



SWAMI VIVEKANAND
SUBHARTI
UNIVERSITY
UGC Approved Meerut



AN ISO 21001: 2018 ORGANIZATION

OFFICE OF THE REGISTRAR
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Ref.No.U-508(i)/SVSU/2025/ 1692

Date:03.02.2025

NOTIFICATION

It is hereby notified for information of all the concerned that the Academic Council in its 34th meeting held on 25-07-2024 vide resolution No.34(10) has approved the revised syllabus (as per CBCS system) of the following ordinance:

Ordinance No.V-136(B2), relating to B.Sc.-Bioinformatics

The copy of above is enclosed and shall be applicable from Academic Session 2022-23 onwards.

This issues with the approval of the Hon'ble Vice Chancellor.

Ref.No.U-508(i)/SVSU/2025/ 1692

Copy forwarded to information of:

1. Hon'ble Vice-Chancellor
2. Controller of Examination
3. Dean-Academics
4. Director-IQAC
5. Dean-Faculty of Science (for compliance please)
6. CTO (with a request to upload the ordinance on University website)
7. Additional Registrar-Academics
8. Guard File

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03.02
2025

Registrar

Date: 03.02.2025

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2025

Registrar



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Subhartipuram, NH-58, Delhi-Haridwar Bypass Road, Meerut-250005 (U.P.) INDIA

**KERAL VERMA SUBHARTI COLLEGE OF SCIENCE
SWAMI VIVEKANAND SUBHARTI UNIVERSITY**

MEERUT



SYLLABUS

136B2

FOR

B.Sc. BIO-INFORMATICS

UNDER CBCS

(Three Year)

EFFECTIVE FROM 2022 – 2023

Dr. Ashwani Kumar

Dr. Ashwani Kumar



Dr. Ashwani Kumar

B.Sc. Bioinformatics I sem

Basics of Biological Sciences (BBI 101)

Unit-I: Evolution of life: Prebiological chemical evolution, Diversity of living world, Whittaker's Five Kingdom System, Classification up to genus & species level, Brief account of Prokaryotic & eukaryotic cell.

Unit-II: Introduction to Plant World Lower plants Algae-Chara, Bryophytes-Funaria, Pteridophyte-Equisetum, Gymnosperms-Pinus

Unit-III: Higher plants. Monocot-Maize, dicot-Sunflower, Morphological Differences in Monocots & Dicots, Flower- parts and their functions, Inflorescence- Types (Racemose & Cymose), Embryo structure & Seed- Structure.

Unit-IV: Brief Introduction to Animal world Gametogenesis, reproductive cycles, fertilization, Placentation in mammals, gestation, Parturition & lactation in mammals.

Reference Books:

- Botany for Degree Students- Vasitha- S. Chand Publication
- College Botany- B.P. Pandey- S.Chand

- Botany by -A.C. Dutta- Oxford

- A textbook of botany Volume I & II- Niranjan Shrotriya & Archana Shrotriya

- Botany for degree students Algae, bryophytes, pteridophytes, Gymnosperm, angiosperms-B.K. Vashishta.
- A textbook of Botany Volume I & II- S.N. Pandey, P.S. Trivedi &

Basics of Biological Sciences-Lab (BBI 101P) Practical

- Morphological study of monocots & dicots.
- Study of flower, inflorescences
- Study of eukaryotic and prokaryotic cells
- Observation of permanent slides of anther.

- Observation of permanent slides of ovule

- Observation of permanent slides of embryo sac
- Observation of permanent slides of embryo

- Observation of permanent slides of endosperm.

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B.Sc. Bioinformatics I sem
Introduction to Bioinformatics (BBI 102)

Unit -I: Introduction to Bioinformatics: Definition of bioinformatics, history, applications and scope of bioinformatics, bioinformatics in business. Central dogma of molecular biology.

Unit -II: Internet and Bioinformatics: General purpose search engine, Biological search engine: Entrez, SRS. What is Database? Types of Databases Biological databases: Primary databases – GenBank, DDBJ, EMBL. Protein sequence databases – Swissprot, Uniprot, TrEMBL, PIR-PSD, PRINTS. Structural databases – PDB, NDB, PubChem, ChemBank, CCSD. Bibliographic databases:-Pubmed, PMC, PloS. citeXplore, Specialized databases.

