

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMY-DSC01

CORE-I: GENERAL MICROBIOLOGY & MICROBIAL PHYSIOLOGY

Instr.Hrs.: 6
Credits : 4

Year : I
Semester: I

Learning Outcomes:

1. Understand the developments in Microbiology and list the contributions of various scientists.
2. Illustrate the structure and function of Microbial cells. Utilize the principles and applications of different types of Microscope. Apply various staining procedures for visualising microorganisms under the microscope.
3. Analyse the nutritional requirement of microorganisms and their cultivation techniques under laboratory conditions. Assess the implication of various sterilisation procedures and bio safety measures in clinical labs and industries.
4. Assess various metabolic pathways occurring in microorganisms and their significance.
5. Acquire knowledge about antibiotics and mode of action.

Course content:

UNIT I:

History of Microbiology- Contributions of Scientists - Anton Von Leeuwenhoek, Louis Pasteur, Robert Koch, Edward Jenner, Alexander Flemming, Joseph Lister. Spontaneous generation Vs Biogenesis hypothesis - Germ theory of diseases- Koch postulates. Classification of Microorganisms - Three Kingdom, Whittaker's Five Kingdom and Eight kingdom. General characteristics of a cellular microorganisms - (Viruses, Viroids, Prions) and cellular microorganisms (Bacteria, algae, fungi and protozoa), Differences between prokaryotic and eukaryotic microorganisms.

UNIT II:

Microscopy: Light Microscopy - Simple, Compound, Dark field, Phase Contrast, Fluorescence and Electron Microscopy – SEM, TEM. Staining methods–Principles of staining, simple staining, negative staining, differential staining, Gram and Acid Fast Staining, flagella staining, capsule and endospore staining.

UNIT III:

Culture media and pure culture techniques- Streak plate, Pour plate and Spread plate methods. Anaerobic culture – Anaerobic Jar.Methods of Sterilization- Physical Methods - Mode of Action and Applications of Heat- Dry and Moist, Pasteurization and Tyndallisation, Chemical Methods - Mode of action and applications - Alcohol, Halogen, Heavy Metals, Phenol and Phenol derivatives, Formaldehydes. Methods of bacterial identification- morphological and biochemical properties.

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

UNIT IV:

Nutrition and Growth of Bacteria - Photoautotrophs, Photoorganotrophs, Chemolithotrophs (Ammonia, Nitrite, Sulfur, Hydrogen, Iron oxidizing Bacteria), Chemoorganotrophs. Nutrition transport mechanisms – Passive diffusion and Active transport. Culture media - Types. Bacterial Growth, Generation time and Growth Curve.

UNIT V:

An overview of Metabolism - Embden Meyerhof Pathway, Entner-Doudoroff Pathway, Pentose Phosphate Pathway, Tricarboxylic Acid Cycle. Electron Transport Chain and Oxidative Phosphorylation. ATP synthesis. Fermentation-Homolactic Fermentation, Heterolactic Fermentation, Mixed Acid Fermentation, Butanediol Fermentation. Photosynthesis - An Overview of chloroplast structure. Photosynthetic Pigments, Light Reaction-Cyclic and non-cyclic Photophosphorylation. Dark Reaction - Calvin Cycle.

References:

1. Pelczar M.J., Chan E.C.S. and Kreig. N.R.(2007). Microbiology 7thedn, McGraw-Hill New York
2. Prescott L.M, Harley J.P and Klein D.A. (2013). Microbiology 9thedn, McGraw-Hill Publications
3. A.J.Salle, (1984). Fundamental Principles of Bacteriology, 7thedn, Tata McGraw-Hill Publications Ltd.
4. Stainer R.Y, Ingharam, Wheelis M.L. Painter (2010). General Microbiology, 5thedn Edition, MacMillan Press Ltd.
5. Tortora, G.J., Funke, B.R., Case, C.L (2013). Microbiology-An Introduction- 11thedn.
6. Madigan M.T., Martinko J.M, Parker J. (2005). Brock - Biology of Microorganisms, 11thedn, Pearson Prentice Hall International, Inc.
7. Nester E.W, Anderson D.G (2004). Microbiology-A Human Perspective, 4thedn McGraw Hill Publications.
8. Atlas.R (1997). Principles of Microbiology, 2ndedn, Wm.C.Brown publishers.
9. Lim D. (1998). Microbiology, 2ndedn, WCB McGraw Hill Publications.
10. Wheelis M, (2010). Principles of Modern Microbiology, 1stedn. Jones and Bartlett Publication.

Web Resources:

1. <https://www.cliffsnotes.com/studyguides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology>
2. <https://courses.lumenlearning.com/microbiology/chapter/staining-microscopic-specimens/>
3. <https://www.cdc.gov/infectioncontrol/guidelines/disinfection/sterilization/index.html>
4. <https://www.britannica.com/science/bacteria/Growth-of-bacterial-populations>
5. <http://www.preservearticles.com/biology/what-are-the-methods-of-measuring-microbial-growth/28473>
6. <https://www.sciencedirect.com/topics/neuroscience/metabolic-pathway>

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMY-DSC02

CORE-II: MAJOR PRACTICAL-I

GENERAL MICROBIOLOGY AND MICROBIAL PHYSIOLOGY

Instr.Hrs.: 3

Year : I

Credits : 4

Semester: I

Learning outcomes:

1. Learn the concept of sterilization processes and apply them in sterilization of different media.
2. Acquire skills to isolate an organism using different technique and to know various Culture media and their applications.
3. Attain the practical skills in microscopy and their handling techniques and staining procedures.
4. Studying the comparative characteristics of eukaryotes. To evaluate antibiotic sensitivity pattern using different methods.
5. Identification of pathogens by standard techniques and methods of culturing preservation and maintenance of microorganisms

Course content:

UNIT I:

Cleaning of glass wares Sterilization principle and methods- moist heat- dry heat and filtration methods. Media preparation: liquid media, solid media, agar slants, agar plates, basal, enriched, selective media preparation- quality control of media, growth supporting properties, sterility check of media.

UNIT-II:

Pure culture techniques: streak plate, pour plate, decimal dilution. Culture characteristics of microorganisms: growth on different media, growth characteristics and description. Demonstration of pigment production.

UNIT-III:

Microscopy: light microscopy and bright field microscopy. Motility demonstration: hanging drop, wet mount preparation, dark field microscopy, semi solid agar, Craigie's tube method. Staining techniques: smear preparation, simple staining, Gram's staining and Acid fast staining.

