

Dept. Microbiology: Satavahana University
Proposed scheme for B.Sc Microbiology under choice based credit system
(CBCS-2015-16)

Course Title	Course Type	HPW (Theory+Practicals)	Credits
FIRST YEAR - SEMISTER-1			
General Microbiology-I	DSC-1A	4+2	5
FIRST YEAR - SEMISTER-2			
General Microbiology-II	DSC-1B	4+2	5
SECOND YEAR-SEMISTER-3			
Microbial Physiology and Enzymology	DSC-1C	4+2	5
SECOND YEAR-SEMISTER-4			
Microbial Genetics and Molecular biology	DSC-1D	4+2	5
THERD YEAR-SEMISTER-5			
APPLIED MICROBIOLOGY	DSC-1E (Core)	3+2	4
A-IMMUNOLOGY OR B- PHARMACEUTICAL MICROBIOLOGY	DSE-1E-A (Elective) OR DSE-1E- B(Elective)	3+2	4
THERD YEAR-SEMISTER-6			
MEDICAL MICROBIOLOGY	DSC-1F (Core)	3+2	4
A-FOOD MICROBIOLOGY OR B- INDUSTRIAL MICROBIOLOGY	DSE-1F-A OR DSE-1F-B	3+2	4

*** DSC (Discipline Specific Core) means Compulsory Subject

*** DSE (Discipline Specific Elective) means A or B Subject

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Syllabus for B.Sc Microbiology
DISCIPLINE SPECIFIC CHOICE-Core-(DSC-1E)
B.Sc III year, SEMESTER-V

Title: APPLIED MICROBIOLOGY

3 HPW- Credits-3

UNIT-I Microbes in Agriculture

Physical and chemical characteristics of soil

Rhizosphere and phyllosphere

Plant growth promoting microorganisms

(mycorrhizae, rhizobium, azospirillum, Azotobacterial, Cyanobacteria, Frankia and phosphate Solubilizing microorganisms)

Biofertilizers- Rhizobium & Cyanobacteria

UNIT-II Plant Diseases & Biocontrol

Concept of disease in plant

Symptoms of plant diseases caused by fungi (ground nut rust) and bacteria (angular Leaf spot cotton) and viruses (tomato leaf curl)

Principles of plant disease control

Biological control of plant diseases

Biopesticides (Bacillus thuringensis, Nuclear polyhedrosis virus (NPV), Trichoderma)

UNIT-III 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-IV Role of microbes in environmental Pollution

Microbiology of potable and polluted water. E. coli and Streptococcus faecalis as indicators of Water pollution. Sewage treatment (primary, secondary and tertiary)

Solid waste disposal-sanitary landfills, composting

Outline of biodegradation of environmental pollutants (pesticides)

References

1. Alexander, M. (1985). Introduction to Soil Microbiology, 3rd Edition. Wiley Eastern Ltd., New Delhi.
2. Paul, E.A. and Clark, F.E. (1989). Soil Microbiology and Biochemistry, Academic Press, USA.

3. Subba Rao, N.S. (1993). Biofertilizers in Agriculture and Forestry, 3rd Edition Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Rangaswami, G. and Bhagyaraj, D.J. (2001). Agricultural Microbiology, 2nd Edition, Prentice Hall of India, New Delhi.
5. Atlas, R.M. and Bartha, R. (1998). Microbial Ecology - Fundamentals and Applications, Addison Wesley Longman, Inc., USA
6. Lynch, J.M. and Poole, N.J. (1979). Microbial Ecology – A Conceptual Approach, Blackwell Scientific Publications, USA
7. Subba Rao, N.S. (1999). Soil Microorganisms and Plant Growth. Oxford & IBH, Publishing Co. Pvt. Ltd., New Delhi.
8. Reddy, S.R. and Singara Charya, M.A. (2007). A Text Book of Microbiology – Applied Microbiology. Himalaya Publishing House, Mumbai.
9. Singh, R.P. (2007). Applied Microbiology. Kalyani Publishers, New Delhi.

