Cambridge.Alexopoulos C J, Minus C W, Blackwell M (1996) Introductory Mycology, John Wiley and Sons, Inc., NewYork.

Suggested Readings:

1. Carlile M J, Watkinson S C, Booday G W (2001) The Fungi, Academic Press, Cambidge
2. Maheshwari R (2012) Fungi: Experimental Methods in Biology, CRC Press, Boca Raton, Florida.
3. Deacon J W, Blackwell M (1997) Introduction to Modern Mycology, Oxford.
4. Webster J, Roland W S (2007) Introduction to Fungi, Cambridge University Press, Cambridge. Rangaswamy, G and Mahadevan, A (1999) Diseases of crop plants in India (4th edn) Prentice Hall of Indian Pvt. New Delhi.
5. Pandey B. P. (2006) Plant Pathology-Pathogen and Plant Diseases. S. Chand & Co. Ltd. New Delhi.
6. Mehrotra R. S. (1991) Plant Pathology, Tata McGraw-Hill Publishing Co. Pvt. Ltd. New Delhi. Agrios George N. (2004) Plant Pathology, Academic Press, Reed Elsevier India Pvt. Ltd. New Delhi.
7. Sharma P. D. (2003) Microbiology and Plant Pathology, Rastogi Publications, Meerut

Online Resources:

1. https://byjus.com/neet-questions/what-is-the-baltimore-classification/
2. https://www.biologydiscussion.com/algae/reproduction-algae/reproduction-in-algae-botany/53445/
3. https://pragatiprakashan.in/new-pattern-mycology-and-phytopathology-ii-sem-odisha.html/
4. https://www.apsnet.org/about/Pages/WhatisPhytopathology.aspx

Practicals

Virus and Bacteria:

- Ultrastructure of Virions (through chart).
- Simple Staining – Mono-chrome staining.
- Special Staining – Gram staining.
- Study of following Cyanobacteria: Nostoc, Oscillatoria

Algae:

- Study of following Algae: Chlorella, Ulva, Spirogyra, Chara, Padina, Sargassum, Polysiphonia.

Fungi:

- Study of following Fungi: Mucor, Sclerospora, Peziza, Aspergillus, Agaricus, Polyporus, Colletotrichum.

Plant Pathology:

- Study of following Plant diseases:
- Bacterial blight of Paddy
- Late Blight of Potato
- Tikka disease in Groundnut
- Powdery mildew of Cucurbits

CO-PO & CO-PSO Mapping

Course Outcomes	Program Outcomes 1: - Less relevant, 2: - Mild relevant, 3: - Highly relevant											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	**3**	**1**	**-**	**-**	**-**	**1**	**1**	**1**	**2**	**1**	**1**	**-**

CO2	**3**	**1**	**-**	**-**	**1**	**1**	**1**	**-**	**1**	**1**	**2**	**1**
CO3	**3**	**2**	**-**	**-**	**2**	**1**	**2**	**2**	**1**	**-**	**3**	**2**
CO4	**2**	**2**	**-**	**-**	**2**	**2**	**1**	**1**	**-**	**-**	**2**	**1**

MBOT112DSC - Principles of Biochemistry

Course title:	**Principles of Biochemistry**	**Course code:**	**MBOT112DSC**
Course type:	Discipline Specific Course	**Course credit:**	04

Teaching Examination Scheme:

Teaching (Hours/week)			**Examination Scheme**			
Lecture	Tutorial	Practical	Internal		External	Total
15×4=60	00	90	Mid	CE		
			20	10	70	100

Pre-requisite: Having passed B. Sc examination from a recognized university with the Botany Subject.

Rationale: On completion of this course, the student will be able to understand the concept of developing understanding on chemical bonding among molecules.

Course Objective:

1. To discuss important results on the Behavior of Biological Compounds, Classification of carbohydrates, Structure and Function of Complex lipids, Function and Conformation of Proteins and Properties of enzymes.

Course Outcome:

After successful completion of the course, the student will be able to…….

