Department of Microbiology

Govt. VYT PG Autonomous College, Durg

(NAAC A+, CPE Phase III, DBT STAR College)

Certificate Course in Applied Microbiology

Course Contents, Eligibility, Examination Pattern

Session: 2022-23

DEPARTMENT OF MICROBIOLOGY
GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG
(Former Name – Govt. Arts & Science College, Durg)
NAAC Grade-'A+', CPE Phase-III, DBT-Star College
Website: www.govtsciencecollegedurg.ac.in

Certificate course in Applied Microbiology

The course is aimed at improving the employability prospects of fresh science graduates or Post graduates specialized in microbiology as well as enhancing the skills of experienced scientific talent. It provides deep understanding of various aspects of Microbiology through an Intensive curriculum comprising 6 modules.

Essentially, the trained microbiologists play a very important role in different industries and thus, offers immense career opportunities in research and development and in the manufacturing processes of Biomolecules, Pharmaceuticals, Medical Devices, and other industrial segments of relevance.

Microbiological Quality is one of the Critical Quality Parameter (CQP) of industrial biotechnology, pharmaceutical, Food & Beverage manufacturing and in vitro diagnostic (IVD) industries. It comprises of critical components viz. Checking quality of raw material, in-process material, utilities, environment personal and Quality Control of finished products, thereby finding application in varied industries such as Biopharmaceuticals, Medical Devices, vitro diagnostic (IVD), Pharmaceuticals, Food Production & Safety, Testing Laboratories, Bio-agriculture, Bio-industrial, Contract Research etc.

With a customised curriculum, modules, this course is aimed at providing high end, specific training to the microbiologists, to make them readily employable and reduce the time taken by the industry to train them on these applications.

Course outcomes:

After completion of the lecture component of the course, successful students will be able to:

- Summarize and explain the roles of microbes in pharmaceutical, industrial and food processes
- Relate their microbiological knowledge for identification and diagnosis of human as well as plant pathogens
- Understand the roles of microorganisms in cleaning and fortification of environment
- Know the up-to-date techniques of genetic manipulation of microorganisms

After completion of Laboratory course, students will be able to:

- Demonstrate aseptic technique to handle cultures, microbiological media, and environmental samples safely and effectively
- Show the ability to efficiently and independently use a microscope to observe microorganisms and be able to describe observed characteristics
- Select appropriate traditional and molecular biological methods to study and characterize microbial isolates
- Devise experiments according to the scientific method and collect, interpret, and present scientific data in microbiology and related fields.

Syllabus:

CMB 01 Paper I

Unit 1: Orientation to Applied Microbiology:

- The basic understanding of about various concepts such as understanding the Contamination and contamination control, Role of a microbiologist, Instrumentation and microbiological methods and Sampling- Methods & Practices

Unit 2: Pharmaceutical Microbiology:

- The microbes are responsible for the production of antibiotics, enzymes, vitamins, vaccines, and other pharmaceutical products, Quality Systems (ICH Q10), Quality Risk Management System (ICH Q9), Overview on Good Manufacturing Practices (GMP), Personal & Surface Monitoring, Microbiology Examination of Air, Pharmaceutical water and its generation, Water Testing for Bioburden & Specific Microorganisms, Sterilization Methods for Pharmaceutical products, Endotoxin – origin and impact, Endotoxin Testing

Unit 3: Microbiological Quality of food & Beverage:

- Overview of food spoilage contamination and food borne diseases, principles of Food Preservation, Microbiological Analysis of food, Principles and Applications of HACCP in Food Industry, FSSAI & BIS standards and regulations, Microbiological Analysis of Carbonated and Alcoholic Beverages

Unit 4: Diagnostic Microbiology:

- Studies about pathogenic microbes, their role in human illness, epidemiology, Introduction to in-vitro Diagnostics (IVD), Safety and Specimen Management, Conventional and Rapid methods for Microbial Detection, Immunological and Molecular Biological Methods for detection and identification, Microbial identification and Anti-biotic Sensitivity Testing

CMB 02 Paper II

Unit 1: Biofertilizer and Biopesticide Production:

- Introduction to Biofertilizers, Types of biofertilizers, Advantages of biofertilizers over chemical fertilizers, Introduction to Biopesticides, Types of biopesticides and their function, Mass scale production, scale up and formulation, Preparation of carrier based biofertilizers, Field application techniques HPLC

Unit 2: Industrial Fermentation Technology:

- The exploitation of microbes for use in industrial processes, Design of Fermenter & types, Media for Industrial Fermentation, Aeration & Agitation, Inoculum Development, Instrumentation & Process Control, Specific Fermentation: Organic Acid, Wine, Ethanol, α-amylase, Polysaccharide Production, Downstream Processes, Fermentation Economics

Unit 3: Environmental microbiology:

- Study of function and diversity of microbes in their natural environments, Microbial ecology, microbially mediated nutrient cycling, Geomicrobiology, Bioremediation: use of micro-organisms to clean air, water and soils, wastewater treatment, interactions between microorganisms and plants and plant pathogens.

Unit 4: Microbial biotechnology:

- Recombinant DNA technology, the manipulation of microorganisms at the genetic and molecular level to generate useful products

CMBL 01 Lab course:

List of Experiments:

- Media Preparation, Sterilization, Plating (pour)
- Specific growth characters of Microorganisms
- Enumeration Methods – Serial Dilution, Plating (pour), Membrane Filtration, Plating
- Air Surface Monitoring - Passive and Active Methods
- Culture Purification (streak), Preservation (slant) and Sterility Testing (open funnel method)
- Microbial Identification – Staining, Biochemical tests and molecular characterization
- Specific Microbial QC Tests: Microbial Limit Test (MLT), Sterility Test, Bacterial Endotoxin Test, Phenol Coefficient Test, Most Probable Number
- Sampling methods in Microbiology, sample preservation, data presentation and interpretation

No. of seats: 30

Duration: 06 months (One Semester)

Pedagogy: Lectures, Lab work, case study methodology

Eligibility: Regular students: Life science graduates or Postgraduates with basic knowledge of Microbiology

Fees: Rs1500/- per students

Examination pattern:

- The End-Semester theory examination shall be conducted by the Autonomous Examination Cell for a maximum of 100 marks each.
- Internal Assessment shall be done on the basis of Internal Assessment test (10 marks), Assignments/Seminars presentations /Case demonstrations (10 marks)
- Lab course examination shall be conducted by external examiner with a weightage of 70 marks for seat work and 30 marks as sessional
- No student with less than 75 % attendance shall be permitted to attend the end-semester examination. However, an overall condonation of 10 % is permitted for valid reasons (NCC, NSS, Swachh Bharat) or medical reasons
- To pass a course the student must secure minimum of 40 % in the internal, in the end-semester examination and lab course separately

Name and Signatures

Chairperson / HOD - Dr. Pragya Kulkarni 25.7.22

Subject Expert - Dr. Anita Mahiswar

Subject Expert - Dr. Sonal Mishra

VC Nominee - Dr. Prakash Sahija

Industrial Representative - Shri Amitesh Mishra

Member of other Department - Dr. Ranjana Shrivastava

Student Nominee - Ms. Yogita Lokhande - 25/7/22

Departmental Members

1. Mrs. Rekha Gupta -
2. Mrs. Neetu Das - 25/7/22
3. Ms. Anamika Sharma - 25/07/22