B.Sc III year –V-semester Practical Syllabus-2016-17

APPLIED MICROBIOLOGY

Practical syllabus

2 HPW-CREDITS-1

1. Isolation & enumeration of Rhizosphere microorganisms.
2. Isolation & identification of Phyllosphere microorganisms.
3. Study of root nodules of leguminous plants.
4. Isolation of Rhizobium from leguminous root nodules.
5. Isolation of *Azospirillum* and *Azotobacter*.
6. Staining & observation of VAM fungi.
7. Plant diseases-Rust, Smuts, Powdery mildews, Tikka disease of ground nut, citrus canker, bhendi yellow vein mosaic, tomato leaf curl, little leaf of brinjal.
8. Microbial quality testing of water by coliform test
9. Determination of Biological oxygen demand (BOD) of water

References

1. Aneja, K.R. (2001). Experiments in Microbiology, Plant pathology, Tissue culture and Mushroom Production Technology, 3rd Edition, New Age International (P) Ltd., New Delhi.
2. Dubey, R.C. and Maheswari, D.K. (2002). Practical Microbiology, S. Chand & Co., New Delhi.
3. Burns, R.G. and Slater, J.H. (1982). Experimental Microbiology and Ecology. Blackwell Scientific Publications, USA.
4. Peppler, I.L. and Gerba, C.P. (2004). Environmental Microbiology – A Laboratory Manual. Academic Press. New York.
5. Gupte, S. (1995). Practical Microbiology. Jaypee Brothers Medical Publishers Pvt. Ltd.
6. Kannan, N. (2003). Hand Book of Laboratory Culture Medias, Reagents, Stains and Buffers. Panima Publishing Co., New Delhi.
7. Gopal Reddy, M., Reddy, M.N., Saigopal, DVR and Mallaiah, K.V. (2007). Laboratory Experiments in Microbiology, 2nd edition. Himalaya Publishing House, Mumbai.

8. Reddy, S.M. and Reddy, S.R. (1998). Microbiology – Practical Manual, 3rd Edition, Sri Padmavathi Publications, Hyderabad

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(CBCS) With effect from 2016-17 Syllabus for B.Sc Microbiology
DISCIPLINE SPECIFIC ELECTIVE- (DSE-1E) - A
B.Sc III year: 5th semester

Title: IMMUNOLOGY

3 HPW-credits-3

UNIT-I HISTORY OF IMMUNOLOGY AND IMMUNITY

Development of immunology. Antigen –types, chemical nature, Antigenic determinants, Haptens. Factors affecting antigenicity. Types of immunity-Innate, Acquired; Active and passive, humoral and cell mediated immunity. Antibodies/Immunoglobulins -Basic structure, Types, Properties and functions of immunoglobulins.

UNIT-II CELLS AND ORGANS OF IMMUNE SYSTEM

Cells of immune system, Identification and functions of B &T Lymphocytes, Null cells, Monocytes. Macrophages, Neutrophils, Basophils & Eosinophils. Primary and Secondary organs of immune system- Thymus, bursa of fabrica, bone marrow, spleen and lymphnodes, Mucus associated lymphoid tissue (MALT).

UNIT-III ANTIGENS AND ANTIBODY REACTION

Complement System, components of complement and activation of complement. Types of antigens-Antibody reactions- Agglutination, blood groups, precipitation, neutralization, complement fixation. Labeled antibody-based techniques-ELISA, RIA and Immunofluorescence

UNIT-IV IMMUNOLOGICAL PROCESSES AND APPLICATIONS

Types of hypersensitivity reactions (Immediate and delayed). Autoimmunity and its significance. Polyclonal, monoclonal and recombinant antibodies production and its application. Types Vaccines.

References

1. Dr. Chand Pasha & Dr. P. Muthenna (2018) Text Book of Immunology. KEDAR NATH RAM NATH (KNRN) Publishers, MEERUT, U.P, INDIA.
2. Shetty, N. (1994). Immunology – Introductory Textbook. New Age International Pvt. Ltd., New Delhi.
3. Ananthanarayana, R. and Panicker, C.K.S. (2000). Text Book of Microbiology, 6th Edition, Oriental Longman Publications, USA.
4. Tizard, I.R. (1995). Immunology: An Introduction, WB Saunders, Philadelphia, USA.
5. Riott, I.M. (1998). Essentials of Immunology, ELBS and Black Well Scientific Publishers, England.
6. Goldsby, Kindt, T.J. and Osborne, B.A. (2004). Kuby Immunology, 6th Edition, W.H.Freeman and Company, New York.

