

अखिल भारतीय आयुर्विज्ञान संस्थान नागपुर
All India Institute of Medical Sciences Nagpur

An Institute of National Importance
"Passion for Excellence"



Course Curriculum

Post-Doctoral Certificate Course – Infectious Diseases Department of Microbiology

All India Institute of Medical Sciences, Nagpur



DEPARTMENT OF MICROBIOLOGY AIIMS, NAGPUR

MISSION

- To develop innovative, competent, and ethical Clinical Microbiologists capable of contributing to the field of Clinical Microbiology towards better patient care and innovative research in the globally competitive environment.

VISION

- To develop a state-of-art Clinical Microbiology laboratory to provide quality patient care services.
- To carry out frontline research in various disciplines of Microbiology.
- To develop and implement ways and means to ensure quality performance of the Clinical Microbiology laboratory.
- To provide up-to-date evidence-based and holistic theoretical and practical training to the undergraduate and postgraduate students focusing on evolving them into globally competent professionals with a value orientation.
- To foster a conducive milieu for the interdisciplinary research practices thereby promoting appropriate collaborative linkages.

Department of Microbiology
All India Institute of Medical Sciences, Nagpur



Goal

To create proficient specialists who would be competent in multidisciplinary approach for the diagnosis, treatment guidelines and effective management of patients with infectious diseases. To understand the comprehensive practices for better coordination between clinicians and microbiologists in the management of patients with infectious diseases from benchside to bedside.

1. Programme

The PDCC students will be fully supervised by the Faculty posted in the area. Clinical knowledge will be acquired by a variety of means, including close liaison of microbiologists with appropriate medical, surgical and radiological meetings. The PDCC students are expected to develop an understanding of the infectious diseases of the patients from bed to bench. The following inter-relationships will be maintained through multidisciplinary meetings in form of short clinics and regular bench work in the Microbiology department under supervision of clinicians and microbiologists. They would be participating in routine teaching and training programs. The PDCC students during the clinical experiences will have opportunity to observe and manage patients with wide variety of infectious diseases. They will be taking in-patient rotation to various clinical departments during the course tenure under supervision of respective clinician incharges. The PDCC Student will take complete history, examination of the patient, appropriate sample collection, follow up of processed samples in the Department of Microbiology under specialized sections, report validation, diagnosis of the infectious disease conditions and treatment for the same. They will be posted and trained under following specialized areas:

- A. Microbiology** – Bacteriology, Virology, Immunology, Mycology, Mycobacteriology and Parasitology
- B. Clinical Branches** - General Medicine, General Surgery, Pediatrics, Obstetrics & Gynecology, Orthopedics, Critical care medicine (MICU, NICU etc.), Pulmonary Medicine, Gastroenterology, Neurology, Oncology and Hematology, Nephrology, Urology & Transplant unit, Emergency, ENT, Ophthalmology, Dermatology, Neurosurgery, CTVS & Cardiology

1.1 Eligibility: MD/ DNB (Microbiology)

1.2. Entrance Exams for Selection:

- 25 Marks MCQ Test based on subject concerned.
- 25 MCQs of 1 mark each
- No Negative Marking
- Merit list will be displayed for eligibility