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

UNIT-IV:

Morphology of microorganisms: morphological variations in algae, morphology of fungi, slide culture technique. Antibiotic sensitivity testing: Disc diffusion test with standard strains. Micrometry: Demonstration of size of yeast and fungal filaments.

UNIT-V:

Physiology characteristics: IMViC test, H₂S, Oxidase, catalase, urease test. Carbohydrate fermentation test, maintenance of pure culture, paraffin method, stab culture, maintenance of mold culture.

References:

1. Prescott, M.J., Harley, J.P. and Klein, D.A. Microbiology. 5th Edition WCB McGraw Hill, New York, (2002).
2. Tortora, G.J., Funke, B.R. and Case, C.L. Microbiology: An Introduction. Pearson Education, Singapore,(2004).
3. Alcom, I.E. Fundamentals of Microbiology. VI Edition, Jones and Bartlett Publishers. Sudbury. Massachusetts,(2001).
4. Black J.G. Microbiology-Principles and Explorations. John Wiley & Sons Inc. New York, (2002).
5. Pelczar, MJ Chan ECS and Krieg NR, Microbiology McGraw-Hill.
6. Willey, Sherwood, Woolverton. Prescott, Harley, and Klein's Microbiology McGraw-Hill publication
7. Tortora, Funke, Case. Microbiology. Pearson Benjamin Cummings.
8. JACQUELYN G. BLACK. Microbiology Principles and explorations. JOHN WILEY & SONS, INC.
9. Madigan, Martinko, Bender, Buckley, Stahl. Brock Biology of Microorganisms. Pearson
10. Tom Besty, D.C Jim Koegh. Microbiology Demystified McGRAW-HILL.

Web Resources:

1. <https://www.cliffsnotes.com/studyguides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology>
2. <https://courses.lumenlearning.com/microbiology/chapter/staining-microscopic-specimens/>
3. <https://www.cdc.gov/infectioncontrol/guidelines/disinfection/sterilization/index.html>
4. <https://www.britannica.com/science/bacteria/Growth-of-bacterial-populations>
5. <http://www.preservearticles.com/biology/what-are-the-methods-of-measuring-microbial-growth/28473>
6. <https://www.sciencedirect.com/topics/neuroscience/metabolic-pathway>

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMY-DSC03

CORE-III: BASIC AND APPLIED IMMUNOLOGY

Instr.Hrs.: 6
Credits : 4

Year : I
Semester: II

Learning outcomes:

1. Understanding the key concepts in immunology and overall organization of the immune system.
2. Understanding the structure of antigen and antibody.
3. Comprehend the salient features of antigen antibody reaction & its uses in diagnostics and various other studies.
4. Illustratively assess hypersensitivity and auto immune disorders.
5. Analyze graft rejection in transplantation by learning the MHC molecules and their functions. • Learn about immunization and their preparation and its importance

Course content:

UNIT I:

Introduction - History, Scope of Immunology and Recent developments. Cells of Immune System. Hematopoiesis. Mononuclear - Phagocytic System. Lymphoid Organs. Primary - Thymus, Bone Marrow, and Bursa of Fabricius, Secondary - Lymph Node and Spleen. Tertiary - CALT, GALT and MALT. Innate and Acquired immunity. Humoral & Cell mediated immunity. Mechanism of immune response.

UNIT II:

Antigen - Types, Properties and Function. Haptens, Adjuvants. Antibody: Structure, and Types of antibody, Theories of Antibody formation. Monoclonal antibody. Complement pathways- Classical and Alternative pathways.

UNIT III:

Antigen - Antibody reaction- Immunohematology-ABO, In vitro methods: precipitation reactions, agglutination, Immunofluorescence, ELISA and RIA. *In vivo* methods: skin tests - Mantoux test.

UNIT IV:

Hypersensitivity - Introduction to Hypersensitivity Reactions. Type I - Mechanism, Primary Mediators, Secondary Mediators, Symptoms and test for Type I Hypersensitivity. Type II - Mechanism and Symptoms. Type III- Mechanism and Diseases - Serum sickness, Arthus

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

reaction. Type IV- Mechanisms& types - Tuberculin. Autoimmune disorders - Rheumatoid Arthritis and SLE.

UNIT V:

Major Histocompatibility complex (MHC) - Introduction, MHC types and pathways, Applications of MHC, Graft rejection. Transplantation Immunology. Vaccines – Types- Live, Attenuated, Sub-unit and Recombinant Vaccines, Immunization schedule. Cancer immunology- Malignant tumors (leukemias and lymphomas).

References:

1. Roitt R.I. (2005). Essential Immunology. 10th edn. Blackwell Scientific Publishers.
2. Tizard, R and Isaunders. (2010). Immunology- An Introduction. 4th edn. College Publishing, Philadelphia.
3. Nairn, R., and Helbert, M. (2005). Immunology for Medical Students. 2nd edn. Mosby International limited.
4. Pelczar M.J., Chan E.C.S. and Kreig N.R. (2007) Microbiology 7th edn, McGraw-Hill New York
5. Ananthanarayan and Jayaram Panicker. (2009). Textbook of Microbiology 8th edn Orient Longman.
6. Kubly, J. (2007). Immunology. 2nd edn. H.W. Freeman and company. New York.
7. Janeway C, Travers P, Walport M, Shlomchik M. (2001). Immunobiology. 6th edn, Garland Science.
8. Stites D.P., Abba I. Terr, Parslow T.G. (1997). Medical Immunology. 9th edn. Prentice-Hall Inc. 1997.
9. Davis, B.D., Dulbecco, R., Eisen, H.N and Ginsberg. 1980. Microbiology, Immunology and Molecular Genetics, 3rd Edt., Harper and Row, Philadelphia.
10. Stanier, Y. Roger, John L. Ingrahm, Mark L. Wheelis and Page R. Painter. 2003. General Microbiology. V Ed. MacMillan Press Ltd. New Jersey. pp: 585- 620.

Web Resources:

1. <https://www.mechanobio.info/development>
2. <https://www.cell.com/trends/immunology>
3. <https://microbiologybook.org/mayer/ab-ag-rx.htm>
4. https://www.ebi.ac.uk/interpro/potm/2005_2/Page2.htm
5. <http://www.immunopaedia.org.za/immunology/archive/type-i-iv-hypersensitivity-reactions/immune-complex-formation/hypersensitivity-reactions/?print=print>

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMY-DSC04

CORE-IV: MAJOR PRACTICALS II -BASIC AND APPLIED IMMUNOLOGY

Instr.Hrs.: 3

Year : I

Credits : 4

Semester: II

Learning outcome:

1. Demonstrate detailed knowledge and understanding of immunology and the way it is applied in diagnostic and therapeutic techniques and research;
2. Demonstrate knowledge and practical skills in undertaking simple immunological experiments that mimic those undertaken in diagnostic laboratories and research laboratories;
3. Demonstrate literature review skills in undertaking a large survey of a complex field within immunology, synthesis the information from primary medical literature;
4. Coherently to write a report in the appropriate language of the field.
5. Articulate and adhere to safe working practice in a mixed microbiology/immunology laboratory.