CO 1	Understand the concept of biological compounds and classification, structure, and function of carbohydrates.
CO 2	Learn classification, structure, function, and biosynthesis of lipids.
CO 3	Explore the properties and metabolism of amino acids, and also understand the properties and stability, and denaturation of properties
CO 4	Understand the basic concept of enzymes, their mechanisms and regulation, and also study vitamins.

Content

Unit	Description in detail	Credit	Weightage
I	**Biochemistry-I**	1	25 %
	Behavior of Biological Compounds: Solubility, Isomerism, Adsorption, Chemical bonds, Ionization of Water.		
	Carbohydrates: Classification of carbohydrates.		
	Occurrence, Structure and Function of Monosaccharides (Triose, Pentose and Hexose), Disaccharides and Polysaccharides (Starch and Cellulose).		
	Carbohydrates as informational Molecules: The Sugar Code.		
II	**Biochemistry-II**	1	25 %
	Lipids: Classification of Lipids, Occurrence.		
	Structure and Function of Simple lipids (Triglycerides and Waxes).		
	Structure and Function of Complex lipids (Phospholipids and Sphingolipids).		
	Oxidation of fatty acids, Biosynthesis of Phospholipids.		

III	**Biochemistry-III**	1	25 %
	Amino Acids: Structure, Properties, and Classification of Amino Acids.		
	Amino Acids metabolism (Biosynthesis and Degradation of Amino Acids).		
	Proteins: classification and structure of Proteins, Function and Conformation of Proteins (Ramachandran Plot).		
	Protein denaturation and stability, Importance of Proteins.		
IV	**Biochemistry-IV**	1	25 %
	Enzymes: An introduction to Enzymes, Nomenclature, Classification of Enzymes.		
	Properties of enzymes, Mechanism of enzyme action Enzyme and Enzyme kinetics.		
	Types of inhibition, Enzyme Regulation, Factors affecting the enzyme action.		
	Vitamins: Occurrence, Classification, Structure and function of various Vitamins and their deficiency diseases.		

Reference Books:

1. Lehninger A C, Biochemistry.
2. Deb A C (2008), Fundamentals of Biochemistry, New Central Book (P0 Ltd, Kolkata (9th Edition Revised).

Suggested Readings:

1. Jain J L, Jain Sanjaya and Jain Nitin (2005) Fundamentals of Biochemistry, S Chand & Co. Ltd, New Delhi Satyanarayana U (1999), Biochemistry.

Online Resources:

1. https://www.britannica.com/science/biochemistry
2. https://www.biochemistry.org/education/careers/becoming-a-bioscientist/what-is-biochemistry/
3. https://biochem.ubc.ca/undergraduate/prospective-students/what-is-biochemistry/
4. https://www.mcgill.ca/biochemistry/about-us/information/biochemistry#:~:text=Biochemistry%20is%20the%20application%20of,the%20chemistry%20of%20living%20systems.

Practicals:

A. Major practical:
- Prepare Standard curve of Starch using standard method.
- Standard curve of Glucose (reducing Sugar) by using standard method.
- Standard curve of Amino Acids using standard method.
- Standard curve of protein using standard method.
- Standard curve of IAA using standard method
- Extraction and Estimation of Starch from plant sample.
- Extraction and estimation of reducing sugar from plant sample.
- Extraction and estimation of Amino acids from plant sample.
- Estimation of Protein from plant sample.
- Determination of Amylase activity.
- Determination of Peroxidase activity.
- Determination of IAA oxidase activity.

B. Minor practical:
- Separation and identification of Sugar by paper chromatography.
- Separation and identification of Amino acids by paper chromatography.
- Separation and identification of Plant pigments by paper chromatography.
- Estimation of seed proteins depending upon the solubility.
- Determination of Isoelectric point of Casein.
- Estimation of free fatty acids by titration.

