Agricultural Microbiology 18. Dyes and Drugs
Agrochemicals & Fertilizers 19. Electronics
Analytical Chemistry 20. Environmental Science
B.C.A. 21. Fishery Science
B.Voc. (Food Processing, Preservation and Storage) 22. Food Science
B.Voc. (Web Printing Technology) 23. Geology
Biochemistry 24. Horticulture
Bioinformatics 25. Industrial Chemistry
Biophysics 26. Information Technology (Optional)
Biotechnology (Vocational) 27. Mathematics
Biotechnology 28. Microbiology
Botany 29. Network Technology
Chemistry 30. Physics
Computer Application (Optional) 31. Software Engineering
Computer Science (Optional) 32. Statistics
Computer Science 33. Zoology
Dairy Science
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CC- Core Course, DSE- Discipline Specific Elective, AEC- Ability Enhancement Course, ESA- End Semester Assessment, MSA- Mid Semester Assessment, PR- Practical, SEC-Skill Enhancement Course

Total credits = 150
Learning Objective:

1. To enable students to utilize their knowledge of grammar effectively for communicative purposes.
2. To develop communicative skills of the learners in listening, speaking, writing and reading.
3. To focus on how English is used in real-life situations
4. To develop fluency in conversation and efficiency in interactional skills
5. To learn to use grammar communicatively so that they become effective and efficient communicators in English.

Learning outcome:

By the end of this course students should be able to:

1. Understand and demonstrate Basic English usages for their different purposes.
2. Clear entrance examination and aptitude tests.
3. Write various letters, reports required for professional life.

Unit I:

Morphology
1.1 Morphology: Free & Bound Morphemes
1.2 Word Formation Processes
1.3 Morphological Analysis of words

Unit II:

A. Grammar in day-to-day use:
2.1 Word Classes: Open and Closed Word Classes
2.2 Phrase: Types and functions of the phrases

B. Speaking Situations:
2.3 Role Playing
2.4 Group Discussion
2.5 Seminars

Unit III:

A. Error Detection
3.1 Determiners: Article, Quantifiers and Demonstratives
3.2 Subject – Verb Agreement

B. Transformation of Sentences:
3.4 Voice: Active & Passive
3.5 Speech: Direct & Indirect

Unit IV:

Business Correspondence
4.1 Letters (Formal & Informal),
4.2 Report Writing (Scientific and Formal)
4.3 Essay Writing
4.4 Resume
Reference Books:

1) Developing of Communication Skills - Krishna Mohan & Meera Banerji
2) A Practical English Grammar A.J. Thomson - Oxford
3) Mastering English Grammar – S. H. Burton
4) Technical Communication- Raman Sharma- Oxford
5) Written Communication in English – Sarah Freeman Orient Longman Pvt. Ltd.
6) A Course in Phonetics & Spoken English - J. Sethi & P. V. Dhamija.

List of Practical:

1) Group Discussion
2) Seminars on the general topics
3) Debate Competitions
4) Public Speaking
5) Role Playing
6) Telling Stories and Jokes in English
7) Hosting the programmes as an Anchor
8) Translations: Mother tongue to English
Objective:
To have overview and understanding of world of Biotechnology with applications.

Outcome:
Students become able to understand the applications of Biotechnology in different fields.

Unit-I: Introduction:
Definition, Historical overview of Biotechnology, Recent discoveries from Cell biology to Biotechnology.

Application of Biotechnology in Agriculture:
Plant tissue culture, Seed Technology, Transgenic plants, Bio-fertilizers, Bio-pesticide with examples. etc.

Unit II: Biotechnology in Health & Biopharmaceuticals:
Diagnostics- Ag-Ab Interactions and other types of diagnosis. Concept of Stem Cells, Hybridoma Technology, Genetic Counseling. Transgenic Animals and their applications.