Course content:

UNIT-I

Blood groups and typing.Precipitation reaction in Gel-Outchelony double diffusion, Single Radial Immunodiffusion.VDRL, RPR.

UNIT-II

Complement fixation test.Titration of amboceptor and complement (demonstration only).Immunofluorescence, (Demonstration only), ELISA

UNIT-III

Isolation of Buffy coat, using heparin lymphocytes (T cells, B cells), Enumeration of different cell types, Peripheral blood cell counts, absolute cell counts.

UNIT-IV

Antibody productions in rabbits against sheep RBC and its titration (Demonstration).Anaphylactic reactions in guinea pigs.Arthus reaction in rabbits, (Demonstration).

UNIT-V

Skin tests, both immediate and delayed hypersensitivity reactions to egg proteins, bacterial, fungal antigens. (Demonstration)

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

References:

1. Roitt R.I. (2005). Essential Immunology. 10th edn. Blackwell Scientific Publishers.
2. Tizard, R and Isaunders. (2010). Immunology-An Introduction. 4th edn. College Publishing, Philadelphia.
3. Nairn, R., and Helbert, M. (2005). Immunology for Medical Students. 2nd edn. Mosby International limited.
4. Pelczar M.J., Chan E.C.S. and Kreig N.R. (2007) Microbiology 7th edn, McGraw- Hill New York
5. Ananthanarayan and Jayaram Panicker. (2009). Textbook of Microbiology 8th edn Orient Longman.
6. Kubly, J. (2007). Immunology. 2nd edn. H.W. Freeman and company. New York.
7. Janeway C, Travers P, Walport M, Shlomchik M. (2001). Immunobiology. 6th edn, Garland Science.
8. Stites D.P., Abba I. Terr, Parslow T.G. (1997). Medical Immunology. 9th edn. Prentice- Hall Inc. 1997.
9. Davis, B.D., Dulbecco, R., Eisen, H.N and Ginsberg. 1980. Microbiology, Immunology and Molecular Genetics, 3rd Ed., Harper and Row, Philadelphia.
10. Stanier, Y. Roger, John L. Ingrahm, Mark L. Wheelis and Page R. Painter. 2003. General Microbiology. V Ed. MacMillan Press Ltd. New Jersey. pp: 585- 620.

Web Resources:

1. <https://www.mechanobio.info> › Development
2. <https://www.cell.com> › trends › immunology
3. <https://microbiologybook.org/mayer/ab-ag-rx.htm>
4. https://www.ebi.ac.uk/interpro/potm/2005_2/Page2.htm
5. <http://www.immunopaedia.org.za/immunology/archive/type-i-iv-hypersensitivity-reactions/immune-complex-formation/hypersensitivity-reactions/?print=print>

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMY-DSC05

CORE-V: MOLECULAR BIOLOGY

Instr.Hrs.: 6
Credits : 4

Year : II
Semester: III

Learning Outcomes:

1. Understand the chemical components of DNA and various forms of DNA. Know about the organization of prokaryotic and eukaryotic genome.
2. Understand the DNA replication, repair and recombination in prokaryotes with that of eukaryotes.
3. To know about RNA synthesis and processing and function of different types of RNA.
4. To know about protein synthesis and inhibition factors of protein synthesis.
5. To Understand prokaryotic and eukaryotic gene expression and control of gene expression.

Course Content:

UNIT I

Primary Structure of Nucleic Acids, ABZs of DNA Secondary Structure, Denaturation and Renaturation of DNA, Supercoils and Cruciforms: Tertiary Structure in DNA. Ribonucleic Acid, types of RNA and Secondary and Tertiary Structure of RNA.

UNIT II

Prokaryotic replication- model of replication - semiconservative mode of replication- replication forks, semi-discontinuous replication, Okazaki fragments. Bacteriophages M13 and Φ X174 replication, rolling circle model of replication. Enzymology of replication- role of DNA polymerases I, II, III, gyrase, topoisomerases, helicase, ligases and SSB proteins. Theta replication in *E.Coli*- initiation events at Ori C, elongation events on the replication fork and termination - fidelity of replication -inhibition of replication.

UNIT III

Transcription- prokaryotic RNA polymerases - role of sigma factor. TATA box, promoter, closed and open promoter complexes- initiation, elongation and termination of transcription, post transcriptional modifications in prokaryotes (tRNA and rRNA). Inhibitors of transcription.

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

UNIT IV

Protein synthesis: Ribosome, formation of initiation complex, initiation factors and their regulation, elongation and elongation factors, termination, inhibition factors of protein synthesis, genetic code, aminoacylation of tRNA,

UNIT V

Regulation of activity of Genes and Gene products in Prokaryotes: The lactose system and the operon model, The Galactose operon, The Arabinose operon, The Tryptophan operon, Regulation of Translation, Regulation of the synthesis of Ribosomes, Feedback Inhibition.

References:

1. Brown, T.A. (1999). Gene Cloning. 3rd edition. Chapman and Hall Publications,U.S.A.
2. Burrell, M.M. (1993). Enzymes of Molecular Biology, Humana Press.
3. Chirikjian, J.G. (1995). Biotechnology – Theory and Techniques, Vol. II, Jones and Burtlett Publishers.
4. Lewin, B. (2000). Genes VII. Oxford University Press, Oxford.
5. Antony, J.F., Griffiths, Gilbert, W.M., Lewontin, R.C. and Miller, J.H. (2002). Modern genetic analysis, Integrating Genes and Genomes, 2nd edition, WH Freeman and Company, New York.
6. Blackburn, G.M. and Gait, M.J. (1996). Nucleic acids in chemistry and biology. Oxford University Press.
7. Bruce Alberts, Dennis Brag, Julian Lewis, Martin Raff, Keith Roberts, James D. Watson. (1994). Molecular Biology of cell. Garland Publishing Inc.
8. Hames, B.D. and Rickwood, D. (1990). Gel Electrophoresis – A Practical Approach, Oxford University Press, New York.
9. Sambrook, J and Russell, D.W. (2001). Molecular Cloning – A Laboratory Manual, 3rd Edition, Vol I, II, III, Cold Spring Harbour Laboratory Press, New York.
10. Westermeier, R. (1993). Electrophoresis in Practice, VCH, Federal Republic of Germany.