C. General Practical:
- Identification of different sugars (spot tests).

CO-PO & CO-PSO Mapping

Course Outcomes	**Program Outcomes 1: - Less relevant, 2: - Mild relevant, 3: - Highly relevant**											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	**1**	**3**	**1**	**-**	**1**	**2**	**1**	**2**	**1**	**-**	**2**	**-**
CO2	**3**	**1**	**-**	**1**	**1**	**1**	**2**	**1**	**1**	**-**	**1**	**-**
CO3	**2**	**1**	**1**	**-**	**-**	**2**	**1**	**2**	**-**	**1**	**2**	**1**
CO4	**2**	**2**	**-**	**-**	**2**	**1**	**-**	**1**	**-**	**1**	**1**	**-**

MBOT113 - DSC Principles of Cell Biology

Course title:	**Principles of Cell Biology**	**Course code:**	**MBOT113DSC**
Course type:	Discipline Specific Course	**Course credit:**	04

Teaching Examination Scheme:

Teaching (Hours/week)			**Examination Scheme**			
Lecture	Tutorial	Practical	Internal		External	Total
15×4=60	00	90	Mid	CE		
			20	10	70	100

Pre-requisite: Having passed B. Sc examination from a recognized university with the Botany Subject.

Rationale: On completion of this course, the student will be able to understand the concept of cell biology and cell organelles.

Course Objective:

1. To discuss important results on the Cell wall, Plasma membrane, cellular organelles, cell cycle and cell division, Cell Fixation, and Cell staining.

Course Outcome:

After successful completion of the course, the student will be able to…….

CO 1	Understand the concept of the composition of the cell wall, its membrane, and cellular organelles
CO 2	Learn the stages of the cell cycle and cell division, the role of the cytoskeleton, and PCD.
CO 3	Explore the structure of the nucleus of the cell, and also about chromatin and chromosomes
CO 4	Understand the process of cell fixation and cell staining, and study techniques in cell biology.

Content

Unit	Description in detail	Credit	Weightage
I	**Cell Biology-I**	1	25 %
	Cell wall: Structure and functions; Plasmodesmata: Structure; role in movement of molecules and macromolecules.		
	Plasma membrane: Structure, models, and functions; sites for ATPases, ion carriers, channels and pumps; receptors.		
	Chloroplast and Mitochondria: Ultra Structure and Functions.		
	Other cellular organelles: Structure and functions of microbodies, Golgi apparatus, Lysosomes, endoplasmic reticulum, Ribosomes.		
II	**Cell Biology-II**	1	25 %
	Cytoskeleton; organization and role of microtubules and flagella.		
	Cell cycle: Phases and regulation		
	Cell Division: Amitosis, Mitosis and Meiosis.		
	Apoptosis/ Programmed Cell Death with reference to plant cells.		
III	**Cell Biology-III**	1	25 %
	Nucleus: Structure; nuclear pores; nucleosome organization, Nucleolus.		
	Chromatin organization: Chromosome structure and packaging of DNA, molecular organization of centromere and telomere.		
	Euchromatin and Hetero chromatin, Karyotype analysis.		
	Specialized type of chromosomes: Structure and functions of polytene, lamp brush and Sex chromosomes.		

IV	**Cell Biology-IV**	1	25 %
	Experimental approaches for studying Cells: Cell Fixation.		
	Experimental approaches for studying Cells, Cell Staining.		
	Cytochemical methods (Flow Cytometry) and cell fractionation (Centrifugation).		
	Techniques in cell biology: Immuno techniques; in situ hybridization to locate transcripts in cell types; FISH, GISH.		

Reference Books:

1. Lewin, B. (2000). Genes VII. Oxford University Press, New York.
2. Rost, T. et al. (1998). Plant Biology. Wadsworth Publishing Co., California, USA.
3. Krishnamurthy, K. V. (2000). Methods in Cell Wall Cyto chemistry. CRC Press, Boca Raton, Florida.
4. De, D. N. (2000). Plant Cell Vacuoles: An Introduction. CSIRO Publication, Collingwood, Australia.
5. Fukui, K. and Nakayama, S. (1996). Plant Chromosomes: Laboratory Methods. CRC Press, BocaRaton, Florida.
6. Sharma, A. K. and Sharma, A. (1999). Plant Chromosomes: Analysis, Manipulation and Engineering. Harwood Academic Publishers, Australia.
7. Buchanan B B, Gruisemm W, Jones R L (2015). Biochemistry and Molecular Biology of Plants, 2ndedition, Wiley Blackwell, New Jersey.
8. Hopkins W G, Huner NPA (2009) Introduction to Plant Physiology, 4th edition Wiley International edition, John Wiley & Sons, New York.
9. Taiz L, Zeiger E, Moller I M, Murph A (2015) Plant Physiology and Development, 6 thedition, Sinurer Associates Inc Publishers, Sunderland, Massachusetts