7. Lydyard, P.M., Whelan, A. and Fanger, M.W. (2000). Instant Notes in Immunology, Viva Books Pvt. Ltd., New Delhi.

Syllabus for Immunology Practicals

Title: IMMUNOLOGY

2HPW-credits-1

1. Determination of blood grouping and RH typing
2. Total count of RBC and WBC
3. Differential count of blood leucocytes
4. Estimation of blood Haemoglobin
5. WIDAL test for typhoid (slide test)
6. VDRL test for syphilis (slide test)
7. Ouchterlony double diffusion test
8. Separation of serum and plasma

References

1. Dr. Chand Pasha & Dr. P. Muthenna (2018) Text Book of Immunology. KEDAR NATH RAM NATH (KNRN) Publishers, MEERUT, U.P, INDIA
2. Talwar, G.P. and Gupta, S.K. (1992). A Hand Book of Practical and Clinical Immunology. CBS Publications, New Delhi.
3. Baren, E.J. (1994). Bailey and Scott's Diagnostic Microbiology, 9th Edition, Mosby Publishers.
4. Dubey, R.C. and Maheswari, D.K. (2002). Practical Microbiology, S. Chand & Co., New Delhi.13
5. Samuel, K.M. (Ed.) (1989). Notes on Clinical Lab Techniques, M.K.G. Iyyer & Son Publishers, Chennai.
6. Wadher, B.J. and Reddy, G.L.B. (1995). Manual of Diagnostic Microbiology, Himalaya Publishing House, Mumbai.
7. Dey, N.C., Dey, T.K., Dey, M. and Sinha, D. (1998). Practical Microbiology, Protozoology, and Parasitology. New Central Book Agency (P) Ltd. Calcutta.
8. Mukherjee, K.L. (1996). Medical Laboratory Technology. Vol II. Tata Mc GrawHill Publishing Co. Ltd., New Delhi.
9. Gopal Reddy, M., Reddy, M.N., Saigopal, DVR and Mallaiah, K.V. (2007). Laboratory Experiments in Microbiology, 2nd edition. Himalaya Publishing House, Mumbai.

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DISCIPLINE SPECIFIC ELECTIVE-(DSE-1E) - B
B.Sc III year: 5th semester
THEORY

Title: PHARMACEUTICAL MICROBIOLOGY

3 HPW-credits-3

UNIT-I

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-II

History of chemotherapy – plants and arsenicals as therapeutics, Paul Ehrlich and his contributions, selective toxicity and target sites of drug action in microbes. Over view of development of synthetic drugs. Antibiotics-The origin, development and definition of antibiotics as drugs, types of antibiotics and their classification.

UNIT-III

Mode of action of important drugs:

Cell wall inhibitors (Betalactam-eg. Penicillin)

Membrane inhibitors (polymyxins)

DNA Replication Inhibitors (Nalidixic acid) and Transcription Inhibitors (Rifamycin)

Macromolecular synthesis inhibitors (streptomycin)

Antifungal antibiotics (nystatin).

UNIT-IV

Anti-Microbial Assays:

Assay for growth inhibiting substance

Assay for non-medicinal antimicrobials (Phenol coefficient/RWC)

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. Thomas. D. Brock, the Biology of Microorganisms, Pearson education.
2. T. J. Franklin and G. A. Snow. Biochemistry and molecular Biology of antimicrobial agents, Springers.
3. Dr. Chand Pasha and Dr. P. Muthenna (2018) Text book of Pharmaceutical Microbiology KEDAR NATH RAM NATH (KNRN) Publishers, MEERUT, U.P, INDIA

Syllabus for B.Sc Microbiology B.Sc III year: 5th semester PRACTICALS

Title: PHARMACEUTICAL MICROBIOLOGY

2HPW-credits-1

1. Tests for disinfectants (Phenol coefficient)
2. Determination of antibacterial spectrum of drugs/antibiotics Chemical assays for antimicrobial drugs
3. Testing for antibiotic/drug sensitivity/resistance.
4. Determination of MIC value for antimicrobial chemicals
5. Microbiological assays for antibiotics (Liquid tube assay, agar tube assay, agar well assays)

