

## **Department of Microbiology**

The following Courses having focus on Employability/ Enterpreneurship/ Skill Development Courses:

**Main Course:** Introductory Microbiology/ General Microbiology/ Food & Environmental Microbiology/ Industrial Microbiology/Applied Microbiology/ Pharmaceutical Microbiology

**SEC:** Haematology/ Hospital Waste Management

TARA GOVERNMENT DEGREE COLLEGE, SANGAREDDY

B.SC. I YEAR SYLLABUS (2016-17) 1 SEMESTER

CHOICE BASED CREDIT SYSTEM (CBCS)

Paper-I INTRODUCTORY MICROBIOLOGY-I

4IPW-credited-4

UNIT-I – History of Microbiology and Classification of Microorganisms 15 Hrs

Meaning, Definition and History of microbiology. 2 hrs  
Contribution of Antony Van Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Iwanoswky, Beijerinck, Winogradsky and Alexander Fleming. 11hrs  
Importance and application of Microbiology. 2 hrs

UNIT-II- Microscopy and Staining Techniques 15 Hrs


Principles of microscopy. Bright field, dark field, phase-contrast, fluorescent and electron microscopy (SEM and TEM). Ocular and stage micrometers. 8 Hrs  
Size determination of microorganisms. 2 Hr  
Principles and types of stains - Simple stain, differential stain, negative stain, structural stains - spore, capsule, flagella. Hanging-drop method. 5 Hrs

UNIT-III - Microbiological Techniques 15 Hrs

Sterilization and disinfection techniques. Principles and methods of sterilization. 3hrs  
Physical methods- Autoclave, Hot air oven, pressure cooker, Laminar air flow, Filter sterilization, Radiation methods- U.V rays, Gamma rays, Ultrasonic methods. 6 hrs  
Chemical methods- Use of Alcohols, Aldehydes, Fumigants, Phenol, Halogens and Hypochlorides, Phenol coefficient. 6 hrs

UNIT- IV- Pure Culture Techniques 15 Hrs

Isolation of Pure cultural techniques- Enrichment culturing, Dilution plating, streak plate, spread plate, Micromanipulator. 8 hrs  
Preservation of Microbial cultures - Sub culturing, overlaying cultures with minerals oils, lyophilization, sand cultures, Storage at low temperature 7 hrs

  
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Jyothi  
Hyderabad

A. R. V. Ramchandar  
CBCS  
SANGAREDDY

**TARA GOVERNMENT DEGREE & P.G. COLLEGE, SANGAREDDY,  
MEDAK  
(AUTONOMOUS)  
Department of Microbiology**

Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)  
With effect from 2016-17

Syllabus for B.Sc Microbiology

Code: BS 104, DSC- 1A

B.Sc I year; 1<sup>st</sup> semester

Title: General Microbiology-I

4HPW -credits-4

**UNIT-1: HISTORICAL ROOTS**

Meaning, definition and scope. History of microbiology: Contribution of Antony Van Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Iwanoswky, Paul Ehrlich, Elie Metchnikoff and Alexander Fleming. Importance and application of Microbiology.

**UNIT-2: MICROSCOPY AND STAINING**

Historical Microscopy. Principles of Microscopy-Bright field, Dark field, Phase-contrast, Fluorescent and Electron microscopy (SEM and TEM). Principles and types of stains-simple stain, differential stain, negative stain. Structural stain-spore, capsule, flagella. Bacterial motility-Hanging drop method.

**UNIT-3: BIOLOGY OF MICROORGANISMS**

Classification of living organisms: Heckel, Whittaker and Carlwoese systems. Place of microorganisms in the living world. Differentiation of prokaryotes and eukaryotes. Prokaryotes—General characteristics of Bacteria, Archa bacteria. Rickettiasis, Mycoplasma ,cyanobacteria and Actinomycets. Classification of bacteria as per the second edition of Bergyes manual of systematic bacteriology.

**UNIT-4: STRUCTURE OF MICROORGANISMS**

Ultra-structure of bacteria cell; invariant components-cellwall,cellmembrane, Ribosomes,nucleiod. Variant components-Capsule,flagella,fimbriae,endospores& storage granules. General characteristics and classification of virus. Morphology and structure of TMV and HIV. Structure and multiplication of lambda bacteriophage. Eukaryotes- General characteristics and classification. Eukaryotic microorganism- protozoa, microalgae, molds and yeast.

*D.K. Jyothi*  
**Chairman,**  
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**P. Maheshwari**  
CAS

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R. Ram Lakshmi

Dept. Microbiology, Osmania University  
Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)  
With effect from 2020-21

Syllabus for B.Sc Microbiology

Code: BS. DSC-1C

B.Sc II year: III Semester

**Title: FOOD AND ENVIRONMENTAL MICROBIOLOGY**

**4 HPW-Credits-4**

**UNIT 1: FERMENTED FOODS**

Introduction to fermented foods; Health aspects of fermented foods; Fermented vegetables: Processing and fermentation of Sauerkraut and pickles, idly, Dairy Microbiology - Types of microorganisms in milk, significance of microorganisms in milk, Microbial products of milk- Bulgarian milk, Kefir, cheese, yogurt; Microorganisms as food: Probiotics and Prebiotics.