Web Resources:

1. <http://bbruner.org/107net99.htm>
2. <https://www.sciencedaily.com/>
3. <https://www.biozone.co.nz/>
4. <https://www.web-books.com/MoBio/>
5. <http://www.cellbiol.com/>
6. <https://www.biozone.co.nz/biolinks/cell-biology/>

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMY-DSC06

CORE-VI: MAJOR PRACTICAL III - MOLECULAR BIOLOGY

Instr.Hrs.: 3
Credits : 4

Year : II
Semester: III

Learning Outcomes:

1. Learn to estimate DNA and RNA.
2. Learn to isolate Plasmid, Genomic and Chromosomal DNA.
3. Learn to isolate RNA and antibiotic resistant mutants.
4. Acquire Knowledge in Preparation of competent cells.
5. Acquire Knowledge in Transformation of *E. coli*.

UNIT I

Estimation of DNA by diphenylamine method. Estimation of RNA by rcinol method.

UNIT II

Isolation of Plasmid DNA by Alkalysis method. Isolation of genomic DNA from prokaryotes. Isolation of Chromosomal DNA from Eukaryotic cells. Eg. Leaves, .

UNIT III

Isolation of RNA from yeast.
Isolation of antibiotic resistant mutants.

UNIT IV

Preparation of competent cells.

UNIT V

Transformation of *E.coli*.

References:

1. Brown, T.A. (1999). Gene Cloning. 3rd edition. Chapman and Hall Publications, U.S.A.
2. Burrell, M.M. (1993). Enzymes of Molecular Biology, Humana Press.
3. Chirikjian, J.G. (1995). Biotechnology – Theory and Techniques, Vol. II, Jones and Burtlett Publishers.
4. Lewin, B. (2000). Genes VII. Oxford University Press, Oxford.
5. Antony, J.F., Griffiths, Gilbert, W.M., Lewontin, R.C. and Miller, J.H. (2002). Modern genetic analysis, Integrating Genes and Genomes, 2nd edition, WH Freeman and Company, New York.
6. Blackburn, G.M. and Gait, M.J. (1996). Nucleic acids in chemistry and biology. Oxford University Press.
7. Bruce Alberts, Dennis Brag, Julian Lewis, Martin Raff, Keith Roberts, James D. Watson. (1994). Molecular Biology of cell. Garland Publishing Inc.
8. Hames, B.D. and Rickwood, D. (1990). Gel Electrophoresis – A Practical Approach, Oxford University Press, New York.

Web Resources:

1. <http://bbruner.org/107net99.htm>
2. <https://www.sciencedaily.com/>
3. <https://www.biozone.co.nz/>
4. <https://www.web-books.com/MoBio/>
5. <http://www.cellbiol.com/>
6. <https://www.biozone.co.nz/biolinks/cell-biology/>

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMY-DSC07

CORE-VII: SOIL AND AGRICULTURAL MICROBIOLOGY

Instr.Hrs.: 6
Credits : 4

Year : II
Semester: IV

Learning Outcome:

1. Upon successful completion of this course, the student should be able to understand types, structure, formation and microbial flora of soil.
2. Understand the role soil microflora in biogeochemical cycle in the environments.
3. Know about the mechanism and responsibility of microbial interaction with microbes, plant, animal and insects.
4. Be familiar with the role of microorganism in nitrogen fixation and know about the types and mode of action of biopesticides.
5. Know about defense mechanism, etiology, epidemiology and management various plant diseases caused by microorganisms.

Course content:

UNIT I

Soil microbiology - quantitative and qualitative micro flora of different soils-role of microbes in soil fertility-tests for soil fertility - soil structure, soil formation - characterization of soil types and importance.

UNIT II

Biogeochemical cycles-role of micro organisms in carbon, phosphorus, sulphur and iron cycles. Methods of studying ecology of soil micro organisms-microbial gas metabolism-carbon dioxide, hydrogen, and methane and hydrogen sulphide.

UNIT III

Microbial interactions between microorganisms, plant and soil. Rhizoplane, rhizosphere, phyllosphere, spermosphere, mycorrhizae. Microbial association with insects-gut micro flora - symbiosis between microbes and insects; organic matter decomposition.

UNIT IV

Nitrogen cycle; ammonification- nitrification- de-nitrification- nitrogen fixation- Bio-fertilizers (bacterial, cyanobacteria and azolla), mycorrhiza and its types and crop response- bio-pesticides (bacterial, viral and fungal) saprophytes for pathogen suppression.

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

UNIT V

Principles of plant infection and defense mechanisms. Symptoms, Etiology, Epidemiology and Management of the following plant diseases: Bacterial disease – Citrus canker, blight of paddy, Fungal disease- Red rot of sugarcane, Black stem rust of wheat, Tikka leaf spot, Wilt of cotton, Viral Disease – TMV, Vein clearing disease.

References:

1. Subbarao N.S. (2017) Soil Microbiology, 5th edition, Medtechpublisher.
2. Hakeem K.R, AkhtarM.S.,Abdullah S.N.A, (2016) Plant, Soil and Microbes, Volume 1: Implications in Crop Science, Springer.
3. Paul E.A (2014) Soil Microbiology, Ecology and Biochemistry, 4th edition, AcademicPress.
4. Pareek R.P (2018) Agricultural Microbiology, Scientific PublishersIndia.
5. Rangaswami G (1992) Agricultural Microbiology, 2nd edition, Prentice Hall India Learning Private Limited.
6. Trivedi P.C. (2010) Agricultural Microbiology, PointerPublishers.
7. Alef K, Nannipieri P (1995) Methods in Applied Soil Microbiology and Biochemistry, Academic Press.
8. Subbarao N.S. (2017). Advance in Agriculture Microbiology, MedtechPublisher.
9. Subbarao N.S. (2018) Soil Microbiology : Soil Microorganisms & Plant Growth, Oxford &Ibh Publishing Co PvtLtd.
10. Verma D.K, Srivastav P.P (2017) Microorganisms in Sustainable Agriculture, Food, and the Environment. 1st edition Apple AcademicPress.
11. Subbarao N.S. (2017) Bio-fertilizers in Agriculture and Forestry Medtech Publisher.
12. Pandey, S.N. and Sinha, B.K (2005) Plant Physiology, 4th edition Vikas Publishing House, NewDelhi.

