

Department of Microbiology

Course Outcomes of 4 Year Microbiology (H) course under CCF

Semester 1

CC101: INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

Theory:

CO1: Understanding the history of development of Microbiology as a discipline and the concept of basic microbiology.

CO2: Understanding the classification of living organisms based on their morphology, structure and function

CO3: Gaining insights on the general features and significance of the different groups of microbes

Practical

CO1P: Learning about good microbiology practice. Preparation, sterilization of bacterial culture media

CO2P: Gaining knowledge about the structure of algae, fungi and protozoa.

MCB-IDC-TH

CO1: Understanding the history of development of Microbiology as a discipline and the concept of basic microbiology.

CO2: Understanding the classification of living organisms based on their morphology, structure and function

CO3: Gaining insights on the general features and significance of the different groups of microbes

CO4: Getting acquainted with the common tools and techniques used in a microbiology laboratory

CO5: Gaining knowledge on pathogenic microorganisms and the diseases associated with them together with an introduction to the functioning of the immune system.

CO6: Understanding the fundamentals of interaction of microbes with the biotic and abiotic components of the environment along with their beneficial roles in environment

CO7: Understanding the basics of industrial production of microbial products including those in food industries and gaining knowledge on the cause of food spoilage

SEC101: FOOD FERMENTATION TECHNIQUES AND PACKAGING

CO1: Development of the concept of fermentation and fermented foods along with introduction to physicochemical changes during fermentation.

CO2: Understanding the use of various microbes in fermentation to yield many fermented food and beverages.

CO3: Throwing light on biochemical and microbiological standards and features of various starting materials like milk, cereals, vegetables etc.

CO4: Understanding the use of meat, fish, as starting materials and analyzing the biochemical changes occurring in the fermentation process.

CO6: Introduction to quality of probiotics and probiotic potential of some specific fermented foods.

CO7: Introduction to quality control of food and food packaging

Semester II

CC102: BACTERIOLOGY

Theory:

CO1: Understanding the various features of bacterial morphology, cultivation and maintenance techniques of bacteria and the diversity of the bacterial and archaeal world.

CO2: Understanding bacterial nutrition and growth patterns, use of various different nutrients for reproduction and growth of bacteria

CO3: Understanding the visualization technique of microorganisms by magnification of small entities by applying various microscopic techniques along with introduction to the modern molecular biological methods in determining bacterial systematic position.

Practical

CO1: Development of technique for cultivation and visualization of bacteria. Introduction of various staining techniques to apply them on particular requirements.

CO2: Introduction of techniques for purification of single bacterial type from a mixture by commonly followed methods.

SEC: AI FOR EVERYONE

CO1: Define and explain the fundamental concepts and subfields of AI.

CO2: Identify real-world applications of AI across various industries.

CO3: Analyze the ethical, social, and economic implications of AI.

CO4: Recognize the potential of AI to drive innovation and transformation in different domains.

Semester 3:

Theory

CO1: Understanding the basic concepts of thermodynamics with special focus on biothermodynamics and free energy in living cells, its generation and expenditure and develop concepts to solve problems in free energy

CO2: Understanding the structure, stereochemistry and basis of reactivity of carbohydrates (monosaccharides, disaccharides and polysaccharides), developing insights to understand differences amongst different types of sugars.

CO3: Learning the major classes of commonly encountered lipids in living cells along with their structure, degree of unsaturation and function as effector molecules of various cellular responses

CO4: Learning the structure and chemical nature of amino acids as building blocks of proteins, understanding the different components of protein structure and folding and the forces involved therein, obtaining a basic idea about non-ribosomal peptides, their structure and function.

CO5: Understanding the basis of enzyme classification, developing concepts on mechanism and kinetics of enzyme action in presence and absence of inhibitors and carrying out physicochemical characterisation of a given enzyme.

CO6: Learning the basics of classification and characteristics of vitamins

CO7: Understanding the basics of nucleic acid structure

Practical

CO1: Develop basic concepts to solve numerical problems on acid, bases, buffers, free energy
Develop basic concepts to be able to identify a biomolecule on the basis of biochemical tests and learn quantitative estimation of proteins Learn how to carry out physicochemical characterisation of enzymes and determine catalytic parameters. Learn basic concepts of protein modeling.

CC202: Microbial Physiology and Metabolism

Theory

CO1: Understanding microbial growth patterns and growth variations in response to different environmental parameters, their mode of nutrition and energy acquisition.

CO2: Conceptualize the process of nutrient uptake including important processes like group translocation and iron uptake in microorganisms.

CO3: Comprehend heterotrophic metabolism with in depth knowledge of aerobic respiration, anaerobic respiration and fermentation.

CO4: Basic idea on autotrophy-- focusing mainly on microbial aspects . Conceptualize microbial photosynthesis. Ability to differentiate between chemolithotrophy and photolithotrophy and a brief idea on different chemolithotrophic pathways.

CO5: Understanding important biological processes of nitrogen assimilation and nitrogen dissimilation and the crucial role played by microbes to generate nitrogen balance.

Practical

CO1: Learning the method of studying bacterial growth both by densitometric analysis and as well as by serial dilution on solid media.

SEC201: BIOFERTILIZERS AND BIOPESTICIDES

CO1: Understanding the basic concepts on biofertilizer and the role of microorganisms in biofertilizer preparation.

CO2: Gaining knowledge on isolation, identification and field application of symbiotic nitrogen fixing microorganisms.

CO3: Gaining knowledge on isolation, identification and field application of phosphate solubilizing microbes

CO4: Learning about Mycorrhizae and their application as Biofertilizers.

CO5: Getting an insight into the role of microorganisms in controlling different types of pests.