Unit-II: Biotechnology in Industry:
Beverage-Winery, Distillery, Dairy, Food Processing and packaging, Enzymes, Paper & Pulp etc

Unit-IV: Application of Biotechnology in Environment & Biodiversity:

Reference Books & Text:
1. Introduction to Biotechnology- Brown, C Publications ampbell, Priest-Panima Publications
2. Biotechnology-U Satyanarayana- New Age Publications
5. Elements of Biotechnology - P.K. Gupta, Rastogi Publications
7. Advances in Biotechnology- S.N. Jogdand- Himalaya Publication
9. Biotechnology - Purohit- Agrobios Publication
10. Modern concepts of Biotechnology, H.D. Kumar, Vikas Publications

Practical:
1. Students are expected to go on field study to reveal the applied areas of biotechnology, Biotech Companies, Products and their impact on society.
2. Survey and report on commercial dairy products and packaged food products available in market.
3. Survey and report on biopesticides, and bio control agents available in market
4. Survey and report on genetically modified/hybrid crops seeds and vegetables
5. Survey and report on vaccination programme in India and vaccines in market
6. Survey and report diagnostic kits, antibiotics, anti-sera available in market
7. Survey and report on use of Biofuel (Biodiesel, biogas, ethanol, biomass, coal etc)
8. Visit and report on local drinking and waste water treatment, bio composting, biogas unit
9. Report on government agencies- DBT, CSIR, ICMR, ICAR, TIFR, ISSER, IIT, DRDO
10. Report on Top 10 Biotech companies in India and World
11. Visit and report on Biotech Research Institute, Forensic Laboratory and Biotech Industry
Basic Bioscience - CCBT-2A

Objective:
To understand the basic concept of Life forms, Evolution and Biodiversity
Learning Outcomes: Students will understand biodiversity of living organism and plant body organization

Unit-I: Evolution in 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: Plant body organization
Structural Morphology of vegetative and reproductive organs of monocot & dicot plants, Functional - Flower- Parts and their functions. Inflorescence- Types, special types of inflorescence, Physiology of flowering –Photoperiodism, Vernalization and Dormancy Fruit- Types of fruit, Parthenocarpy. Seed – Development, structure, germination, control of seed germination,

Unit-III : Brief Introduction to types of Animals

Unit-IV: Fungi

Reference Books:
2. Botany for Degree Students- Vasitha- S. Chand Publication
3. College Botany- B.P. Pandey- S.Chand
5. Plant Physiology-SundaraRanjan- Anmol Publication
6. Fundamentals of Plant Physiology- V.K. Jain- S. Chand
7. Fungi for Degree Students- Vashist- S.Chand
8. Zoology –Jordan &Verma-S. Chand
9. Chordate Embryology- Verma, Agarwal- S.Chand
10. Plant physiology, Biochemistry & Biotechnology- Verma&Verma- S Chand

Practicals:
1. Study of T S of Monocot & Dicot stem and root
2. Study of Flower, Inflorescence, fruits, Seeds
3. Study of TS of anther and ovule
4. Preparation of Potato dextrose agar and growth of any fungus
5. Study of embryo development (Chicken /Frog)
6. Study of extra embryonic membranes in chicks
7. Visit to a protected area of the state to understand and appreciate biodiversity
8. Observation of permanent slides of anther, ovule, embryo sac, embryo and endosperm etc
9. Study of eukaryotic and prokaryotic cell structures
Microbiology I-CCBT-3A

Maximum Marks: 75  Hours: 45  Credits: 3

Objective:

To understand basic concepts in Microbiology. To understand the morphology and fine Structure of Bacteria

Learning Outcomes: Students will understand the history of microbiology. They will learn the fine structure of bacteria and applied areas of Microbiology

Unit –I: Introduction to Microbiology History of Microbiology:


Unit –II. Basic and applied areas:

Medical Microbiology, Space microbiology, Soil and Agricultural Microbiology, Food and Dairy Microbiology, Geomicrobiology. Concept of Systematic and Classical taxonomy including Bergey’s Manual of Bacteriology.

Unit-III: Morphology and Fine Structure of Bacteria Morphology of Bacteria,

Size and shape, Arrangements. Ultra structure of Bacteria Structure, function and chemical composition of Capsule, Flagella, Pili and Fimbriae, Cell Wall (Gram positive & Gram negative), Cell membrane, Mesosome, Cytoplasm, Nucleoid and ribosome’s. Cytoplasmic inclusion – PHB granules, glycogen, carbohydrates, Magnetosome, Gas vesicles, chromosome, Sulphur, granules.

Unit –IV. Spore and Cyst-

Endospore and Exospores, Germination and Sporulation of endospore. Eukaryotic Cell Structure and function: Overview of eukaryotic cell structure.