Web Resources:

1. <https://www.sciencedirect.com/topics/earth-and-planetary-sciences/biogeochemical-cycle>
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3588038/>
3. <https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/biofertilizer>
4. <https://www.nature.com/subjects/soil-microbiology>

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMY-DSC08

CORE-VIII: MAJOR PRACTICAL IV
SOIL AND AGRICULTURAL MICROBIOLOGY

Instr.Hrs.: 3

Credits : 4

Year : II

Semester: IV

Learning outcome:

1. By the end of the course, the student should be able to learn different methods for the isolation and identification soil microorganisms.
2. Understand the mechanisms and application of enzymes produced by soil microorganisms.
3. Know about the role and methods used for the isolation and identification of *Rhizobium* and *Azotobacter*.
4. Know about the application and methods used for isolation and identification of nitrogen fixing algae.
5. Understand the causes, symptoms, control and treatment of various plant diseases caused by microorganisms.

Course content:

UNIT I

Methods to study soil microorganisms - Isolation and enumeration of Bacteria, Fungi, Bacterio-phages, Algae, Protozoa etc., Microbiological test for fertility - Bacterial and Fungal

UNIT II

Microbiological demonstration of soil enzymes – Amylase, Protease, Lipase, Gelatinase etc.

UNIT III

Isolation and identification of root nodule bacteria- *Rhizobium*(symbiotic), demonstration of *Rhizobium* in the root nodule(CS of root nodule) Isolation and identification of *Azotobacter* (Asymbiotic).

UNIT IV

Isolation and identification of nitrogen fixing Cyanobacteria-*Anabaena*, *Nostoc* etc., Demonstration of *Azolla* Demonstration of antagonistic activity –bacterial and fungal.

UNIT V

Study of the following diseases: Tobacco mosaic; Bacterial blight of paddy; Downy mildew of bajra; Powdery mildew of cucurbits; Head smut of sorghum; Leaf rust of coffee; Leaf spot of paddy, Red rot of sugar cane, Root knot of mulberry.

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

References:

1. P. C. Trivedi (2010) Agricultural Microbiology, Pointer Publishers (January 1, 2010), ISBN-10:8171326153
2. Eldor A. Paul (2014) Soil Microbiology, Ecology and Biochemistry, Fourth Edition,
3. Atlas, R.M. and Bartha, R. (1992) Microbial Ecology: Fundamentals and Applications, 2nd Edn. The Benjamin / Cummings Publishing Co., Redwood City, CA.
4. Subba Rao, N.S. (1995) Soil Microorganisms and Plant Growth. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
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14. Mukherji, S. and Gosh, A.K. (2004) Plant Physiology .Tata McGraw Hill Publishers, New Delhi.
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1. <https://www.sciencedirect.com/topics/earth-and-planetary-sciences/biogeochemical-cycle>
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3588038/>
3. <https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/biofertilizer>
4. <https://www.nature.com/subjects/soil-microbiology>

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMY-DSC09

CORE-IX: MEDICAL BACTERIOLOGY

Instr.Hrs.: 6
Credits : 4

Year : III
Semester: V

Learning outcomes:

1. Knowledge of various techniques of sample collection, transport and processing for laboratory diagnosis of bacterial diseases.
2. Knowledge of basic and general concepts of causation of disease by the pathogenic microorganisms.
3. Information for the assessment of their severity including the broad categorization of the methods of diagnosis.
4. Insights to practical aspects of antibiotic sensitivity testing.
5. Knowledge of various zoonotic infections, ways to tackle them and use biosafety precautions.

Course Contents:

UNIT I

Classification and General Properties of medically important bacteria. Principles and specific procedures for the collection and transport of clinical samples from skin, respiratory tract (upper and lower), urinary tract, genital tract and blood.

UNIT II

Isolation of bacteria from clinical specimens: Primary media for the isolation of microorganisms, common staining procedures (Gram, Negative – Capsule, Acid fast and spore staining) and biochemical tests. Antimicrobial sensitivity testing by Kirby-Bauer disc diffusion method and determination of MIC by broth dilution method.

UNIT III

Morphology, cultural characteristics, pathogenicity, Laboratory diagnosis, prevention and treatment of diseases caused by the following organisms: *Staphylococcus aureus*, *Streptococcus pyogenes*, *Corynebacterium diphtheria*, *Mycobacterium tuberculosis* and *Mycobacterium leprae*.

UNIT IV

Vibrio cholera, *Haemophilus influenzae*, *Pseudomonas aeruginosa*, *Bordetella pertussis*, *Escherichia coli*, *Salmonella typhi*, *Shigella*, *Proteus*, *Klebsiella pneumonia*, *Neisseria meningitidis* and *Neisseria gonorrhoea*.

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

UNIT V

Bacillus anthracis, Brucella, Clostridium (perfringens, tetani, botulinum), Mycoplasma, Rickettsia rickettsii, Treponema Pallidum, Leptospira, Borrelia and Helicobacter pylori.

References:

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2. Topley and Wilson's. (1997), Bacterial Infections.9thedn. Edward Arnold,London.
3. Jawetz, E., Melnic, J.L. and Adelberg, E.A. (2000), Review of Medical Microbiology, 19thedn.Lange Medical Publications,U.S.A.
4. Williams and Wilkins, Holt. (1994), Bergey's Manual of Determinative Bacteriology, 9thedn. Baltimore,USA.
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6. Ananthanarayanan, R, &Panicker, C.K.J. (2005). Textbook of Microbiology- OrientLongman.
7. Greenwood, D., Slack, R.B., &Peutherer, J.F. (2002) Medical Microbiology 14thedn. Churchill LivingstonLondon.
8. Medical Microbiology. (2008) MIMS. 5thednElsevierLtd.
9. Ronald M. Atlas, Lawrence C. Paxis (1993) Hand book of Microbiological Media. Ed. LC. CRC Press,London.
10. Pelczar&Kreig (2006). Microbiology5th edition. Tata McGraw Hill, NewDelhi
11. Dubey RC and Maheswari DK (2005). A text book of Microbiology, Revised Multicolour edition, S.Chand Publishers, NewDelhi.
12. Purohit SS (2005). Microbiology - Fundamentals and Applications. Student EditionPublishers,Jodhpur.