Unit -III: Biological data mining and Human Genome Project : Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, applications of data mining. The Human Genome Project, Bioinformatics and Human diseases.

Unit -IV: Problem Solving in Bioinformatics: Genomic analysis for DNA sequence, genomic analysis for protein sequence, strategy and options for similarity searches, structure prediction, illustration some problems and solution

Unit -V: Introduction to advance fields of Bioinformatics: Genomics, Proteomics, Transcriptomics, Metabolomics, Metagenomics, Nutricogenomics, Protein engineering, Comparative Genomics, Pharmacogenomics, Pharmacogenetics, Rational Drug Designing, CADD.

Reference Books:-

1. Bioinformatics Concepts Skills and Application-S.C. Rastogi- PHI
2. Essentials of Bioinformatics-Jin Xion- Cambridge
3. Introduction to Bioinformatics- Attwood & Parry Smith- Pearson
4. Bioinformatics-CSV Murthy-Himalaya
5. Introduction to Bioinformatics- Arthur M. Lesk, - Oxford University
6. Bioinformatics Computing- Bergeron- PHI
- Discovering Genomics Proteomics and Bioinformatics- Campbell, Heyer-Pearson
7. Data mining: Introductory and advanced-Margeret H. Dunham- IE publisher

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Introduction to Bioinformatics-Lab (BBI 102P)

1. Use of different browsers, search engines for desired data retrieval
2. Study of major bioinformatics companies in India and overseas
3. Study of products produced by major bioinformatics firms using biological data analysis in Health (Diagnosis, Vaccines, Therapeutics) Agriculture, Environment etc
4. Explore the sitemap of NCBI. Study the resources available on NCBI.
5. Study format of Genbank entry data retrieval from Genbank
6. Retrieve the Genbank entry with Specific accession number
7. Retrieve and save only the coding sequence of the entry AF375082 in FASTA format.
8. Retrieving Protein sequences from protein database
9. Visit and report on bioinformatics research institute/ company

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Fundamentals of IT (BBI 103)

1.1 Introduction to Computers:

- 1.1.1 The evolution of computers – Computer Generation
- 1.1.2 Classifications of Computers –
- 1.1.3 Micro
- 1.1.4 Mini,
- 1.1.5 Mainframe
- 1.1.6 Super Computers
- 1.1.7 Distributed Computer System
- 1.1.8 Parallel Computers
- 1.1.9 Computer Hardware – Major Components of a Digital Computer
- 1.1.10 Block Diagram of Computer
- 1.1.11 Input devices
- 1.1.12 Output devices
- 1.1.13 Description of Computer IPO Cycle
- 1.1.14 CPU

1.2 Computer Memory:

- 1.2.1 Memory Types,
- 1.2.2 Units of memory
- 1.2.3 Read Only Memory,
- 1.2.4 Random Access Memory,
- 1.2.5 Serial Access Memory,
- 1.2.6 Physical Devices Used to construct Memories,
- 1.2.7 Hard disk,
- 1.2.8 Floppy Disk Drives,
- 1.2.9 CD, DVD, Flash Drives,
- 1.2.10 Magnetic Tape Drives.

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2.1 Number System:

- 2.1.1 Decimal,
- 2.1.2 Binary,
- 2.1.3 Octal,
- 2.1.4 Hexa-decimal.
- 2.1.5 Conversion - Decimal to all other number systems,
- 2.1.6 Binary to octal and Hexa Decimal,

3.1 Computer Software:

- 3.1.1 System software,
- 3.1.2 Operating System concepts,
- 3.1.3 Different types of operating systems,
- 3.1.4 Assemblers,
- 3.1.5 Compilers,
- 3.1.6 Interpreters,
- 3.1.7 linkers,
- 3.1.8 Application Software,
- 3.1.9 Firmware Software,

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3.1 Introduction of Internet and Objectives

- 3.2 Basic of Computer Networks
- 3.2.1 Local Area Network (LAN)
- 3.2.2 Wide Area Network (WAN)

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3.3 Internet

Text Books:

1. Alex Leon & Mathews Leon, "Fundamentals of Information Technology", LeonTechworld, 1999.
2. Vikas Gupta, "Comdex Computer Kit", Wiley Dreamtech, Delhi, 2004
3. P. K. Sinha & Priti Sinha, "Computer Fundamentals", BPB Publications, 1992.

