

**ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)  
CUDDALORE-1**



**PG & RESEARCH DEPARTMENT OF MICROBIOLOGY**

**B.Sc. MICROBIOLOGY - SYLLABUS  
2019 - 2020 onwards**

<b>YEAR - I</b>	<b>FUNDAMENTALS OF MICROBIOLOGY</b> <b>(For those students who are admitted in the year</b> <b>2019 - 2020 onwards)</b>	<b>19MB101</b>
<b>SEMESTER - I</b>		<b>HRS/WK - 4</b>
<b>CORE - I</b>		<b>CREDIT - 3</b>

**Objective:**

- To make the students understand the basic principles in Microbiology
- To enable the students understand the Sterilization process

**Unit - 1**

**(12 Hrs)**

Introduction - History (Discoveries - Contributions of Women Scientists in Microbiology) - Scope of Microbiology - Employability in Microbiology (Job opportunities and Entrepreneurship)

**Unit - 2**

**(12 Hrs)**

Morphology - Shape, size, arrangement of Bacteria - Structure of bacterial cell - Structure and functions of cell organelles (Cell wall, structures found outside the cell wall and within the cell wall) - Structure of Endospore

**Unit - 3**

**(12 Hrs)**

Microscopy - Simple, Compound, Dark-field, Phase-contrast, Fluorescent, Electron Microscopes - Stains and dyes – staining methods.

**Unit - 4**

**(12 Hrs)**

Sterilization - Physical agents - High temperature, Low temperature, Desiccation, Osmotic pressure, Radiation, Filtration

**Unit - 5**

**(12 Hrs)**

Sterilization - Chemical agents - Phenols and phenolic compounds, Alcohols, Halogens, Heavy metals and their compounds, Dyes, Synthetic detergents, Quaternary ammonium compounds, Aldehydes, Gaseous agents -Antibiotics - Classification, Mode of action – Antifungal and antiviral agents.

**Text Books**

- Prescott, L. M., J. P. Harely and D. A. Klain, Microbiology, 2003 (5<sup>th</sup> Edition) McGraw Hill, New York.

**Reference Books**

- Atlas R. A. Principles of Microbiology (2<sup>nd</sup> Edition), 1997. Wm. C. Brown Publishers, Iowa.
- Salle A. J., Fundamental Principles of Bacteriology, 1974 (TMH Edition), Tata McGraw Hill Publishing Company, New Delhi.

**E-Reference**

- <http://www.microbeworld.org>

<b>YEAR - I</b>	<b>MICROBIAL TAXONOMY</b> <b>(For those students who are admitted in the year</b> <b>2019 - 2020 onwards)</b>	<b>19MB102</b>
<b>SEMESTER - I</b>		<b>HRS/WK - 3</b>
<b>CORE - II</b>		<b>CREDIT - 3</b>

**Objective:**

- To make the students understand the concept of classification
- To enable the students appreciate the diversity of microorganisms

**Unit - 1**

**(9 Hrs)**

Classification - Haeckel's, Whitaker's - Prokaryotes and eukaryotes - Evolution of microorganisms - Taxonomical ranks, Binomial Nomenclature - Characteristics used in Taxonomy

**Unit - 2**

**(9 Hrs)**

Outline of bacterial classification according to Bergey's manual - Brief account of important groups of bacteria - Archaeobacteria, Spirochetes, *Mycoplasma*, Actinomycetes, Photosynthetic bacteria, Cyanobacteria, Methanogenic bacteria, Sulfate utilizing bacteria.

**Unit - 3**

**(9 Hrs)**

Fungi - characteristics, morphology, reproduction, physiology, classification - Fungi of special interest - *Mucor*, *Rhizopus*, *Penicillium*, *Neurospora*, *Agaricus*, *Saccharomyces*, *Candida*, Lichens, mycorrhiza

**Unit - 4**

**(9 Hrs)**

Algae - occurrence, importance, characteristics, classification - Algae of special interest - *Chlamydomonas*, *Euglena*, *Volvox*, diatoms - Protozoa - occurrence, free-living, symbiotic, morphology, reproduction, classification - Protozoa of special interest - *Amoeba*, *Paramecium*

**Unit - 5**

**(9 Hrs)**

Viruses - general characteristics, morphology, classification - viruses of bacteria, plants, animals, human beings - T4 phage, TMV, rabies, HIV as examples.