Reference books:

1. General Microbiology-Powar and Daginawala- Himalya Publication
3. General Microbiology-Pelczar- Tata McGraw Hill
5. General Microbiology- Stanier R.-. Macmillan Press Ltd.
6. Text Book of Microbiology- R.C. Dubey- S.Chand

Practical:

1. General Rules and Safety in Microbiology Laboratory.
2. Study of basic requirements in Microbiology Laboratory- Autoclave, Hot air oven & Incubator
3. Isolation of microorganisms from soil, water and air.
4. Detection of number of bacteria from milk by SPC
5. Microbiological examination of food
6. Simple staining
7. Gram staining
8. Measurement of size of microorganism by Micrometry method
9. Study of motility of Microorganisms by hanging drop method
10. Alcoholic fermentation
Business Communication-AEGBT - 2A

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Objective:
1. To enable students to utilize their knowledge of grammar effectively for communicative purposes.
2. To develop communicative skills of the learners in listening, speaking, writing and reading.
3. To focus on how English is used in real-life situations.
4. To develop fluency in conversation and efficiency in interactional skills.
5. To learn to use grammar communicatively so that they become effective and efficient communicators in English.

Outcome:
1. Understand and demonstrate Basic English usages for their different purposes.
2. Clear entrance examination and aptitude tests.
3. Write various letters, reports required for professional life.

Unit-I:

**Day-to-Day-English**

1.1 Describing persons, objects or things
1.2 Narrating Pictures
1.3 Talking about places and recipes
1.4 Expression opinions

Unit-II:

**Vocabulary**

2.1 Spellings: How to spell correctly
2.2. Idioms and Phrases
2.3 Synonyms and antonyms
2.4 One Word Substitution

Unit-III:

**Reading Comprehension:**

3.1 Basic Approaches for understanding English
3.2 Para Jumbles
3.3 Rearranging the jumbled parts of a sentence
3.4 Cloze Test

Unit-IV:

**Writing Ability**

4.1 Writing Research Papers- Introduction
4.2 Creative Writing- Writing Meeting Notices, Agenda and Minutes
4.3 Email Writing for day-to-day purpose: Emails for Jobs, Invitation and Complaint
4.4 Writing short moral stories
Reference Books:

1) Developing of Communication Skills - Krishna Mohan & Meera Banerji
2) A Practical English Grammar A.J. Thomson - Oxford
3) Mastering English Grammar – S.H. Burton
4) Technical Communication - Raman Sharma - Oxford
5) Written Communication in English – Sarah Freeman Orient Longman Pvt. Ltd.
6) A Course in Phonetics & Spoken English - J. Sethi & P. V. Dhamija.

List of Practical:

1) Preparing Individual Resume
2) Curriculum Vitae
3) Presenting Prepared Speeches
4) Handling Tele-interviews
5) Email Drafting, Cover Letter Writing and Sending error free emails
6) Organizing Conference and dealing with oral presentations
7) Art of Oratory and Video conferencing
8) Delivering speeches, lectures using technology like you-tube and other social media
S. R. T. M. University, Nanded

Principles of Genetics- CCBT-1B

Maximum Marks: 75  Hours: 45  Credits: 3

Objective:

To understand Mendelian genetics, Microbial genetics, concept of Genes and Human population Genetics

Outcome:

Students will learn the Mendel’s laws of Inheritance and will acquire the laboratory skills of microbial recombination.

UNIT 1
Mendel’s law of Inheritance – principal of segregation, independent assortment, Dominance, Mendelian genetics in humans.
Variety of gene expression –modifiers, suppressors, pleiotropic gene, multiple allele, interaction of gene-Epistasis, complimentary gene, supplementary gene, duplicate gene

UNIT 2
Linkage –definition, coupling and repulsion hypothesis, linkage groups; Crossing over –Mechanism and theory; Structural and numerical changes in chromosomes; Extra chromosomal inheritance-mitochondrial and plastids; Karyotype study

UNIT 3
Concept of Gene, Classical & modern gene concepts, Mapping of gene, Mutation-Basic Concept, Types –Spontaneous, Induced ; Mechanism of mutagenesis – Base analogues, Nitrous acid hydroxyl amine, alkyl ting agent, Acridine dyes, U. V. light