Web Resources

1. [https://bio.libretexts.org/Bookshelves/Microbiology/Book%3AMicrobiology_\(OpenStax\)/15%3AMicrobial_Mechanisms_of_Pathogenicity/15.3%3AVirulence_Factors](https://bio.libretexts.org/Bookshelves/Microbiology/Book%3AMicrobiology_(OpenStax)/15%3AMicrobial_Mechanisms_of_Pathogenicity/15.3%3AVirulence_Factors)
2. https://www.healthcare.uiowa.edu/path_handbook/Appendix/Micro/micro_spec_collection.html
3. <http://www.textbookofbacteriology.net/>.
4. <https://www.msmanuals.com/en-in/home/infections/bacterial-infections-gram-negativebacteria/overview-of-gram-negative-bacteria>
5. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4196475/>

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMV-DSC10

CORE-X: MEDICAL MYCOLOGY AND PARASITOLOGY

Instr.Hrs.: 6
Credits : 4

Year : III
Semester: V

Learning outcomes:

1. Information for collection of different clinical samples, their transport, culture and examination by microscopy, staining and biochemical methods for the diagnosis of fungal and protozoan diseases.
2. Knowledge of basic and general concepts of causation of disease by the pathogenic microorganisms and the various parameters of assessment of their severity including the broad categorization of the methods of diagnosis.
3. Insights to treatment options of fungal and protozoan diseases.
4. Knowledge about the importance of protozoan in the intestine.
5. Knowledge of Nematodes as infectious agent.

Course Contents:

UNIT I

Morphology, Taxonomy, Reproduction, Classification of fungi. General characteristics of Zycomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes.

UNIT II

Superficial Mycoses- Pityriasis versicolor, Tinea nigra, Piedra. Cutaneous Mycoses- Dermatophytoses (Trichophyton, Epidermophyton and Microsporum). Subcutaneous Mycoses- Eumycotic mycetoma. Systemic Mycoses- Histoplasmosis. Opportunistic Mycoses- Candidiasis and Cryptococcosis.

UNIT III

Collection and transport of specimens. Isolation of fungi from clinical specimens: Methods for direct microscopic examination of specimens (KOH wet mount, KOH with calcofluor white, India ink, Tissue stains, LPCB stain, cellophane tape mount), culture technique- primary media, slide culture technique, germ tube test, Carbohydrate fermentation and assimilation test. Antifungal agents.

UNIT IV

General introduction to Medical Parasitology. Classification of medically important parasites. Morphology, life cycle, pathogenesis, clinical features, laboratory diagnosis, prevention and treatment of diseases caused by the following organisms: *Entamoeba (histolytica and coli)*,

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

flagellates (*Giardia lamblia*, *Leishmaniadonovani*), Sporozoa- *Plasmodium (malariae and falciparum)*.

UNIT V

Introduction to Helminths. Platyhelminthes: *Taenia (saginata and solium)*, *Schistosomahaematobium*, *Fasciola hepatica*, *Paragonimuswestermani*. Nematihelminthes: *Ascarislumbricoides*, *Enterobiusvermicularis*, *Wuchereriabancrofti*, *Dracunculusmedinensis*. Laboratory techniques in parasitology: Examination of faeces for ova and cyst by direct wet mount and iodine wet mount, concentration methods (Floatation and sedimentation techniques), Examination of blood for parasites. Cultivation of protozoanparasites.

References:

1. Alexopoulos CJ and C W. Mims. (1993).Introductory Mycology (3rd edition) WileyEastern Ltd,NewDelhi.
2. Elizabeth Moore-Landecker. (1996). Fundamentals of the fungi.(4th edition). PrenticeHall International, Inc,London
3. Jawetz, E., Melnic, J.L. and Adelberg, E.A. (2000) Review of Medical Microbiology, 19th Edn. Lange Medical Publications, U.S.A.
4. Ananthanarayan, R. and JeyaramPaniker, C.K. (1994) Text Book of Microbiology, 6th Edn. OrientLongman,Chennai.
5. JeyaramPaniker, C.K. (2006) Text Book of Parasitology. Jay Pee Brothers,NewDelhi.
6. Schmidt, G.D. and Roberts, L.S. (1981) Foundations of Parasitology, 2nd Edn, Mosby,St.Louis.
7. Finegold, S.M. (2000) Diagnostic Microbiology, 10th Edn. C.V. Mosby Company, St.Louis
8. JagadishChander (1996) A Text Book of Medical Mycology.Interprint,NewDelhi.
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10. Chatterjee(1986)MedicalParasitology. Tata McGraw Hill, Calcutta.
11. Parija S. C. (1996). Text Book of Medical Parasitology.4th edition, Orient Longman, All India Publishers &Distributors.
12. Levanthal R. and Cheadle R.S. (2012), Medical Parasitology, 6th edition, S.A.Davies Co.,Philadelphia.

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1. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4047123/>
2. <https://www.ncbi.nlm.nih.gov/pubmed/21722309>
3. <https://www.sciencedirect.com/science/article/pii/S2211753919300193>
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UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMY-DSC11

CORE-XI: MEDICAL VIROLOGY

Instr.Hrs.: 6
Credits : 4

Year : III
Semester: V

Learning outcomes:

- (a) Knowledge about viruses and the chemical nature of viruses, different types of viruses infecting animals, plants and bacteria -Bacteriophages
- (b) Understanding about the emerging viral diseases.
- (c) Information about the role of viruses in the causation of the cancer.
- (d) Gain wider knowledge on clinical aspects and related implications of viral diseases.
- (e) Knowledge on viral vaccines and antiviral drugs.

Course Contents:

UNIT I

General characteristics of viruses: Structure (nucleic acid, capsid, envelope) and replication. Laboratory diagnosis of viral diseases: Microscopy, culture and isolation, serological diagnosis of viral infections. Cultivation of viruses– inoculation in animals, embryonated eggs and tissue culture.

UNIT II

Morphology, mode of transmission, pathogenesis, symptoms, laboratory diagnosis, prophylaxis and control of diseases caused by the following viruses – Arboviruses (Flavi virus), Picorna viruses (Polio virus and Rhinovirus), Hepatitis viruses (HAV, HBV, HCV, HDV), Rabies virus, Orthomyoviruses (Influenza virus) and Paramyxoviruses (Mumps and Measles virus).

UNIT III

Pox viruses (Variola, Vaccinia), Herpes viruses (Herpes simplex, Varicella zoster), Adeno viruses, Rota viruses and HIV viruses. Oncogenic viruses (Human Papilloma virus): Introduction, characteristics of transformed cells, mechanism of viral oncogenesis and clinical manifestations.

UNIT IV

Bacteriophages – Types, Morphology and life cycle (lytic and lysogenic). Significance of phages. Study of recent outbreaks of human diseases (SARS, Swine flu, Ebola, Dengue, Chikungunya) – causes, spread and preventive measures.

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

UNIT V

Antiviral agents and their mode of action. Interferons. Viral vaccines - types, Immunization schedule.