Reference Books:

1. V. Raja Raman, "Introduction to Computers", PHI, 1998.
2. Alex Leon & Mathews Leon, "Introduction to Computers", Vikas Publishing House, 1999.
3. Norton Peter, "Introduction to computers", 4th Ed., TMH, 2001.

Fundamentals of IT-Lab(BBI 103P)

Objectives: This is a basic course for Commerce students to familiarize with computer and its applications in the relevant fields and exposes them to other related courses of IT.

Details

MS-WORD

1. Text Manipulations
2. Usage of Numbering, Bullets, Tools and Headers
3. Usage of Spell Check and Find and Replace
4. Text Formatting
5. Picture Insertion and Alignment
6. Creation of Documents Using Templates`
7. Creation of Templates
8. Mail Merge Concept
9. Copying Text and Picture From Excel
10. Creation of Tables, Formatting Tables
11. Splitting the Screen
12. Opening Multiple Document, Inserting Symbols in Documents

MS-EXCEL

1. Creation of Worksheet and Entering Information
2. Aligning, Editing Data in Cell
3. Excel Function (Date, Time, Statistical, Mathematical, Financial Functions)
4. Changing of Column Width and Row Height (Column and Range of Column)
5. Moving, copying, Inserting and Deleting Rows and Columns
6. Formatting Numbers and Other Numeric Formats
7. Drawing Borders Around Cells
8. Creation of Charts Raising Moving
9. Changing Chart Type
10. Controlling the Appearance of a Chart

MS -POWER POINT Working With Slides

1. Creating, saving, closing presentation
 2. Adding Headers and footers
 3. Changing slide layout
 4. Working fonts and bullets
 5. Inserting Clip art: working with clipart,
 6. Applying Transition and animation effects
 7. Run and Slide Show
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II	<p>Bacterial morphology Ultrastructure of bacterial cell, cell wall, plasma membrane, capsule, flagella, nucleoid, and reserve material. Differences between archaebacterial and eubacterial cell. General features of Rickettsia, Chlamydia, Mollicutes, Actinomycetes and Cynobacteria.</p> <p>The viruses General properties and structure of animal viruses: Influenza, HIV; plant viruses: TMV; bacterial viruses: Lambda Phage and T4 bacteriophage; general features of Prions and Viroids.</p> <p>Fungi General characteristics, classification & reproduction of Saccharomyces, Aspergillus.</p> <p>Protozoa General characteristics, classification & reproduction of Giardia, Entamoeba</p>	10
III	<p>Techniques in microbiology I Principles of microscopy, construction and application of- Compound Microscope (monocular and binocular), Bright field Microscopy, Dark field Microscopy, Phase Contrast Microscopy, Fluorescence Microscopy, Electron Microscopy- TEM and SEM</p>	6
IV	<p>Techniques in microbiology II Principles, construction and application of centrifuge; bacteriological Incubator & Incubator Shaker; Laminar flow; Colourimeter & Spectrophotometer (UV- Vis)</p>	6
V	<p>Sterilization techniques and control of microorganisms Definitions of terms- sterilization and disinfection; Sterilization by Physical methods- Use of moist heat- heat under pressure, autoclave, boiling, pasteurization, fractional sterilization, tyndallization; Use of dry heat- hot air oven, incineration; Filtration- Seitz filter, membrane filter, HEPA filter; Radiation- Ionizing and non- ionizing; Chemical methods- Alcohols, aldehydes, phenols, halogens, metallic salts, ethylene oxide.</p>	7
VI	<p>Isolation, cultivation and preservation of microorganisms Culture media and its types; Methods for enumeration & isolation of microorganisms using pour plate, spread plate technique, and streak plate; Isolation of anaerobic microorganisms; Maintenance and preservation of pure Culture</p>	8
VII	<p>Stains and staining techniques Staining techniques, principles, procedures and applications of Simple staining, negative staining; Differential staining- Gram's staining, acid fast staining, Leishman's staining, Giemsa's staining, Ziehl Neelsen staining; Structural staining- cell wall, capsule, endospore and flagella staining.</p>	7

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Sl. No.