Suggested Readings:

1. Frank B. Salisbury and Cleon W. Ross (1985). Plant Physiology Wadsworth Publishing Company, Belmont, California.
2. Robert M. Devlin (3rd edition) (1975) Plant Physiology Van Nostr and Reinhold Company, New York.
3. Walter Larcher (4thedition) (2003) Physiological Plant Ecology: Ecophysiology and Stress Physiology of Functional Groups Springer Verlag, Berlin.
4. Hans Mohr and Peter Schopfer (2010) Plant Physiology Springer Verlag, Berlin. Edwin Oxlade (2007) Plant Physiology: The Structure of Plants Explained Glmp Ltd, Abergele, United Kingdom.

Online Resources:

1. https://www.nature.com/scitable/topic/cell-biology-13906536/#:~:text=Cell%20biology%20is%20the%20study,and%20organisms%20that%20cells%20compose.
2. https://www.britannica.com/science/cell-biology
3. https://byjus.com/biology/cells/
4. https://www.nationalgeographic.org/topics/resource-library-cell-biology/

Practicals:

- Isolation of Chloroplast by centrifugation.
- Isolation of mitochondria by ultracentrifugation.
- Temporary stained preparation of Mitosis / Meiosis – Onion tip, Ipomoea bud, Tradescantia bud,
- Aloe bud.
- Study of Giant chromosomes from Salivary glands of Chyronomous larva (Polytene)/Chart.
- Salivary glands of Drosophila (Lampbrush) - Chart.
- Study of various cell organelles (as per syllabus) through permanent slide/charts/models.
- Study of Karyotype in plant cells.
- Demonstration of SEM and TEM - photograph.

CO-PO & CO-PSO Mapping

Course Outcomes	Program Outcomes 1:- Less relevant, 2:- Mild relevant, 3:- Highly relevant											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	**2**	**1**	-	-	-	**2**	**1**	-	**1**	**1**	**1**	-
CO2	**3**	**1**	-	-	**2**	**1**	**2**	**1**	-	-	**2**	**1**
CO3	**2**	**2**	-	-	**1**	**2**	-	**2**	**1**	**2**	**2**	-
CO4	**2**	**2**	-	-	**2**	**2**	**2**	**1**	-	**1**	**1**	-

MBOT114DSC - Genetics and Evolution

Course title:	**Genetics and Evolution**	**Course code:**	**MBOT114DSC**
Course type:	Discipline Specific Course	**Course credit:**	04

Teaching Examination Scheme:

Teaching (Hours/week)			**Examination Scheme**			
Lecture	Tutorial	Practical	Internal		External	Total
			Mid	CE		
15×4=60	00	90	20	10	70	100

Pre-requisite: Having passed B. Sc examination from a recognized university with the Botany Subject.

Rationale: On completion of this course, the student will be able to understand the concept of genetic basis of population and evolutionary levels.

Course Objective:

1. To discuss important results on Gene structure, chromosomal inheritance, Mutation, Origin of cells, and unicellular evolution.

Course Outcome:

After successful completion of the course, the student will be able to…….

CO 1	Understand concept of concept of gene and extrachromosomal inheritance.
CO 2	Learn mechanisms of DNA repair and damage, and study mutation and cancer
CO 3	Explore the Mendelian and non-Mendelian genetics, also linkage and crossing over
CO 4	Understand the concept of the origin of the cell and theories of evolution.