**UNIT 2: MICROBIAL FOOD SPOILAGE AND POISONING**

Microbial Spoilage of foods; Microbial Food poisoning, risks and hazards; Mycotoxins and their poisoning toxicity; Food preservation methods and food safety issues, Food Quality; Importance and functions of quality control, Methods of quality assessment of foods; Screening and Enumeration of spoilage microorganisms, Detection of pathogens in food.

**UNIT 3: AIR AND WATER MICROBIOLOGY**

Microorganisms in air and their importance (brief account); Microorganisms and water pollution Water-borne pathogenic microorganisms and their transmission; Sanitary quality of water; Water pollution due to degradation of organic matter; Aerobic and Anaerobic sewage treatment.

**UNIT 4: SOIL MICROBIOLOGY**

Soil properties (physical, chemical and biological), Soil microorganisms, Methods of enumeration and activity of microbes in environment/soil; Microbes and plant interactions – Rhizosphere, Phyllosphere and Mycorrhizae, Introduction to Microbial Bioremediation, Microbial degradation of organic pollutants, Carbon and Nitrogen cycle.

References:

1. Stachurski, P.E., Whitaker, A. and Hall, S.J. (1997). Principles of Fermentation Technology. Aditya Books (P) Ltd, New Delhi.
2. Doyle, M.P., Beuchat, L.R. and Montville, T.J. (1997). Food Microbiology: Fundamentals and Frontiers. ASM Press, Washington D.C., USA
3. Frazier, W.C. and Westhoff, D.C. (1988). Food Microbiology. McGraw-Hill, New York.
4. Jay, J.M. (1996). Modern Food Microbiology. Chapman and Hall, New York.

Dr. B. Shama  
Chairman, H-OS  
10/10/2020

**TARA GOVERNMENT DEGREE COLLEGE, SANGAREDDY**  
**(AUTONOMOUS)**  
**DISCIPLINE SPECIFIC ELECTIVE-(DSE-IF) - B**  
Dept. Microbiology

Proposed scheme for B.Sc Microbiology program under choice based credit system  
(CBCS) With effect from 2016-17

Syllabus for B.Sc Microbiology

Code: BS 606.DSE-1F-B

**B.Sc III year: 6<sup>th</sup> semester**

**Title: INDUSTRIAL MICROBIOLOGY**

**3 HPW-credits-3**

**UNIT-I**

Microorganisms of industrial importance-Yeast, Molds, Bacteria, Actinomycetes  
Screening and isolation of industrially useful microbes. Methods of Screening and strain improvement.

**UNIT-II**

Types of fermentation- Aerobic, anaerobic, batch, continuous, submerged, surface, solid state Dual and multiple.  
Design of stirred tank reactor fermentor.

**UNIT-III**

Inoculation media and fermentation media  
Raw material used in fermentation industry and their processing Downstream processing

**UNIT-IV**

Microbial products  
Industrial production of alcohol (ethyl alcohol), Beverages (beer), Amylases  
Antibiotics(penicillin) Aminoacids(glutamic acid), Organic acid(tartaric acid) VitaminB12  
Biofuels (biogas-methane)

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**A. MADHURI**

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**Chaitanya**



TARA GOVERNMENT DEGREE COLLEGE, SANGAREDDY  
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Dept. Microbiology

Proposed scheme for B.Sc Microbiology program under choice based credit system  
(CBCS) Syllabus for B.Sc Microbiology Code: BS 503, DSC-1E

B.Sc III year, SEMESTER-V

THEORY

Title: APPLIED MICROBIOLOGY

3 HPW Credits-3

UNIT-1 - Microbes in Agriculture

Physical and chemical characteristics of soil Rhizosphere and phyllosphere  
Plant growth promoting microorganisms  
(mycorrhizae, rhizobium, azospirillum, azotobacter, cyanobacteria, frankia and phosphate solubilising microorganisms)  
Biofertilizers- Rhizobium & Cyanobacteria

UNIT-2 Plant Diseases & Biocontrol

Concept of disease in plant Symptoms of plant diseases caused by fungi (groundnut rust), bacteria (angular leaf spot cotton) and viruses (tomato leaf curl)  
Principles of plant disease control  
Biological control of plant diseases, Biopesticides *Bacillus thuringiensis*, *Nuclear polyhedrosis virus* (NPV), *Trichoderma*

UNIT-3 Microbial ecology

Outline classification of nitrogen fixation (symbiotic, non symbiotic) Microorganisms of environment soil, water, air  
Role of microorganisms in nutrient cycles (carbon, nitrogen, sulphur)  
Microbial interaction-mutualism, commensalism, antagonism, competition, parasitism, predation

UNIT-4 Role of microbes in environmental Pollution

Microbiology of potable and polluted water *E.coli* and *Streptococcus faecalis* as indicators of water pollution. Sanitation of potable water, Sewage treatment (primary, secondary and tertiary) Solid waste disposal-sanitary landfills composting  
Outline of biodegradation of environmental pollutants -pesticides

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Signature  
Date





Discipline Specific Elective  
Dept. Microbiology: Osmania University  
Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)  
With effect from 2020-21

Syllabus for B.Sc Microbiology

Code: DSE-2B

B.Sc III year: VI Semester

Title: PHARMACEUTICAL MICROBIOLOGY

4 HPW-Credits-1

**Unit-1: INTRODUCTION TO CHEMOTHERAPY**

History of chemotherapy – plants and arsenicals as therapeutics, Paul Ehrlich and his contributions, selective toxicity and target sites of drug action in microbes. Development of synthetic drugs – Sulphanamides, antitubercular compounds, nitrofurans, nalidixic acid, metronidazole group of drugs.