VIII	Biostatistics Introduction to biostatistics – definition statistical methods, biological measurement, kinds of biological data; Measure of central tendency – Mean, median, mode, standard deviation; Collection of data, sampling and sampling design, classification and tabulation, types of representation, graphic biodiagrams.	8
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Suggested Readings:

1. Alexopoulos C.J. and Mims C.W., Introductory Mycology, New Age International, New Delhi.
2. Aneja K.R., Experiments in Microbiology, plant pathology, Tissue culture and Mushroom cultivation, New Age International, New Delhi.
3. Atlas R.M., Microbiology- Fundamentals and applications, Macmillan Publishing Company, New York.
4. Benson Harold J., Microbiological Applications, WCB Mcgraw-Hill, New York.
5. Bold H.C. and Wynne M.J., Introduction to Algae, Prentice Hall of India Private Limited, New Delhi.
6. Baveja C.P., Textbook of microbiology APC 6th edition.
7. Dubey R.C.. and Maheshwari D.K., Textbook of microbiology, S Chand Publications.
8. Pelczar M.J., Chan E.C.S and Kreig N.R., Microbiology, Mcgraw-Hill Book Company, New York.
9. Prescott Lansing M., Harley John P. and Klein Donald A., Microbiology, WCB Mcgraw- Hill, New

Programme/Class: Certificate	Year: First	Semester: First
Subject: MICROBIOLOGY		
Course Code: BBI 104P	Course Title: Experiments in Basic Microbiology	

Course Outcomes:

The student at the completion of the course will be able to:

- To understand the instruments, microbial techniques and good lab practices for working in amicrobiology laboratory.
- Practical skills in the laboratory experiments in microbiology.
- Develop skills for identifying microbes and using them for industrial, agricultural and environmental purpose.
- To prepare slides and stain to see the microbial cell.

Credits: 2	Core: Compulsory
Max. Marks: 15+35	Min. Passing marks: as per rules

Total No. of Lectures-Tutorials-Practical(in labs per week): L-T-P: 0-0-2

S. No.	Objectives Any 3 practicals from each unit may be performed/demonstrated	Total No. of Lectures/ Hours (60)
1.	<ul style="list-style-type: none"> • Good laboratory practice in Microbiology and safety measures. • Cleaning and sterilization of glassware and equipments. • Study of aseptic technique- preparation of cotton plug, wrapping of glassware, transfer of media and Inoculum. 	12
2.	<ul style="list-style-type: none"> • Study of instruments- Microscope, autoclave, hot air oven, laminar airflow, inoculation loop and needle, incubator, B.O.D incubator, centrifuge machine, pH meter, colony counter, seitz filter, membrane filter, colourimeter, spectro photometer. 	12
3.	<ul style="list-style-type: none"> • Preparation of different culture media- nutrient agar/nutrient broth for bacterial culture, PDA for fungal culture. • Enumeration of bacteria using spread plate and pour plate techniques. • Isolation of bacteria by pour plate, spread plate and streak plate method. 	12
4.	<ul style="list-style-type: none"> • Staining of bacteria- <ol style="list-style-type: none"> 1. Simple staining- methylene blue 2. Gram's staining 3. Acid fast staining 4. Ziehl Neelsen staining 5. Giemsa staining 6. Structural staining- capsule, endospore. 7. Staining of fungi using lactophenol and cotton blue. 	12
5.	Study of permanent slide and life materials <ul style="list-style-type: none"> • Bacteria- E.coli, Staphylococci, Streptococci, Lactobacillus sp., 	12

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CELL BIOLOGY UNIT I **Basics of Cell Biology BBI 202**

organization of plant and animal cells, classification of cell types, cell theory, **UNIT II** Ultrastructure of cells, comparison of microbial, plant and animal cell.

protein and lipids). **UNIT III** Subcellular organization, cytosol, endoplasmic reticulum, nucleus, cytoskeleton,

ribosomes, mitochondria, chloroplast, vacuoles, peroxisomes, lysosomes and cell wall. **UNIT IV** structure and function of cell membranes, Cell division (eukaryotic and prokaryotic),

mitosis, meiosis and cell cycle. **UNIT V** Specialized cell, motile cells, nerve cells, muscle cells, cell death and apoptosis .