**Text Books**

- Prescott, L. M., J. P. Harely and D. A. Klain, Microbiology, 2003 (5<sup>th</sup> Edition) McGraw Hill, New York.

**Reference Books**

- Michael J. Pelzar. Jr., E.C.S. Chan, Noel R. Krieg, Microbiology, 1993 (Fifth edition), Tata McCraw Hill, New Delhi.
- Roger Y. Stanier, John L. Ingraham, Mark L. Wheelis, Page R. Painter, Microbiology 1987 (5<sup>th</sup> Edition), Macmillan.

**E-Reference**

- [www.asm.org](http://www.asm.org)

<b>YEAR - I</b>	<b>GROWTH AND NUTRITION OF MICROORGANISMS</b> <b>(For those students who are admitted in the year</b> <b>2019 - 2020 onwards)</b>	<b>19MB203</b>
<b>SEMESTER - II</b>		<b>HRS/WK - 4</b>
<b>CORE - III</b>		<b>CREDIT - 3</b>

**Objective:**

- To make the students understand the basic principles of Microbial growth

**Unit - 1 (12 Hrs)**

Nutrient requirements of microorganisms - Growth factors - Nutritional types

**Unit - 2 (12 Hrs)**

Culture media - Pure culture - Maintenance and preservation of cultures - Environmental factors affecting growth

**Unit - 3 (12 Hrs)**

Microbial growth - exponential growth - Growth curve - Measurement of microbial growth - Batch and Continuous culture - Synchronous growth

**Unit - 4 (12 Hrs)**

Sporulation - Bacterial reproduction - Motility of bacteria - Flagellar and gliding - Chemo-, photo-, Aero-, Magneto- taxis

**Unit - 5 (12 Hrs)**

Uptake of nutrients - Simple, Passive, Facilitated diffusion, Active transport, Group translocation

**Text Books**

- Schlegel, H.G., 1993. General Microbiology, (7<sup>th</sup> Edition), Press Syndicate of the University of Cambridge.

**Reference Books**

- Caldwell, D.R., 1995. Microbial Physiology & Metabolism, USA.Wm.C. Brown Communications, Inc.
- Dawes, I. W. and Sutherland L.W. 1992. Microbial Physiology, (2<sup>nd</sup> Edition), Oxford Blackwell Scientific Publications.

<b>YEAR - I</b>	<b>MICROBIAL METABOLISM</b> <b>(For those students who are admitted in the year 2019 - 2020 onwards)</b>	<b>19MB204</b>
<b>SEMESTER - II</b>		<b>HRS/WK - 3</b>
<b>CORE - IV</b>		<b>CREDIT - 3</b>

**Objective:**

- To make the students understand the basic principles of Microbial Physiology

**Unit - 1 (9 Hrs)**

Principles of energetics – oxidation-reduction reactions – respiratory chain

**Unit - 2 (9 Hrs)**

Energy production by anaerobic process (Glycolysis, Pentose phosphate pathway, ED Pathway, Fermentation)

**Unit - 3 (9 Hrs)**

Energy production by aerobic process (TCA, catabolism of lipids, catabolism of proteins)

**Unit - 4 (9 Hrs)**

Energy production by aerobic process (respiration without oxygen, heterotrophic CO<sub>2</sub> fixation, glyoxylate cycle)

**Unit - 5 (9 Hrs)**

Energy production by photosynthesis (cyclic, non-cyclic), Mechanism of ATP synthesis - Bioluminescence

**Text Books**

- Schlegel, H.G., 1993. General Microbiology, (7<sup>th</sup> Edition), Press Syndicate of the University of Cambridge.

**Reference Books**

- Moat, A.G. and J. W. Foster, 1995. Microbial Physiology, (3<sup>rd</sup> Ed.). Wiley - LISS, A John Wiley & sons. Inc. Publications,.
- Dawes, I. W. and Sutherland L.W. 1992. Microbial Physiology, (2<sup>nd</sup> Edition), Oxford Blackwell Scientific Publications.