**Unit-2: ANTIBIOTICS**

The origin, development and definition of antibiotics as drugs, types of antibiotics and their classification. Non-medical uses of antibiotics. Principles of chemotherapy – Clinical and lab diagnosis, sensitivity testing, choice of drug, dosage, route of administration, combined/mixed multi drug therapy, control of antibiotic/drug usage.

**Unit-3: DRUG RESISTANCE**

The phenomenon of drug resistance, clinical basis of drug resistance, biochemistry of drug resistance, genetics of drug resistance in bacteria.

Mode of action of important drugs – Cell wall inhibitors (Beta lactam – eg. Penicillin), membrane inhibitors (polymyxins), macromolecular synthesis inhibitors (streptomycin), antifungal antibiotics (nystatin)

**Unit-4: MICROBIOLOGICAL ASSAYS**

Assays for growth promoting substances, nutritional mutants and their importance. Drug sensitivity testing methods and their importance. Assay for antibiotics – Determination of MIC, the liquid tube assay, solid agar tube assay, agar plate assay (disc diffusion, agar well and cylinders cup method).

**References:**

1. Ananthanarayana, R. and Panicker, C.K.S. (2000). Text Book of Microbiology, 6th Edition, Oriental Longman Publications, USA.
2. Gupte, S. (1995). Short Text Book of Medical Microbiology, 8th Edition. Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.

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**SKILL ENHANCEMENT COURSE-I (SEC-I)**

**Dept. Microbiology: Osmania University**

**Proposed scheme for B.Sc Microbiology program under choice based credit system (CBCS)**

**With effect from 2020-21**

**Syllabus for B.Sc Microbiology**

**Code: BS, SEC-1**

**B.Sc II year: III Semester**

**Title: HAEMATOLOGY**

**2HPW-Credits-2**

**UNIT-1: INTRODUCTION TO BLOOD**


Blood: definition, characters, composition. Collection of blood – capillary blood: from adults and infants, examinations employed. Venous blood: from adults and infants, examinations employed. Composition of blood (RBC, WBC, Plasma, Serum, Platelet cells). Staining of blood films. Total blood picture. Differential count. Blood grouping, Rh-typing. Haemoglobin: composition and normal values, haemoglobin estimation. Anti-coagulants.

**UNIT-2: BLOOD TRANSFUSION**

Principles of blood transfusion, Donor screening – cross matching, collection of blood, preservation and storage. Precautions of handling blood and its products. Challenges in management of Hemophilia and Anaemia. General account on spread of diseases through blood and blood products. Coagulation mechanism: factors, bleeding time, clotting time. Haematological indices: packed cell volume. Erythrocyte sedimentation: principle – determination.

References:

1. Kawthalkar. Essentials of Haematology Paperback – 2013
2. Lokwani, D.P. The ABC of CBC Interpretation of Complete Blood Count and Histograms Paperback – 2013
3. Rammik Sood, Medical Laboratory technology Methods and Interpretation Jaypee Publications.
4. Shirish MKawthalkar. Essential Of Hematology. Jaypee Publications.





TARA GOVERNMENT DEGREE COLLEGE, SANGAREDDY  
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SKILL ENHANCEMENT COURSE-IV (SEC-4)

Dept. Microbiology

Proposed scheme for B.Sc Microbiology program under choice based credit system  
(CBCS) With effect from 2016-17

Syllabus for B.Sc Microbiology

Code: BS 601, SEC-4

B.Sc III year: 6<sup>th</sup> semester

Title: HOSPITAL WASTE MANAGEMENT

2 HPW-credits-2

Unit-I

- Types of Hospital waste and its Management.
- General , Hazardous , Health care waste, Infectious waste, Genotoxic Waste.
- Specification of Materials and colour coding for Identification.
- Biomedical waste management and handling rules.
- Guidelines of Central Pollution Control Board (CPCB).
- Safe disposal of the Radioactive waste rules.

Unit-II

- Basic steps in health care waste management- Segregation, Decontamination/Disinfection, Storage and Transportation.
- Mechanical and Chemical Treatment of the Waste.
- Liquid waste treatment-Autoclaving, Incrimination.
- Waste minimization- Recyclint and reusing.
- Health and safety practices.
- Estimation of various items of waste management.

References:

1. B.D. Acharya, Meeta Singh. Hospital Waste Management and Its Monitoring.

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