Recommended Books:

De Robertis and De Robertis. 2005. 8th Eds. Cell and Molecular Biology.

Lippincott Williams & Wilkins Lodish, Berk, Baltimore et al. 2000. 6th Eds Molecular Cell Biology.

W.H. Freeman & Co. Gerald Karp, 2008. Cell and Molecular Biology: Concepts and Experiments, 5th Eds.

Wiley Geoffrey Cooper, 2000. The Cell: A molecular approach. 2nd Eds. Sinauer Associates Inc.

PRACTICAL-I Basics of Cell Biology

1. Cell types – Microbial, animal and plant morphometric measurements.
2. Fractionation of cellular components.
3. Cell membrane, separation and analysis of membrane components.
4. Cell staining: Cyto chemical methods for demonstration of cellular and sub cellular components. Protein, carbohydrate and lipids.
5. Enzymes: Assay of urease, demonstration catalytic activity.
6. Titration curve of amino acids.
7. Selection of complementary filters.
8. Beer- Lambert's law verification.

Basics of Biochemistry BBI 201

UNIT-1

Introduction to Biochemistry: a historical perspective, structural classification & properties of major biomolecules-carbohydrates, fats, proteins, Water.

UNIT-2 Amino acids & Proteins - Structure & function. Structure and properties of amino acids, Types of proteins and their classification, Forces stabilizing protein structure and shape. Different level of structural organization of proteins, Purification of proteins and criteria of their purity. Denaturation and renaturation of proteins. Fibrous and globular proteins.

UNIT-3 Carbohydrates - Structure and properties of monosaccharides, Oligosaccharides and Polysaccharides. Homo & hetero Polysaccharides, Mucopolysaccharides. Glycolysis: reactions, energetics and regulation, Fate of pyruvate under aerobic and anaerobic conditions. Pentose phosphate pathway and its significance, Gluconeogenesis, Glycogenolysis and glycogenesis. TCA cycle: ETC, Oxidative phosphorylation Beta oxidation of fatty acids Biochemistry of photosynthesis.

UNIT-4 Lipids - Structure & functions-Classification, structures, nomenclature and properties of fatty acids, essential fatty acids. Phospholipids structure and properties of different types of phospholipids, sphingomyelins, glycolipids, cerebrosides, gangliosides, Prostaglandins cholesterol-its structure and biological properties, utilization of cholesterol.

UNIT-5 Nomenclature and classification of Enzymes, Holoenzymes, Apoenzymes, Cofactors, coenzyme, prosthetic groups, metalloenzymes, monomeric & oligomeric enzymes, activation energy and transition state, enzyme activity, specific activity, common features of active sites, enzyme specificity: types and theories,

Basics of Biochemistry-Lab BBI 201P

1. Effect of pH, temperature on activity of salivary amylase enzyme activity.
2. Separation of aminoacids by paper chromatography.
3. Quantitation of proteins and sugar.
4. Colorimetric determination of pK.
5. Analysis of oils-Iodine number, saponification value, acid number.
6. Cell division in onion root tip.
7. Study the effect of temperature, organic solvent on semi permeable membrane.
8. Study of plasmolysis and deplasmolysis.
9. Microscopy: Structure of prokaryotic and eukaryotic cell, fixation.

Basics of Genetics BBI 203

UNIT I

Principles of heredity and variation: Mendel and his experiments, monohybrid crosses, incomplete dominance and codominance, dihybrid crosses, rediscovery of Mendelism, multiple alleles.

UNIT II

The chromosome theory of inheritance, sex linked, sex limited and sex influenced inheritance, variation in chromosome number and structure.

