



Department of Microbiology

Ahmednagar College

Learning outcomes

Program Specific Outcomes

Microbiology is a branch of science that studies “Life” taking an example of microorganisms such as bacteria, protozoa, algae, fungi, bacteria, viruses, etc. These studies integrate cytology, physiology, ecology, genetics and molecular biology, evolution, taxonomy and systematics with a focus on microorganisms; in particular bacteria. The relevance and applications of these microorganisms to the surrounding environment including human life and Mother Nature becomes part of this branch. Since inception of this branch of science, Microbiology has remained a field of actively research and ever expanding in all possible directions; broadly categorized as pure and applied science. Different branches of Pure Microbiology based on taxonomy are Bacteriology, Mycology, Protozoology and Parasitology, Phycology and Virology; with considerable overlap between these specific branches over each other and also with other disciplines of life sciences, like Biochemistry, Botany, Zoology, Cell Biology, Biotechnology, Nanotechnology, Bioinformatics, etc. Areas in the applied Microbial Sciences can be identified as: Medical, Pharmaceutical, Industrial (Fermentation, Pollution Control), Air, Water, Food and Dairy, Agriculture (Plant Pathology and Soil Microbiology), Veterinary, Environmental (Ecology, Geomicrobiology); and the technological aspects of these areas.

Department of Microbiology offers B.Sc. Microbiology and M.Sc. Microbiology

Programme specific outcomes for B.Sc. Microbiology are as follows

| Sr. No. | Program | Program Objectives | Program Specific Objectives |
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| 1 | B.Sc. Microbiology | PO 1: Knowledge of different aspects of Microbiology has become crucial and indispensable to everyone in the society. Study of microbes has become an integral part of education and human progress. Building a foundation and a sound knowledge-base of Microbiological | F.Y.B.Sc: Students will be given the basic information that includes- Introduction of microbiological world, Classification of microorganisms, Techniques of Microscopy, isolation, observation of morphology. S.Y.B.Sc.: |

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| | | <p>principles among the future citizens of the country will lead to an educated, intellectual and scientifically advanced society.</p> <p>PO 2: Microbiological tools have been extensively used to study different life processes and are cutting edge technologies. There is a continual demand for microbiologists in the work force – education, industry and research. Career opportunities for the graduate students are available in manufacturing industry and research institutes at technical level.</p> | <p>Students will be given the necessary information about classification of specific group of microorganisms, Physiology and genetics of microorganisms, and applied microbiology.</p> <p>T.Y.B.Sc.: Students will be dealt with broad applied areas of microbiology that are interactive with higher living forms. Five such areas are – medical microbiology, microbial physiology, microbial (prokaryotic and eukaryotic) genetics, immunology and immunopathology, fermentation technology. The sixth course will be Applied Microbiology that will include – Dairy Microbiology, Food Microbiology, Fermentation Technology, Agriculture Biotechnology, Fungal Biotechnology.</p> <p>Over all objectives are</p> <ul style="list-style-type: none"> • To enrich students’ knowledge and train them in the pure microbial sciences • To introduce the concepts of application and research in Microbiology. • To inculcate sense of scientific responsibilities and social and environment awareness. • To help students build-up a progressive and successful career. |
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Learning outcomes – B.Sc. Microbiology

| Sr. No. | Course | Course Outcomes |
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| F.Y.B.Sc. | | |
| 1 | F.Y.B.Sc. Paper I: Introduction to Microbiology | <p>CO 1: Students will be able to define Microbiology and Microorganisms.</p> <p>CO 2: They will be able to identify different types of microorganisms.</p> <p>CO 3: They will be able to describe the importance and applications of microbiology</p> <p>CO 4: They will be able to memorise and recite the names of microorganisms with genus and species.</p> |
| 2 | F.Y.B.Sc. Paper II: Basic techniques in Microbiology | <p>CO 1: Students will be able to define and state the principles various techniques in microbiology.</p> <p>CO 2: They will be able to describe individual technique in detail.</p> <p>CO 3: Students will be able to name and list the growth requirements of micro-organisms.</p> |
| 3 | F.Y.B.S.c. Practicals | <p>CO 1: Students will be trained to techniques in microbiology like staining, cultivation of microorganisms</p> <p>CO 2: They will be able to label the different parts of instruments like incubator, Microscope, Autoclave etc. They will be able to identify types of microorganisms with the help of microscope.</p> |
| S.Y.B.Sc. | | |
| 1 | MB211: Bacterial systematics and Physiology | <p>CO 1: Students will be able to summarise the species concept in prokaryotes and re write it with the help of Chemotaxonomy, Numerical taxonomy.</p> <p>CO 2:</p> |