References

1. Thomas. D. Brock, the Biology of Microorganisms, Pearson education.
2. T. J. Franklin and G. A. Snow. Biochemistry and molecular Biology of antimicrobial agents, Springers.
3. Dr. Chand Pasha and Dr. P. Muthenna (2018) Text book of Pharmaceutical Microbiology KEDAR NATH RAM NATH (KNRN) Publishers, MEERUT, U.P, INDIA

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With effect from 2016-17
Syllabus for B.Sc Microbiology:
DISCIPLINE SPECIFIC Course-Core-DSC-1F
B.Sc III year: 6th semester

Title: MEDICAL MICROBIOLOGY

3HPW-credits-3

UNIT-I INTRODUCTION TO MEDICAL MICROBIOLOGY

History of medical Microbiology. Normal flora of human body. Definition of infection. Non-specific defense mechanism- Mechanical barriers. Antibacterial substance- Lysozyme, Complement, Properdin, Antiviral substances, Phagocytosis. Host pathogen interactions. Bacterial toxins, Virulence and Attenuation.

UNIT-II DIAGNOSTIC AND THERAPEUTICAL MICROBIOLOGY

General principles of diagnostic microbiology. Collections, transport & processing of clinical samples. General methods of lab diagnosis-cultural, biochemical, serological & molecular methods. Test for antimicrobial susceptibility. Elements of chemotherapy-Therapeutic drugs, Mode of action of Penicillin & sulpha drugs & their clinical use. Drug resistance. Antiviral agents- Interferon, Base analogues. Preventive control of diseases- active & passive immunization.

UNIT-III MEDICAL BACTERIOLOGY

General account of following diseases, casual organisms, pathogenesis, epidemiology, diagnosis, prevention & control Air born diseases-Tuberculosis. Food & water born diseases- Cholera, Typhoid. Contact diseases- Syphilis, Gonorrhoea. General account of Nosocomial infections. Zoonotic diseases - Anthrax.

UNIT-IV MEDICAL VIROLOGY AND PARASITOLOGY

General account of following diseases, casual organisms, pathogenesis, epidemiology, diagnosis, prevention & control of Air born diseases- Influenza. Food & water born diseases- Hepatitis-A, Poliomyelitis, Amoebiasis. Insect born diseases-Malaria, Filariasis, Dengue fever. Zoonotic diseases -Rabies. Blood born diseases- Serum hepatitis, AIDS.

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.

3. Annadurai, B. (2008). A Textbook of Immunology and Immunotechnology. S. Chand & Co. Ltd., New Delhi.
4. Dey, N., T.K. and Sinha, D. (1999). Medical Bacteriology Including Medical Mycology and AIDS. New Central Book Agency (P) Ltd. Calcutta, India.
5. Shetty, N. (1994). Immunology – Introductory Textbook. New Age International Pvt. Ltd., New Delhi.
6. Singh, R.P. (2007). Immunology and Medical Microbiology. Kalyani Publishers, New Delhi.

PRACTICALS

Title: MEDICAL MICROBIOLOGY

2 HPW-credits-1

1. Biochemical tests for identification members of Enterobacteriaceae
2. IMVIC test
3. Oxidase test.
4. Catalase test.
5. Study of medically important microorganisms- E. coli, Klebsiella, Staphylococcus, Pseudomonas.
6. Test for disinfectant (Phenol coefficient)
7. Antibiotic sensitivity testing – Disc diffusion method
- 8. Slides**
 - Mycobacterium
 - Candida albicans
 - Entamoeba histolytica
 - Plasmodium

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.
3. Annadurai, B. (2008). A Textbook of Immunology and Immunotechnology. S. Chand & Co. Ltd., New Delhi.
4. Dey, N., T.K. and Sinha, D. (1999). Medical Bacteriology Including Medical Mycology and AIDS. New Central Book Agency (P) Ltd. Calcutta, India.
5. Shetty, N. (1994). Immunology-Introductory Textbook. New Age International Pvt. Ltd., New Delhi.

