Rajiv Gandhi Institute of Veterinary Education and Research
Kurumbapet, Puducherry – 605 009

A Government of Puducherry Institution

Affiliated to Pondicherry University

1. **Title of the Short-Term course/programme:** Post Graduate Diploma in Diagnostic Microbiology (PGDDM)

2. **Type of the course:** PG Diploma

3. **Department:** Department of Veterinary Microbiology, Rajiv Gandhi Institute of Veterinary Education & Research (RIVER), Puducherry-605 009

4. **Duration of the course:** One year (Hybrid)

5. **Start date: (Month/Year):** September of every Academic Year

6. **Details of Faculty associated with the course**

	Principal Faculty	**Co-Principal Faculty**
Name	Dr. H.K.Mukhopadhyay	Dr. V. M. Vivek Srinivas
Designation	Professor & Head	Assistant Professor
Contact No.	+91 94430 34065	+91 97428 91992
Email	mhirak@rediffmail.com	vivekvet24@gmail.com

7. **Other Departments to be associated with conducting / supporting the Short-Term course:**

    - Centre for Translational Research (CTR), RIVER, Puducherry

8. **About the course**

Diagnostic microbiology is to confirm the infectious diseases by identifying the etiological agent, using variety of techniques such as bacterial or fungal culture or virus isolation, morphological characteristics, biochemical/physiological properties, molecular assays (e.g., PCR), and DNA sequence analysis. Infectious disease causing microbes are identified in different specimens directly or indirectly. The discipline Diagnostic microbiology has been developing to rapidly detect and accurately identify the implicated microorganisms in test specimens through a variety of techniques and uses the information to distinguish between two or more conditions at the different stages of infection/pathogenicity. Diagnostic microbiology used not only in medical, but also important in diagnosing the infectious diseases of animal/ agriculture/ environment. Diagnostic microbiology can also be used to identify pathogens in foodstuffs, vegetables, meat types, processed foods, etc., and can also be used in environmental monitoring to detect the presence of specific microorganisms in various samples, including food materials. The course will provide the theory and use of microbiological techniques in

diagnostics, placing more importance on bacterial or fungal culture or virus isolation/ cell culture techniques , morphological characteristics, biochemical test, serological tests, molecular techniques (PCR, RT-PCR, real-time PCR), bioinformatics (sequence analysis) will be emphasized.

The entire program/ course will be taught by highly qualified professionals and faculty members of VMC, RIVER who have expertise in various subjects (general microbiology, bacteriology, virology, mycology, immunology based diagnostic techniques). The department of VMC at RIVER has been established almost 25 years before and having separate sections for Bacteriology/immunology diagnostics and virology lab/ cell culture facility etc. The lab facilities are equipped with BSC Class II, vertical/ horizontal laminar flow chamber, inverted and fluorescent microscopy, PCR, Electrophoretic apparatus, Gel documentation system, ELISA reader, Bioinformatics tools, etc., at Puducherry shall provide a platform for successfully running the hands-on session of the course. We plan to maintain a maximum annual intake capacity of fifteen undergraduates to maintain an appropriate teacher-student ratio. This would enhance the technical skill of the graduates and also to provide them with quality hand-holding so that our students are well placed in sectors such as hospitals, diagnostic labs, pharma industries, and R&D labs.

9. Scope of the Course

Diagnostic Microbiology has revolutionized the healthcare system by providing rapid and timely diagnosis to ease the treatment modalities. An increase in the incidence of life-threatening diseases, like bacterial, viral, and fungal diseases, primarily drives the high demand for diagnostic microbiology. Hospitals, industries, and research centres account for the largest share of this market. This means an immediate need for trained professionals in the healthcare sector, including diagnostic microbiology. Though the microbiological techniques in India are at par with global standards, we still need to provide skilled professionals who can efficiently use the available resources and technology. Therefore, to meet the demand for skilled, qualified professionals in the field of diagnostic microbiology, we plan to introduce a new one-year practical -based PG diploma course on Diagnostic microbiology at the Department of Veterinary Microbiology (VMC), Rajiv Gandhi Institute of Veterinary Education & Research (RIVER), Puducherry.

10. Objectives of the Course

The course focuses on learning and understanding of major infectious diseases to provide systematic knowledge on the basics and principles of various microbiological/ immunology based techniques for diagnosis and development, as well as troubleshooting for research and utilization in diagnosis.