Content

Unit	Description in detail	Credit	Weightage
I	**Genetics – I**	1	25 %
	Gene structure: Gene vs allele, fine structure of gene as cistron, recon and muton.		
	Gene structure: Gene vs allele, fine structure of gene as cistron, recon and muton.		
	Extra chromosomal inheritance (maternal inheritance): Chloroplast genome (cp-DNA); Plastid inheritance in Mirabilis jalapa. Mitrochondrial genome (mt-DNA); Mitochondrial inheritance in Zea mays (Male Sterility-Types, origin, induction and application).		
	Petite in yeast and Porky in Neurospora. Comparison between Cp-DNA and Mt-DNA		
II	**Genetics – II**	1	25 %
	Mutation: Spontaneous and induced mutation, Physical and chemical mutagens; Molecular basis of gene mutations.		
	Transposable elements: IS elements, Transposons in Prokaryotes and Eukaryotes, Ac-Ds system, Retroelements (Viral and Non-viral).		
	DNA damage and repair mechanisms; inherited human diseases and defects in DNA repair.		
	Initiation of cancer at cellular level; Oncogenesis, Oncogene, proto-oncogenes and onco viruse.		
III	**Genetics – III**	1	25 %

	Mendalian (mono & Di-hybridization) and non-mendelian genetics (9:6:1), Epistatis (9:3:4 & 12:3:1), Polygenic inheritance (characteristics and Kernel colour in Wheat) and multiple alleles.		
	Chromosome theory and sex determination, chromosomal aberration.		
	Linkage and crossing over: Complete and incomplete linkage, Types of Crossing over, a three-point test cross and Chi square (X^2) test for segregation.		
	Linkage maps in Drosophila and chromosomal mapping.		
IV	**Evolution**	1	25 %
	Emergence of evolutionary thoughts: Lamarckism; Darwinism – concepts of variation, adaptation, struggle for existence, survival of fittest and natural selection.		
	Origin of cells and unicellular evolution: Origin of basic biological molecules; Abiotic synthesis of organic monomers and polymers; Concept of Oparin and Haldane; Experiment of Miller (1953); The First cell.		
	Origin of prokaryotes; Origin of eukaryotic cells; Evolution of unicellular eukaryotes; Anaerobic metabolism, photosynthesis and aerobic metabolism.		
	Evolutionary divergence: Plant diversity as a result of evolution		

Reference Books:

1. Atherly, A.G., Girton, J.R. and McDonald, J.F. (1999). The Science of Genetics. Saunders College Publishing, Fort Worth, USA.

2. Burnham, C.R. (1962). Discussions in Cytogenetics. Burgess Publishing Co., Minnesota.

3. Busch, H. and Rothblum, L. (1982). Volume X. The Cell Nucleus rDNA Part A. Academic Press.

4. Hartl, D.L. and Jones, E.W. (1998). Genetics: Principles and Analysis (4h edition). Jones &

Bartlett Publishers, Massachusetts, USA.

5. Khush, G.S. (1973). Cytogenetics of Aneuploids. Academic Press, New York, London.

Suggested Readings:

1. Karp, G. (1999). Cells and Molecular Biology: Concepts and Experiments. John Wiley & Sons, Inc., U.S.A.
2. Lewin, B. (2000). Gene VII. Oxford University Press, New York, USA.
3. Lewis, R. (1997). Human Genetics: Concepts and Applications edition). WCB McGraw Hill, USA.
4. Russel, P. J. (1998). Genetics (5th edition). The Benjamin/Cummings Publishing Company Inc., USA.
5. Snustad, D.P. and Simmons, M.J. (2000). Principles of Genetics (2nd edition). John Wiley & Sons Inc., USA.

Online Resources:

1. https://nigms.nih.gov/education/fact-sheets/Pages/genetics.aspx#:~:text=Genetics%20is%20the%20scientific%20study,that%20help%20the%20body%20work.
2. https://www.britannica.com/science/genetics
3. https://www.cdc.gov/genomics/about/basics.htm
4. https://www.nationalgeographic.org/encyclopedia/theory-evolution/#:~:text=Evolution%20is%20the%20process%20by,response%20to%20their%20changing%20environment.

Practicals:

- Induction of polyploidy using Colchicine.
- Study of permanent slides/ charts/ models/ photographs as per theory syllabus.
- Solve the genetic problems based on topics covered in the theory syllabus.

