DEPARTMENT OF MICROBIOLOGY

HOOGHLY WOMEN'S COLLEGE

BSc. Hons. in Microbiology

PROGRAMME OUTCOME (PO)

Hooghly Women's College is affiliated to the University of Burdwan. The Choice Based Credit System (CBCS) was introduced in the academic session 2017-18 and again the New Education Policy (NEP) was introduced from the session 2023-24. Sharing the experience of the students and discussing with the faculty members, a glimpse of the programme outcome is being shared below:

PO-1: As the choice base credit system has been introduced, the students get the option to choose of their own choice. This system is much more flexible than the previous system.

PO-2: Students feel less stressed in this Semester System than the previous Part I, II & III system where they were overburdened with the pressure of the huge syllabus.

PO-3: The system has tried to distribute the load of the subject in a symmetric manner so as to reduce the burden from the students as well as the syllabus is covered in stipulated time.

PO-4: There is a tendency to provide symmetry in the Honours and General stream so that both can avail the chance in Post Graduation course or be competent enough to appear in different competitive examinations throughout the country.

PO-5: Certain activities like dissertation/ term paper/ lab or industry visit and excursion could cater the students for field work research industry experience etc. and to equip them in different techniques and instrumentations etc.

PO-6: Students gain knowledge and skill in the fundamentals of classical microbiology, understands the complex interactions among various living organisms.

PO-7: Microbiology is an applied subject. The design of this syllabus reflects this basic thing this highlighting the papers like, Medical Microbiology, Immunology, Environmental Microbiology, Instrumentations and Techniques etc.

PO-8: The course may help the students to acquire gradual knowledge from base to its intrigue in a successful manner.

PO-9: The method and pattern of question may be helpful to make a student equipped for any public or competitive examination.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO-1: Understand the basic concept of Microbiology including Classification and Microbial Diversity.

PSO-2: Apply the knowledge of internal structure of cell, its function in control of various metabolic activities.

PSO-3: Study of basic concept of Biochemistry with its application in Microbiology

PSO-4: A detailed study of Viruses including application of virology

PSO-5: Understanding of Microbial physiology and study of different modes of metabolism of microbes under normal and stressed conditions.

PSO-6: Acquiring knowledge about the structure and organization of cell and its components

PSO-7: Gain knowledge of Molecular Biology and Recombinant DNA Technology.

PSO-8: Understanding the concept of genetics and its importance in different fields like Genetic Engineering and Biotechnology

PSO-9: Analyse complex interaction among various microorganisms in respect to their habitat and their relationship with the environment

PSO-10: Understanding the role of microbes in food and dairy industries

PSO-11: Study of the economic aspect of microbiology

PSO-12: Study of the interaction of microbes and human beings; gain knowledge in Immunology and Medical Microbiology

PSO-13: Study of the application of microbiology in Agriculture

PSO-14: Study of different Biotechniques as well as to gain knowledge of application of different instruments related to Microbiological studies

PSO-15: To gain knowledge about Plant Pathology

PSO-16: Understanding Biosafety and Intellectual Property Rights

PSO-17: Gain knowledge about Research Methodologies and skills of problems of solving methods.

COURSE OUTCOME (CO)

CO-1: Microbial Diversity

a. Gain a knowledge about the contribution of different microbiologists in the scope and field of Microbiology

b. To study the different theories in the classification of Microbiology
c. Knowledge about habit, habitat, cell structure, reproduction and economic importance of algae.
d. Knowledge about habit, habitat, cell structure, reproduction and economic importance of fungi.
e. Knowledge about life cycle and economic importance of protozoa.
f. Gain knowledge about different instruments used in microbiology laboratory; have an idea of different types of media used for microbial cultures and study of identification of different species.

CO-2: Bacteriology

a. Detailed knowledge of bacterial cell structure and cell organization
b. Knowledge about different techniques used in bacteriological study
c. Study of different nutritional modes of bacteria
d. Gain knowledge about different methods of control of microorganisms
e. Study of growth and reproduction in bacteria
f. Gain a detailed knowledge of classification used in bacterial systemics
g. Gather practical knowledge of isolating pure cultures and also classifying bacteria through different staining techniques

CO-3: Biochemistry

a. Gain basic knowledge about various biomolecules and their role in metabolism
b. Interaction and interdependence of physiological and biochemical processes
c. Understanding through scientific enquiry into the nature of physical and biochemical function of cells
d. Gain practical knowledges about qualitative and quantitative measurements of biomolecules, separation techniques and studying enzyme actions

CO-4: Virology

a. Gain knowledge about discovery of viruses; Study of viral structure and viral taxonomy
b. Study of bacteriophages with special emphasis to lytic and lysogenic cycle
c. Study of different viral diseases, their prevention and control
d. Gain knowledge about application of virology and gene therapy
e. Gather practical knowledge about different viral infections, its isolation, enumeration and study of viral growth
f. A visit programme to microbiological industry or institute to gain hand on practical knowledge

CO-5: Microbial Metabolism and Physiology

a. Gain fundamental knowledge on microbial physiology
b. Detailed concept of bacterial nutrition and study of different metabolic pathways
c. Gain idea about nitrogen metabolism

d. Gather practical knowledge about bacterial growth under different physiological conditions

CO-6: Cell Biology

a. Gain a detailed knowledge of prokaryotic and eukaryotic cell and cell organelles
b. Gain knowledge of cellular signalling and cell interaction
c. Gain knowledge about cell cycling and cancer
d. Gain practical knowledge of cell division and study of chromosomal changes during cell division
e. Identification of different types of cells and gather practical knowledge about polyploidy