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Syllabus for B.Sc Microbiology:
DISCIPLINE SPECIFIC ELECTIVE-DSE-1F-A
B.Sc III year: 6th semester

Title: FOOD MICROBIOLOGY

3 HPW-credits-3

UNIT-I

Microorganisms of food materials and their sources. Spoilage of different food materials (Fruits, vegetables, Meat, Fish and Canned foods). Food born diseases (Salmonellosis & Shigellosis) and their detection.

UNIT-II

Microbiological production of fermented foods- Bread, Cheese, Yoghurt. Biochemical activities of microbes in milk. Microorganisms as food – SCP, Edible mushrooms (white button oyster, Paddy straw). Concepts of Probiotics.

Unit-III

Methods of Food preservation, food poisoning (Staphylococci, C. botulinum)
Food intoxication.

UNIT-IV

Microbiology of potable and polluted water, E. coli and streptococcus of water pollution
Sanitation of potable water. Sewage treatment (primary, secondary and tertiary)
Solid waste disposal-sanitary landfills composting
Outline of biodegradation of environmental pollution –pesticides

References

1. Doyle, M.P., Beuchat, L.R. and Montville, T.J. (1997). Food Microbiology: Fundamentals and Frontiers. ASM Press, Washington D.C., USA.
2. Frazier, W.C. and Westhoff, D.C. (1988). Food Microbiology, Mc Graw-Hill, New York.
3. Jay, J.M. (1996). Modern Food Microbiology, Chapman and Hall, New York.
4. Ray, B. (1996). Fundamentals of Food Microbiology, CRC Press, USA.

PRACTICALS

Title: FOOD MICROBIOLOGY

2HPW-credits-1

1. Isolation of microorganisms by crowded plate technique
2. Isolation of Amylase producing organisms
3. Isolation of microorganisms in air by petri plate exposure method
4. Determination of microbiological quality of milk by MBRT method
5. Isolation of fungi & bacteria from spoiled fruits & vegetables
6. Microbiological examination of water by coliform test
7. Determination of biological oxygen demand
8. Spoiled foods-bacterial soft rot, bread & bakery products, milk & milk products, eggs, meat and meat products, canned foods, cheese, yoghurt.
9. Bacterial slides:
Escherichia coli, Bacillus, Lactobacillus, Azospirillum, Azotobacter, Rhizobium, Yeast, Rhizopus, Penicillium

References

1. Doyle, M.P., Beuchat, L.R. and Montville, T.J. (1997). Food Microbiology: Fundamentals and Frontiers. ASM Press, Washington D.C., USA.
2. Frazier, W.C. and Westhoff, D.C. (1988). Food Microbiology, Mc Graw-Hill, New York.
3. Jay, J.M. (1996). Modern Food Microbiology, Chapman and Hall, New York.
4. Ray, B. (1996). Fundamentals of Food Microbiology, CRC Press, USA.

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Syllabus for B.Sc Microbiology:
DISCIPLINE SPECIFIC ELECTIVE- DSE-1F-B
B.Sc III year: 6th 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 fermenter,

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 (pencillin), Aminoacids (glutamic acid), Organic acid (citric acid.) VitaminB12, Biofuels (biogas-methane).

References

1. Patel, A.H. (1984). Industrial Microbiology, Mac Milan India Ltd., Hyderabad.
2. Cassida, L.E. (1968). Industrial Microbiology, Wiley Eastern Ltd. & New Age International
3. Crueger, W. and Crueger, A. (2000). A Text Book of Industrial Microbiology, Panima Publishing Corporation, New Delhi
4. Prescott & Dunn's Industrial Microbiology, 4th Edition, CBS Publishers & Distributors, New Delhi.

Practicals

Title: INDUSTRIAL MICROBIOLOGY

2HPW-credits-1

1. Screening for amylase producing microorganisms
2. Screening for organic acid producing microorganisms
3. Production and Estimation of Ethanol by potassium dichromate method.
4. Production and Estimation of Citric acid by titrimetric method.
5. Estimation of streptomycin.
6. Bacterial slides- Bacillus, Lactobacillus, Yeast, Aspergillus, Penicillium

References

6. Singh, R.P. (2007). Applied Microbiology. Kalyani Publishers, New Delhi.
7. Demain, A.L. and Davies, J.E. (1999). Manual of Industrial Microbiology and Biotechnology, ASM Press, Washington, D.C., USA.