CO-PO & CO-PSO Mapping

Course Outcomes	Program Outcomes 1:- Less relevant, 2:- Mild relevant, 3:- Highly relevant											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	**2**	**3**	**1**	**2**	**-**	**1**	**2**	**2**	**-**	**-**	**1**	**-**
CO2	**2**	**1**	**-**	**-**	**2**	**-**	**-**	**1**	**-**	**1**	**2**	**1**
CO3	**3**	**2**	**-**	**-**	**1**	**2**	**2**	**2**	**-**	**1**	**1**	**-**
CO4	**1**	**2**	**-**	**-**	**2**	**-**	**1**	**-**	**-**	**-**	**1**	**-**

MBOT115SE – BIODIVERSITY

Course title:	**BIODIVERSITY**	**Course code:**	**MBOT115SE**
Course type:	Discipline-Specific Course	**Course credit:**	02

Teaching Examination Scheme:

Teaching (Hours/week)			**Examination Scheme**			
Lecture	Tutorial	Practical	Internal		External	Total
			Mid	CE		
15×2=30	00	00	10	05	35	50

Pre-requisite: Having passed B. Sc examination from a recognized university with the Botany Subject.

Rationale: On completion of this course, the student will be able to understand the concept of analyzing the plants along with their ecological and economic importance.

Course Objective:

1. To discuss important results on Significance of Biodiversity, Conservation of Biodiversity, Role of Educational Institute in Biodiversity Conservation.

Course Outcome:

After successfully completion of the course, the student will be able to…….

CO 1	Understand concept of significance, types, uses, depletion and factor affecting biodiversity
CO 2	Learn about role of organization helps in conservation of biodiversity and study of conservation of biodiversity

Content

Unit	Description in detail	Credit	Weightage
I	**Biodiversity– Types, Uses and its depletion**	1	25 %
	Biodiversity Science: Definition, Significance of Biodiversity, types of Biodiversity (Genetic diversity, Species diversity and Ecosystem diversity).		
	Ethics and Uses of Biodiversity: Biodiversity values, Ethical and Aesthetic values, Uses of plants (Food, Fodder and forage, Rattans and Canes, Medicinal and Ornamental Plants).		
	Depletion of Biodiversity: Law of Genetic diversity, Species diversity and Ecosystem diversity.		
	Factors affecting in loss of Biodiversity and process of species extinction, Loss in diversity of Major Ecosystem of the world.		
II	**Biodiversity- Conservation and Management**	1	25 %
	Conservation of Biodiversity: Why Conservation; Conservation of Genetic diversity, Species diversity and Ecosystem diversity; In-situ and Ex-situ conservation; Role of Biotechnology in Biodiversity conservation; Current Practice in conservation of it in India; Social approaches in conservation of Biodiversity (examples like Chipko movement etc.)		
	Role of Educational Institute in Biodiversity Conservation (BSI, NBPGR, ICAR).		
	Biodiversity Management and Prospecting: Organizations associated with Biodiversity Management (IUCN, UNEP, UNESCO, WWF, ICSU, FAO, WCMC, GEF, ETC).		
	Biodiversity legislation and conservation; Biodiversity Laws; Biodiversity- Information and Communication; Role of Indigenous Knowledge System in Biodiversity Prospecting and conservation; Intellectual Property Rights (IPRs); and Biopiracy.		

Reference Books:

1. Heywood V H, Watson R T (1996) Global Biodiversity Assessment, Cambridge University Press, London.
2. Singh J S, Singh S P, Gupta S R (2014) Ecology, Environmental Science and Conservation, S Chand & Co, New Delhi.

Suggested Readings:

1. Bryant P J (2009) Biodiversity and Conservation, University of California, Irvine, USA.

Online Resources:

1. https://www.worldwildlife.org/pages/what-is-biodiversity#:~:text=Biodiversity%20is%20all%20the%20different,maintain%20balance%20and%20support%20life.
2. https://www.britannica.com/science/biodiversity

CO-PO & CO-PSO Mapping

Course Outcomes	Program Outcomes 1:- Less relevant, 2:- Mild relevant, 3:- Highly relevant											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	**2**	**1**	**-**	**-**	**1**	**-**	**1**	**1**	**-**	**1**	**2**	**1**
CO2	**2**	**2**	**-**	**-**	**2**	**1**	**2**	**2**	**-**	**2**	**2**	**-**