UNIT 4
Plasmid- Structure, Types, properties and applications; Transposable elements; genetic recombination in bacteria – definition, transformation, Conjugation, transduction, mechanism of recombination

Text & References
1. Genetics, M.W., Strickberger, Prentice Hall College Division
2. Microbial Genetics- David Friefelder- Narosa Publications
3. Stanier “General Microbiology”
5. C. Sarin “Genetics”
6. Larry Snyder Wendy Champness “Molecular Genetics of Bacteria”
8. Genetics –B.D. Singh –Himalaya Publication

Practical:
1. Two examples on Dihybrid cross
2. Two examples on Monohybrid cross.
3. One example each on interaction of genes.
4. Study of Karyotype.
5. Study of Human blood group.
6. Study of special types of chromosomes.
Objective:
To focus on the basic concept of Biomolecules & their physiological role in life.
Outcome: Students will analyze the structure and functions of biomolecules in life forms. They will acquire the lab skills for the estimation of biomolecules.

UNIT-I: Carbohydrate:
Nomenclature, Classification (Monosaccharide’s, oligosaccharides, polysaccharide), structure & functions, chemical properties and structural aspects of Monosaccharide’s (Glucose), Disaccharides (Sucrose, Lactose) and polysaccharides (Starch, Glycogen).

UNIT-II: Amino Acid:

UNIT-III: Nucleic Acid:
Structure of nucleic acid – Nitrogenous bases, pentose, nucleotides, nucleosides, nucleoside di and triphosphate. Basic structure of DNA & RNA, Forms of DNA, Types of RNA, physicochemical properties and biological function of nucleic acids.

UNIT-IV: Lipid-
Classification (Saturated and Unsaturated fatty acid) structure and Biological role, Cholesterol. Vitamin- Definition and classification of Vitamins, Water soluble Vitamins:- Structure, Function and properties of Vit. B1, B2, B6 and C. Deficiency, Disorder and clinical Significances. Fat soluble Vitamin:- Structure, Function and properties of Vit, A, D, E, K. Deficiency, disorder and clinical Significances.

Text & References:
1. Biochemistry- U. Satyanarayana & Chakrapani- New Age
2. General Biochemistry- J.H. Weil- New Age
3. Fundamentals of Biochemistry- A.C. Deb- Central publication
4. Lehniger Biochemistry- Kalyani Publication
5. Principle of Biochemistry- Cohn and Stumpf.
6. Biochemistry- Powar & Chatawal- Himalaya
7. Biochemistry- J.L Jain- S.Chand
8. Biochemistry- Rastogi- Tata Mcgraw Hill

Practical:
1. General and Safety Rules of Laboratory
4. Study of Lambert Beer’s Law
5. Estimation of Carbohydrate by DNS Reagent.
6. Estimation of Protein by Biuret method.
7. Qualitative estimation of DNA by Diphenylamine method.
8. Determination of acid value of oil and fat.
10. Preparation of Buffers Solutions
11. Study of Enzymes
Objective:
To understand basic concepts in Microbiology. To know the Microbial Nutrition and growth kinetics of bacteria.

Outcome:
Students will learn the microbial nutrition & cultivation. They will understand bacterial growth and various methods of sterilization.

UNIT-I:

UNIT-II:

Unit-III:

Unit-IV:
Control of Microorganisms by chemical methods. Chemical methods of Microbial Control: Phenolics, Biguanides- Chlorohexidine, Alcohols, Halogens, Heavy Metals, Quaternary ammonium compounds, Surface active agents, Aldehydes, Sterilizing gases, Peroxynitrous, chemotherapeutic agents.

Text & References:
1. General Microbiology-Powar and Daganawala- Himalya Publication
3. General Microbiology-Pelczar- Tata McGraw Hill
5. General Microbiology- Stanier R.-. Macmillan Press Ltd. 6. Text Book of Microbiology- R.C. Dubey- S.Chand
Practicals:

1) Preparation of solid and liquid media
2) Isolation of Mos from Soil, Water and Air
3) Isolation of microorganisms by using selective media.
4) Isolation of bacteria by spread plate, streak plate and pours plate method.
5) Study of bacterial growth curve.
6) Maintenance of Pure Culture
7) Detection of Pathogens from water Samples
6) Detection of number of bacteria from milk by breed method.