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| | | <p>They will be able to defend the importance of genetic methods in taxonomy.</p> <p>CO 3: They will be able to distinguish between the methods of taxonomy.</p> <p>CO 4: They will be able to distinguish between different classes of enzymes and give examples of of each class.</p> <p>CO 5: Students will be able to illustrate and explains the metabolic pathways.</p> <p>CO 6: They will be able to paraphrase the term oxidative and substrate level phosphorylation.</p> |
| 2 | MB 212: Industrial and soil microbiology | <p>CO 1: Students will be able to restate the importance of microorganisms in Industry.</p> <p>CO 2: They will be able to give examples of industrially important micro-organisms and their applications.</p> <p>CO 3: They will be able to explain process of Fermentation.</p> <p>CO 4: They will be able to distinguish between the types of fermentations.</p> <p>CO 5: They will be able to illustrate and label different parts of fermenters.</p> <p>CO 6: They will be able to summarise the role of microorganisms in agriculture.</p> <p>CO 7: They will be able to inter relate the microorganisms and elemental cycles in nature.</p> |
| 3 | MB 221: Bacterial Genetics | <p>CO 1: Students will be able to summarise the development of genetics.</p> <p>CO 2: They will be able to paraphrase the concept of gene.</p> |

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| | | <p>CO 3: They will be able to interpret the central dogma of molecular biology</p> <p>CO 4: They will be able to explain the cellular processes like DNA replication, transcription and translation.</p> <p>CO 5: They will be able to inter relate the cause of adaptation, evolution and cancer with the change in genetic inheritance.</p> |
| 4 | MB 222:Air and water Microbiology | <p>CO 1: Students will be able to explain both air and water microflora.</p> <p>CO 2: They will be able to distinguish between air wate microflora.</p> <p>CO 3: They will be able to summarise different techniques to measure the air and water microflora and interpret the results.</p> |
| 5 | MB 223: Practical course | <p>CO 1: Practical for the second year students will be less defined i.e. kept more flexible, designed to evolve project themes on environment, agriculture and pollution aspects and acquiring laboratory related skills. Practical at this level will also include application of biostatistics principles and computers for data analysis and interpretation, and introduction to scientific writing and report preparation. These aspects can be practiced better while carrying out the mini-projects.</p> |
| T.Y.B.Sc. | | |
| 1 | MB 331 and 341: Medical Microbiology | <p>CO 1: Students will be able to organize diseases with respect to system.</p> <p>CO 2: They will be able to categories disease causing organisms like bacterial, fungal, viral etc.</p> <p>CO 3: They will be able to match diseases and their causative agents</p> <p>CO 4:</p> |

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| | | They will be able to understand the role antibiotics in the irradiation of disease and resistance generate against them. |
| 2 | MB 332 and 342: Genetics and Molecular Biology | <p>CO 1: Students will be able to extend their study from prokaryotic gene expression to eukaryotic gene expression.</p> <p>CO 2: They will be able to describe and interpret various techniques of gene mapping and able to solve problems based on it.</p> <p>CO 3: Students will be able to define recombinant DNA technology (RDT) and state their applications. Students will be able to explain the various steps in RDT.</p> |
| 3 | MB 333 and 343: Enzymology and Metabolism | <p>CO 1: Students will be able to extend their study in enzymology with respect to identification and purification of enzyme.</p> <p>CO 2: They will be able to describe and generalize the role of co enzyme in enzyme catalysis.</p> <p>CO 3: Students will be able to interrelate between anabolism and catabolism.</p> <p>CO 4: Students will be able to elaborate their study about bioenergetics.</p> |
| 4 | MB 334 and 344: Immunology | <p>CO 1: Students will be able to define the term immunology.</p> <p>CO 2: They will be able to list out components of immune system and describe them in detail.</p> <p>CO 3: They will be able to distinguish between humoral and cell specific immunity and innate and adaptive immunity.</p> |
| 5 | MB 335 and 345: Fermentation technology | <p>CO 1: Students will be able to define fermentation.</p> <p>CO 2: They will be able to describe process of industrial fermentation.</p> <p>CO 3: They will be able to understand the role of bioreactor in</p> |

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| | | <p>fermentation.</p> <p>Co 4:</p> <p>They will be able to explain industrial processes for various products by flow sheet diagram.</p> |
| 6 | MB 336 and 346: Applied Microbiology | <p>CO 1:</p> <p>Students will be able to define and analyse the role microorganisms in dairy, food, and environment.</p> <p>CO 2:</p> <p>They will be able to explain milk and food spoilage due to micro-organisms.</p> <p>CO 3:</p> <p>They will be able to describe and apply process of food preservation.</p> |
| 7 | MB 347: Applied Microbiology (Practical course I) | <p>CO 1:</p> <p>Students will be trained with various techniques carried out in industries like fermentation, food and dairy.</p> |
| 8 | MB 348: Biochemistry and molecular biology (Practical course II) | <p>CO 1:</p> <p>Students will be trained in various biochemical techniques like chromatography, centrifugation, qualitative and quantitative analysis of biochemical biomolecules.</p> |
| 9 | MB 349: Clinical Microbiology (Practical course III) | <p>CO 1:</p> <p>Students will be trained with various techniques in clinical Microbiology like isolation and identification of pathogen by classical and serological methods.</p> |