References

1. Jawetz, E., Melnick, J.L. and Adelberg, E.A., (1991), Review of Medical Microbiology 19thedn. Lange Medical Publications, USA.
2. Luria, S.E., Darnel, J.E., Jr., Baltimore, D. and Campbell, A., (1978), General Virology, 3rdedn. John Wiley & Sons, New York.
3. Greenwood, D., Slack, R.B., and Peutherer, J.F. (1993). Medical Microbiology 14thedn. Churchill Livingstone London
4. Morag, and Timbury, M.C, (1994). Medical Virology 10thedn. Churchill Livingstone.
5. Dimmock, N.J., and Primrose, S.B., (1994) Introduction to Modern Virology 5thedn. Blackwell Scientific Publications, Oxford.
6. Fenner, F. and White, D.O, (1994) Medical Virology, 5thedn. Academic Press, New York.
7. Conrat, H.F., Kimball, P.C. and Levy, J.A., (1994) Clinical Virology, 3rdedn. Prentice Hall, New Jersey.
8. S.J. Flint. (2009). *Principles of Virology*. 4thedn, ASM Press.
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11. Hayes, W. (1968) The Genetics of Bacteria and their Viruses. Blackwell Scientific Publications, London.
12. Hoepflich, P.D. (1977) Infectious Diseases, 2nd Edn. Harper & Row Publishers, New York.

Web Resources

1. <https://viralzone.expasy.org/656>
2. <https://www.sciencedirect.com/topics/neuroscience/dna-viruses>
3. <https://www.sciencedirect.com/topics/immunology-and-microbiology/rna-viruses>
4. <https://gmch.gov.in/e-study/e%20lectures/microbiology/10%20arboviruses.pdf> <https://www.britannica.com/science/antiviral-drug/anti-hiv-drugs>

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMY-DSC12

CORE-XII: MAJOR PRACTICAL V
(MEDICAL BACTERIOLOGY, MYCOLOGY, PARASITOLOGY AND VIROLOGY)

Instr.Hrs.: 6

Year : III

Credits : 4

Semester: V

Learning outcomes:

1. Skills to identify medically important bacteria, fungus and parasites from the clinical samples.
2. Very good information about practical aspects of collection of different clinical samples, their transport, culture and examination by staining, and biochemical tests for diagnosis of bacterial diseases.
3. In depth knowledge on clinical sample processing.
4. Knowledge to promote diagnostic skills, including the use and interpretation of laboratory tests in the diagnosis of infectious diseases.
5. Insights to antibiotic sensitivity determination.

Course Contents:

UNIT I

General requirements for collection and transport of clinical Specimens. Isolation of organisms from clinical materials viz: Throat swab, Pus, Urine, Sputum, Stool etc. Enumeration of Bacteria in Urine, Quantitative Urine Culture.

UNIT II

Identification of bacterial pathogens from clinical specimens and their biological reactions. Simple, differential and special staining techniques. Antimicrobial Sensitivity testing by Kirby-Bauer disc- diffusion technique and determination of MIC by broth dilution method.

UNIT III

Identification of pathogenic viruses in Slides/ Smears / Spotters. Isolation of phage from natural sources.

UNIT IV

KOH and Lactophenol preparations for skin scrapings for dermatophytes. Microscopic identification and cultural characteristics of medically important fungi and lab contaminants. Germ tube, carbohydrate assimilation and fermentation tests for yeasts.

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

UNIT V

Direct examination of faeces- wet mount and Lugol's iodine method- demonstration of protozoan cysts and helminthes eggs. Concentration techniques of stool specimen- floatation and sedimentation methods.Examination of blood for malarial parasites- thin and thick smearpreparation.Identification of pathogenic parasites in slides/ specimens as spotters.

References:

1. Collee, J.C., Duguid, J.P., Fraser, A.C. and Marimon, B.P. (1996), Mackie and McCartney Practical Medical Microbiology, 14thedn. Churchill Livingstone,London.
2. Medical Microbiology. (2008) MIMS. 5thednElsevierLtd.
3. Ronald M. Atlas, Lawrence C. Paxis (1993) Hand book of Microbiological Media. Ed. LC. CRC Press,London.
4. Jawetz, E., Melnick, J.L. and Adelberg, E.A., (1991), Review of Medical Microbiology 19thedn. Lange Medical Publications,USA.
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6. Greenwood, D., Slack, R.B., and Peutherer, J.F(1993). Medical Microbiology 14thedn. Churchill LivingstonLondon
7. Morag, and Timbury, M.C, (1994). Medical Virology 10thedn. Churchill Livingston.
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10. Elizabeth Moore-Landecker. (1996).Fundamentals of the fungi.(4th edition). PrenticeHall International, Inc,London
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13. Levanthal R. and Cheadle R.S. (2012), Medical Parasitology, 6th edition, S.A.Davies Co.,Philadelphia.

Web recourses:

1. <https://www.cliffsnotes.com/studyguides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology>
2. <https://courses.lumenlearning.com/microbiology/chapter/staining-microscopic-specimens/>
3. <https://www.cdc.gov/infectioncontrol/guidelines/disinfection/sterilization/index.html>
4. <https://www.britannica.com/science/bacteria/Growth-of-bacterial-populations>

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMY-DSC13

CORE-XIII: ENVIRONMENTAL MICROBIOLOGY

Instr.Hrs.: 6

Year : III

Credits : 4

Semester: VI

Learning outcome:

1. The basic knowledge about the natural ecosystem and role of microorganisms in the ecosystem
2. An understanding of the composition of air, air borne organisms and how the organisms causes the diseases and its preventive measures
3. Knowledge about different types of microorganism in water causes of water pollution, and methods to analyze the quality of water and treatment for purification of drinking water, hygienic practices to control the water borne diseases.
4. An understanding the role and application of microorganisms to degrade the environmental contaminants. and microbes involved in solid and liquid waste management.
5. Knowledge about the role of microbes in biodegradation and bioremediation of heavy metals and hydrocarbon etc.,

Course Content:

UNIT I

Introduction: Organization of the biosphere and components of ecosystem, Natural habitats of microorganisms, Microbial communities in aquatic and terrestrial habitats, Microorganisms as components of ecosystem-as producers and decomposers

UNIT II

Microbes in air: Composition of Air; Number and kinds of organisms in air; Distribution and sources of air borne organisms, droplet nuclei - aerosol , Assessment of air quality - some important air borne diseases caused by bacteria, fungi, viruses their symptoms and preventive measures.