CO-7: Molecular Biology

a. Study of basic structure of DNA and RNA
b. Sustain a basic knowledge about Nucleic acids, DNA replication, Transcription and Translation of prokaryotes and eukaryotes
c. Familiar with gene modification (post-transcriptional processing) and gene regulation
d. Practical knowledge to handle Spectrophotometer and Agarose Gel Electrophoresis
e. Gain experience on isolation of DNA

CO-8: Microbial Genetics

a. Concept of genome organization and mutation
b. Gain idea about plasmids, mechanism of genetic exchange and transposition
c. Study of phage genetics
d. Gain practical knowledge on the effect of different mutagens

CO-9: Environmental Microbiology

a. Study of different types of microbial interactions and biogeochemical cycles
b. Gain knowledge about waste management and bioremediation
c. Gain practical knowledge of soil testing
d. Gain practical experience on water potability test

CO-10: Food and Dairy Microbiology

a. Study of food as substrate for microorganism
b. Study of microbial spoilage, food preservation and food sanitation
c. Detailed study of different types of fermented food
d. Study of different types of food borne diseases and methods for detection of such diseases
e. Performing different tests to access food quality and isolation and study of microorganism from spoiled food

CO-11: Industrial Microbiology

a. Gain knowledge about history and development of industrial microbiology

b. Familiar with the industrially important strains, fermentation media, bioreactors and other upstream processes
c. Study of different downstream processes and fermentative production of organic acids, antibiotics and beverages
d. Gain practical experience upon microbial production and estimation of enzymes, amino acids, organic acids and alcohol

CO-12: Immunology

a. Understanding types of immunity, antigens, antibodies and their properties
b. Understanding immune mechanisms in disease control, vaccination and process of immune interactions
c. Gather practical knowledge of lymphoid tissues, blood cell morphology, histochemical analysis
d. Practical knowledge on blood grouping, leucocyte count and serum separation
e. Study of different immunological techniques like ELISA, Western Blotting, Ouchterlony test etc.

CO-13: Medical Microbiology

a. Study of the importance of the normal microflora of the human body and host pathogen interaction
b. Idea about methods of collection of samples its transport and diagnosis (PCR, DNA probe)
c. Study of different bacterial, viral, fungal and protozoal diseases
d. General idea of antimicrobial agents, their source, characteristics and mode of action
e. Gain practical knowledge to identify bacteria through different biochemical tests
f. Having hand on knowledge on antibiotic sensitivity test

CO-14: Recombinant DNA Technology

a. Gain idea about genetic engineering and molecular cloning
b. Gather practical idea of bacterial transformation
c. Idea about Southern blotting and DNA amplification
d. Gain knowledge about application of RDT in human therapeutic interest

CO-15: Microbiological analysis of Air and Water

a. Understanding aero-microbiology, sample collection, analysis and control measures
b. Understanding water microbiology, sample collection, analysis and control measures

CO-16: Microbial Diagnosis in Health Clinics

a. Study of different methods of diagnosis of diseases including sample collection, culture and microscopic examination
b. Study of different serological and molecular methods and test for antibiotic sensitivity
c. Idea of rapid detection test for pathogens (Typhoid & Dengue)

CO-17: Biofertilizers and Biopesticides

a. Gain knowledge of different types of biofertilizers like symbiotic and non-symbiotic nitrogen fixers, phosphate solubilizers and mycorrhiza
b. Gain idea about biopesticides and bioinsecticides

CO-18: Food Fermentation Technology

a. Gain knowledge about different types of fermented food, milk based, grain based, vegetable based and meat and fish based
b. Gain knowledge about probiotic food and their health benefits

CO-19: Bioinformatics

a. Knowledge about computer fundamentals, bioinformatics and biological database
b. Gain knowledge about sequence alignments, phylogeny and phylogenetic trees
c. Study of genome organization and analysis using software like Genscan, protein structure prediction
d. Gain practical knowledge about different operating systems like LINUX and WINDOWS
e. Gather idea about biological database like NCBI, PDB

CO-20: Microbes in Sustainable Agriculture

a. Gain idea about soil microbiology, green house gases and phytostimulation
b. Gather knowledge about secondary agricultural biotechnology like biotech feed, silage, biofuel, biomanure etc.
c. Idea about genetically modified crops like Bt cotton and Golden rice
d. Gain practical knowledge about preparation of inoculum for soil conditioning, study of bacterial load in soil

CO-21: Instrumentation and Biotechniques

a. Study of different biotechniques like microscopy, chromatography, electrophoresis, spectrophotometry and centrifugation
b. Gain practical experience of separation of different biomolecules using biotechniques

CO-22: Microbial Biotechnology

a. Gain knowledge about application of microbial biotechnology in human therapeutics, agriculture and food technology
b. Gather information about biotransformation and product recovery
c. Gain practical knowledge about cultivation of edible mushroom
d. Gather hand on experience on enzyme immobilization and isolation

CO-23: Advances in Microbiology

a. Study of evolution of microbial genome and metagenomics
b. Gain knowledge about system and synthetic biology
c. Gain practical experience on extraction and amplification of DNA

CO-24: Biosafety and Intellectual Property Rights

a. Understanding biosafety guidelines and regulations
b. Gain knowledge about guidelines for using radioisotopes in laboratories
c. Have an idea about patents, trademarks, copyrights etc.
d. Gain knowledge about agreements and treaties
e. Gain practical knowledge about designing laboratories, patent processing etc

CO-25: Plant Pathology

a. Study of the history of plant pathology
b. Gain knowledge about stages in development of diseases and epidemiology
c. Understanding disease genetics, defence and control
d. Gather knowledge about some common plant diseases caused by fungi, viruses and viroids
e. Gather practical experience through sectional study of plant pathogens

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