11. Topics to be covered:

Module 1 (Theory 25 hrs)

- General Classification of bacteria
- Microscopy and Micrometry
- Methods of sterilization and disinfection
- Bacterial culture media
- Cultivation of aerobic and anaerobic bacteria
- Pure culture techniques
- Bacterial stains and techniques
- Bacterial motility
- Antimicrobial susceptibility test
- Biochemical reaction
- Collection, transportation and processing of samples for bacterial disease diagnosis
- Isolation and identification of bacteria from clinical cases

Module 2 (Theory 10 hrs-Online)

- Collection, Transportation and Processing of Samples for Fungal Disease Diagnosis
- Fungal Culture Media
- Culture technique in Fungus
- Staining technique in Fungus
- Antifungal susceptibility test

Module 3 (Theory 25hrs)

- Collection, Preservation, Transport of Sample and their Processing in Virology Laboratory
- Isolation of Viruses
- Cell Culture Techniques; Cryopreservation; Recovery of Cell Cultures and Propagation of Viruses in Cell Culture
- Molecular Technique for Viral Disease Diagnosis

Module 4 (Theory 25hrs)

- Antigens; Adjuvants
- Immunoglobulin’s and its types
- Hypersensitivity
- Serological reactions.
- Agglutination Test
- Precipitation Tests: AGPT, SRID, CIE
- Haemagglutination (HA) / Haemagglutination Inhibition (HI) test
- Enzyme-Linked Immunosorbant Assay (ELISA) Agglutination Test

Practical Session-I (In-person 30 hrs)

- Orientation to a Bacteriology Laboratory
- Preparation of culture media for cultivation of aerobic and anaerobic bacteria / Fungal Culture Media
- Methods of inoculation
- Isolation of bacteria by pure culture
- Simple staining

- Differential staining - Gram's Staining & Staining of acid fast bacilli (AFB)
- Special Staining - Staining of bacterial capsule & bacterial spore
- Bacterial motility
- Antimicrobial/Antifungal susceptibility test
- Biochemical reaction
- Lactophenol Cotton Blue Staining (L.C.B. Mount)

Practical Session-II (In-person 30 hrs)

- Orientation to a Virology Laboratory
- Collection, Preservation, Transport of Sample and their Processing in Virology Laboratory
- Isolation of Viruses in Embryonated Chicken Eggs
- Preparation of Media and Reagents for Cell Culture
- Cell Culture Techniques
- Quantitation of Cells by Viable Cell Counts in a Haemocytometer
- Cryopreservation & Recovery of Cell Cultures
- Preparation of Primary Cell Culture
- Propagation of Viruses and Demonstration of Cytopathic Effect (CPE) by Viruses in Cell Culture
- Molecular Technique (PCR, RT-PCR, qPCR) for Viral Disease Diagnosis
- Raising of Antisera
- Tube/Slide Agglutination Test
- Haemagglutination (HA) / Haemagglutination Inhibition (HI) test
- Precipitation Tests: AGPT, SRID, CIE
- Enzyme-Linked Immunosorbant Assay (ELISA)

12. Outcome:

Successful completion of the research-based PG Diploma Course in Diagnostic Microbiology ensure that the students will acquire:

- The concepts and principles of applications of various microbiological /immunological diagnostic methods based on the suspected pathogen.
- Selection of an appropriate specimen/diagnostic method for a particular disease condition
- Adequate knowledge of recent advances and technological developments in the field of diagnostic microbiology and immunology
- Practical knowledge on various microbiological and immunology based diagnostic tools used in healthcare, industry, and research
- Expertise to perform any diagnostic test with an ability to troubleshoot

13. **Eligibility:**

The minimal eligibility for the students to enrol in the PG diploma course is to have Graduates, BVSC & AH degree or BSc degree in either of the following

subjects; (a) Zoology/Botany, (b) Microbiology, (c) Chemistry, (d) Biochemistry, (e) Life-Science/Bioscience, (f) Agriculture, (g) Biotechnology, (h) Medical Laboratory Techniques (MLT) or BTech in Biotechnology with minimal 55% marks or equivalent grades.

14. Curriculum:

- 4 modules (Online) and 2 Practical Session (In-person) in One year (12 Months)
- Two hours of theory per week, online mode
- Practical component – In-person classes, two times, five days each – one in the middle of the year and another after completing 85% of the course duration. Attendance is compulsory. Exact dates will be intimated.
- Distribution of study material compulsory
- Evaluation:

Theory

- Continuous Assessment (20 Marks) – Submission of two response sheets – one in the middle of the year and another after 85% of course duration.
- Final Examination (80 Marks) – In person examination at the end of year.
- Examination pattern –Subjective questions for a three hour duration.
- Subjective (80 Marks) (16x5 marks – Sixteen out of twenty)

Practical

- Toward the end of the course duration for 100 marks
  - ✓ Practical Exam – 70 marks
  - ✓ Viva-Voce – 20 marks
  - ✓ Record – 10 marks
- Weightage: Theory Vs Practical as per the credit load.
- Minimum marks for passing 50% (Theory plus Practical)

15. Fee: Rs. 25,000/- per annum