UNIT III

Linkage and recombination of genes in a chromosome, crossing over and genetic mapping, three point test cross, tetrad analysis, gene recombination and complementation.

UNIT IV

Physical and chemical mutagens, detection of mutation in drosophila (CIB method & Muller-5 method), epigenome and epigenetics.

UNIT V

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Concepts of multiple alleles, Blood group in Humans, antigen-antibody interaction in inheritance of A, B, AB and O blood groups, Rh Factor, epistasis and multiple allelism (Bombay blood group), pseudogenes, overlapping genes and split genes.

Basics of Genetics Lab BBI 203P

1. microscopy, preparation of culture media
2. isolation of microorganisms from different sources
3. maintenance of pure cultures
4. Microbiological staining methods
5. Demonstration of Barr body
6. mendelian deviations in dihybrid crosses
7. karyotyping with help of photographs

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Unit I

Principles of object oriented programming (OOP): Software evolution-OOP paradigm-basic concepts of OOP-object oriented languages-applications of OOP.

Unit II

Introduction to C++, Tokens, keywords, Identifiers, Variables, Operators, Manipulators, Expressions and control structures in C++. Functions in C++-main function-function typing-call by reference-return by reference-function overloading-friend and virtual function.

Unit III

Classes and objects: constructors and destructors and operating overloading and type conversions.

Unit IV

Inheritance: Types – single, multilevel, hierarchical and hybrid inheritance. Pointers, virtual functions and polymorphism. Managing console I/O operations.

Recommended Books

Balagurusamy, E. 1995. Object oriented programming with C++, TMH.
Herbert Schidt, 1995. C++ The complete Reference, 2nd Edition, Osborne, MGH.

Bio-programming using C Language-Lab BBI-204P

1. PDB analysis of protein structure by RASMOL
2. NCBI, EMBL and DDBJ (accession of informations)
3. BLAST and FASTA search
4. Alignments – pair wise and multiple sequence alignment – Clustal W and X
5. Program for function , operation overloading
6. program for multiple constructors in a class
7. program for multiple handling
8. program for error handling
9. program for friend and virtual functions
10. Molecular mechanics and dynamics of nucleotides and proteins.
11. Molecular modelling using HEX.

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Computer Graphics and Visualizations (BBI 304)

Course Code	Course Name	Course Type	Teaching Load/Week				Total Credits	Evaluation Scheme			Total	
			L	P	T	Total		Sessional		ESE		
								CT	TA			Total
BBI 304	Computer Graphics and Visualizations	Core Course	4	0	0	4	4	20	10	30	70	100
BBI 304P	Graphics Lab	Practical	0	2	0	2	2	15	0	15	35	50

Syllabus

Computer Graphics and Visualizations (BBI 304)

Unit-1: Basic of Computer Graphics:

Basic of Computer Graphics: Basic of Computer Graphics, Applications of computer graphics, Display devices, Random and Raster scan systems, Graphics input devices, Graphics software and standards.

Unit-2: Graphics Primitives:

Points, lines, circles and ellipses as primitives, scan conversion algorithms for primitives, Fill area primitives including scan-line polygon filling, inside-outside test, boundary and flood-fill, character generation, line attributes, area-fill attributes, character attributers.

Unit-3: 2D transformation and viewing:

Transformations (translation, rotation, scaling), matrix representation, homogeneous coordinates, composite transformations, reflection and shearing, viewing pipeline and coordinates system, window-to-viewport transformation, clipping including point clipping, line clipping (cohen-sutherland, liang-berksy, NLN), polygon clipping.

Unit-4: 3D concepts and object representation:

3D display methods, polygon surfaces, tables, equations, meshes, curved lies and surfaces, quadric surfaces, spline representation, cubic spline interpolation methods, Bazier curves and surfaces, B-spline curves and surfaces.

Unit-5: 3D transformation and viewing:

3D scaling, rotation and translation, composite transformation, viewing pipeline and coordinates, parallel and perspective transformation, view volume and general (parallel and perspective) projection transformations.