UNIT III

Aquatic Microbiology: Distribution of Microorganisms in the Aquatic Environment- fresh water (ponds,lake,River), Sources and Types of Water Pollution, Biological Indicators of Water Pollution. Determination of the quality of Water - MPN Index, Membrane Filtration, Biological Oxygen Demand potability of water - microbial assessment of water quality, water borne diseases and preventive measures.

UNIT IV

Waste Treatment: Types of wastes - Characterization of solid and liquid wastes - wastes treatment and useful byproducts, Solid - Saccharification - gasification – composting, Vermicomposting - liquid waste treatment - aerobic - anaerobic methods.

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

UNIT V

Degradation of pesticides and detergents; Degradation of lignin; synthetic polymers, Petroleum and hydrocarbon degradation, Detoxification of heavy metals (chromium, lead, arsenic, mercury).

References:

1. Atlas Ronald, M., Bartha, and Richard (1987). Microbial Ecology 2nd Edition. Benjamin/Cummings Publishing Company, California.
2. Dirk, J. Elsas, V., Trevors, J.T., Wellington, E.M.H. (1997). Modern Soil Microbiology, Marcel Dekker INC, New York, HongKong.
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12. Cambell, R. (1983) Microbial Ecology, 2nd Edn. Blackwell Scientific Publications
13. London. Lynch, J.M. and Poole, N.J. (1979) Microbial Ecology: A. Conceptual Approach. Blackwell Scientific Publications, London.
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16. Mitchell, R. (1974) Introduction to Environmental Microbiology. Prentice – Hall. Inc. New Jersey.
17. Aaronson S. (1970) Experimental Microbial Ecology, Academic Press, New York

Web resources:

1. <https://www.healthline.com/health/airborne-diseases#prevention>
2. https://www.researchgate.net/publication/322759519_Microbes_as_Indicators_of_Water_Quality_and_Bioremediation_of_Polluted_Waters_A_Novel_Approach
3. <http://www.fao.org/3/t0551e/t0551e05.htm>
4. https://unctad.org/en/Docs/ditcted200710_en.pdf
5. <http://www.biologydiscussion.com/environmental-microbiology/biodeterioration-of-various-materials-microbiology/66809>

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMY-DSC14

CORE-XIV: FOOD AND DAIRY MICROBIOLOGY

Instr.Hrs.: 6
Credits : 4

Year : III
Semester: VI

Learning outcome:

1. Gain knowledge about food as a substrate for various microbes, the role of factors and its importance
2. Understand about the principles and application of different types of food preservation technique, chemical preservative and its advantages and disadvantages
3. Equip themselves the pragmatic understanding of food spoilage
4. Acquire a thorough understanding of food borne diseases, testing methods, and preventive technique.
5. Learn about the various fermented product and its various stage spoilage

Course Content:

UNIT I

Food as a substrate for micro organisms -.Micro organisms important in food microbiology;
Molds, yeasts and bacteria - General Characteristics - Classification and importance.

UNIT II

Principles of food preservation - Asepsis - Removal of micro organisms, anaerobic conditions
- High temperature - Low temperature - Drying - Food additives.

UNIT III

Contamination and spoilage - Cereals, sugar products, vegetables and fruits, meat and meat products, milk and milk products - Fish , Poultry

UNIT IV

Food borne infections and intoxications - bacterial, non -bacterial - Food borne disease outbreaks - Laboratory testing - preventing measures - Food sanitation - plant sanitation - Employees' health standards.

UNIT V

Food fermentations: Bread cheese, vinegar, fermented vegetables (sauerkraut), fermented dairy products (yoghurt,). Spoilage and defects of fermented dairy products - oriental fermented foods.

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

References:

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2. Andrews AT, Varley J. (1994) Biochemistry of milk products. Royal Society of Chemistry.
3. Banwart GJ. (1989), Basic food microbiology, Chapman & Hall, New York.
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7. Robinson RK. (1990) The microbiology of milk. Elsevier Applied Science, London.
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Web resources:

1. https://www.researchgate.net/publication/15326559_A_Dynamic_Approach_to_Predicting_Bacterial_Growth_in_Food/link/5a1d2e02aca2726120b28eba/download
2. <https://www.fda.gov/food/laboratory-methods-food/bam-food-sampling-preparation-sample-homogenate>
3. https://www.researchgate.net/publication/243462186_Foodborne_diseases_in_India_-_A_review
4. https://www.researchgate.net/publication/228662659_Fermented_Dairy_Products_Starter_Cultures_and_Potential_Nutritional_Benefits/link/000084160cf23f86393d5764/download
5. <https://www.fda.gov/food>

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

BMV-DSC15

CORE-XV: MAJOR PRACTICAL VI –
ENVIRONMENTAL, FOOD AND DAIRY MICROBIOLOGY

Instr.Hrs.: 6
Credits : 4

Year : III
Semester: VI

Learning outcome:

1. To learn about Detection of number of Bacteria in milk by various method.
2. Gains knowledge to determine the quality of milk.
3. Learn to isolate the yeast and molds from spoiled nuts, fruits, and vegetables and also to examine specific food for bacterial contamination.
4. Knowledge gain to determine of BOD and COD of wastewater and Water analysis by MPN and Membrane filter method.
5. Learn to Quantify the microorganisms in air settle plate and air sampler methods. Detection of aflatoxin B₁ from moldy grains using thin layer chromatography.

Course Contents:

UNIT I

Detection of number of Bacteria in milk by breed count. Detection of number of bacteria in milk by standard plant count.

UNIT II

Determination of quality of milk sample by methylene blue reductase test and Resorzurin method.

UNIT III

Isolation of yeast and molds from spoiled nuts, fruits, and vegetables. Bacteriological examination of specific food a) Curd b) Raw meat c) Fish d) Ice cream.

UNIT IV

Determination of BOD and COD of wastewater. Water analysis
a) MPN method b) Memberane filter method.

UNIT V

Quantification of microorganisms in air by settle plate and air sampler methods. Detection of aflatoxin B₁ from moldy grains using thin layer chromatography.

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MICROBIOLOGY
SYLLABUS WITH EFFECT FROM 2020-2021

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Web resources:

1. <https://www.healthline.com/health/airborne-diseases#prevention>
2. <https://www.researchgate.net/publication/322759519> Microbes as Indicators of Water Quality and Bioremediation of Polluted Waters A Novel Approach
3. <http://www.fao.org/3/t0551e/t0551e05.htm>
4. https://unctad.org/en/Docs/ditcted200710_en.pdf
5. <http://www.biologydiscussion.com/environmental-microbiology/biodeterioration-of-various-materials-microbiology/66809>