Reference Books:

1. Computer Graphics, D.Hearn And P.Baker - Pearson Education - C Version
2. Computer Graphics, with OpenGL Hearn and Baker, - Pearson
3. Computer Graphics, Sinha & Udai, - TMH
4. Computer Graphics, Foley and van Dam - Person Education

BBI-302 Biological Database & data Analysis
(BBI-302 P-) Practical

Graphics Lab (BBI 304)

List of Experiments:

1. To study the various graphics commands in C language.
2. Develop the DDA Line drawing algorithm using C language
3. Develop the Bresenham's Line drawing algorithm using C language
4. Develop the Bresenham's Circle drawing algorithm using C language
5. Develop the C program for to display different types of lines
6. Perform the following 2D Transformation operation Translation , Rotation and Scaling
7. Perform the Line Clipping Algorithm
8. Perform the Polygon clipping algorithm
9. Perform the following tasks using MATLAB commands. - Read the grayscale and color image. - Display images on the computer monitor - Write images in your destination folder.
10. Generate the complement image using MATLAB.

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BBI 301 Microbiology and Genetics

Microbiology

UNIT I

Fundamentals & history of microbiology, Classification of microorganisms, microbial taxonomy, criteria used including molecular approaches, Microbial phylogeny and current classification of bacteria, structure of bacterial cell. Difference between gram positive and gram negative cell walls.

UNIT II

Cultivation and maintenance of microorganisms, nutritional categories of microorganisms, methods of isolation, purification & preservation of pure culture. Microbial growth, Growth curve, generation time, Synchronous, batch and continuous culture, measurement of growth and factors effecting growth.

UNIT III

Control of microorganisms, Preservation of Food, waste water treatment, major foodborne infections and intoxications, industrial use of bacteria, yeast and moulds

Genetics

UNIT IV

Principles of heredity and variation: Mendel and his experiments, monohybrid crosses, incomplete dominance and codominance, dihybrid crosses, rediscovery of Mendelism, multiple alleles, epistasis (probability in prediction and analysis of genetic data)

UNIT V

The chromosome theory of inheritance, sex linked, sex limited and sex influenced inheritance, variation in chromosome number and structure. Linkage and recombination of genes in a chromosome, crossing over and genetic mapping, three point test cross, tetrad analysis, gene recombination and complementation.

PRACTICALS (BBI-301P)

1. microscopy, preparation of culture media
2. isolation of microorganisms from different sources
3. maintenance of pure cultures
4. Microbiological staining methods
5. Demonstration of Barr body
6. mendelian deviations in dihybrid crosses
7. karyotyping with help of photographs

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BBI 303 MOLECULAR BIOLOGY

Unit I Cell structure and function: Membrane architecture, membrane associated process, ATP synthesis and photosynthesis, subcellular organelles- mitochondria, chloroplast.

Unit II Chromosomal structure: prokaryotes and eukaryotes. Gene transfer in bacteria- genetic mapping and its uses.

Unit III Prokaryotic and eukaryotic replication: Gene expression-transcriptional and translational regulation in prokaryotes. Post translational modification in eukaryotes.

Unit IV Mutations and mutant, Biochemical basis of mutation, types of mutation – spontaneous and conditional. Chemical and physical mutagens- point mutation.

Unit V Transposons and insertion sequences: Types of transposons – prokaryotes and eukaryotes. DNA rearrangement mediated by transposons.

Recommended Books

- Lodish, Berk, Baltimore et al. 2000. Molecular Cell Biology. 6th Edition. W.H. Freeman & Co
Twyman, R.M.2000. Advanced Molecular Biology. Garland/bios Scientific Publishers.
Sandy B Primrose, 1991. Molecular Biotechnology. 2nd Edition.. Blackwell Scientific Publishers.
Brown, T.A, 2002.Genomes. 2nd Edition. Wiley-Liss (New York).
Larry Snyder, Wendy Champness, 2002. *Molecular Genetics of Bacteria* . 2nd Edition. . American Society for Microbiology.

BBI 303P MOLECULAR BIOLOGY LAB

1. Isolation of plasmid and analysis by Agarose gel electrophoresis
2. SDS-PAGE
3. Determination of molecular size of DNA
4. Restriction analysis of DNA
5. Ligation of DNA into vectors