2. Syllabus

PAPER-I: Advanced Diagnostic Microbiology

PAPER-II: Diagnosis & Management of Infectious Diseases

2.1 Theory

SECTION I: Microbiology

1. Laboratory techniques in Bacteriology
 - 1.1 Culture techniques
 - 1.2 Maintenance of stock culture
 - 1.3 Storage of chemotherapeutic agents and antibiotic assays
 - 1.4 Techniques of Air and OT samples surveillance
2. Laboratory techniques in Virology
 - 2.1 Serology techniques- ELISA, Rapid tests
 - 2.2 Techniques of Molecular tests like PCR, Filmarray
 - 2.3 Techniques of Genomic sequencing
3. Laboratory techniques in Mycology
 - 3.1 Culture isolation and identification techniques for fungus
 - 3.2 Fungal Identification by MALDI-TOF
 - 3.3 Antifungal susceptibility testing
 - 3.4 Fungal biomarkers
4. Laboratory techniques in Parasitology
 - 4.1 Smear examination and culture techniques
 - 4.2 Newer rapid diagnostic techniques
5. Laboratory techniques in Immunology
 - 5.1 Immunological techniques- Immunochromatography, Immunoprecipitation, Latex agglutination etc.
 - 5.2 Enzyme linked fluorescent assay
 - 5.3 Gel electrophoresis
6. Identification techniques for Mycobacteria
7. Fundamentals of Microbiology including Molecular biology
 - 7.1 Safety measures and use of bio-safety cabinets
 - 7.2 Quality control, quality assurance
 - 7.3 Sterilization and disinfections in the laboratory and wards
 - 7.4 Epidemiological surveillance of diseases
 - 7.5 Pathogenesis of infectious diseases
 - 7.6 Biological standardization
 - 7.7 Bio-statistics for analysis of lab results
 - 7.8 Computerization of laboratory data and reporting
8. Automation in Microbiology
 - e.g. BacT-Alert, VITEK, MALDI-TOF MS, Real Time PCR, Whole Genome Sequencing etc.

SECTION II: Infectious Diseases

- i. Diagnosis & management of Acute febrile illnesses (AFI)
- ii. Diagnosis & management of Acute encephalitis syndrome (AES)
- iii. Diagnosis & management of Acute and chronic hepatitis.
- iv. Diagnosis & management of Pyrexia of Unknown Origin (PUO)
- v. Diagnosis & management of Acquired Immunodeficiency Syndrome (AIDS).
- vi. Diagnosis & management of opportunistic Parasitic infections.
- vii. Antifungal/ antimicrobial prophylaxis during neutropenia & immunodeficiency.
- viii. Diagnosis & management of Blood stream infections.
- ix. Diagnosis & management of CNS infections.
- x. Diagnosis & management of Skin & musculoskeletal infections
- xi. Diagnosis & management of acute rashes and eruptions.
- xii. Diagnosis & management of acute respiratory infection.
- xiii. Diagnosis & management of ventilator associated respiratory infection.
- xiv. Diagnosis & management of upper gastrointestinal tract infection.
- xv. Diagnosis & management of acute and chronic diarrhea, gastroenteritis.
- xvii. Diagnosis and Management of deep-seated chronic infections.
- xvi. Diagnosis and Management of sexually transmitted and pelvic inflammatory diseases.
- xviii. Diagnosis and management of all post-operative infection & SSI.
- xix. Diagnosis & management of infection in immunocompromised patients (cancer, transplant patients etc.)
- xx. Diagnosis & management of zoonotic infections.
- xxi. Diagnosis & management emerging and reemerging infections.
- xxii. Immunology of infectious disease.

2.2 Practical Skills

- Clinical evaluation of the patient
- Differential diagnosis of various infectious diseases
- Laboratory investigations for various infectious diseases
- Treatment guidelines for the infectious diseases
- Management and follow up of the patients.

3. PDCC Activity Programme

1. Topic Seminar*
2. Journal club*
3. Tutorials*
4. Case discussion*
5. Microteaching – once during entire tenure
6. Clinical rounds (Ward rounds) - first half of everyday

Note*: Above mentioned activities will be done twice a month as per schedule.

4. Rotational Posting

A. Clinical Posting: In the first half of the day

Sr. No.	Clinical / ICU Posting	Duration	Learning Objectives
1	Medical and allied wards/ ICU	3 Months	<ol style="list-style-type: none"> 1. To take detailed history of the patient 2. To Perform complete Clinical examination 3. To implement diagnostic stewardship in selecting proper investigations, proper sample collection and correlation of results with clinical condition of patient 4. To guide appropriate antimicrobial therapy 5. To implement infection control practices, standard isolation precautions
2	Surgical and allied wards/ ICU	3 Months	
3	Pediatric wards/ ICU	2 Months	
4	Obstetrics and Gynecology HDU	2 months	

B. Departmental Posting: Microbiology laboratory posting in the Second half of the day:

Sr. No.	Departmental Posting	Duration	Learning Objectives
1	Bacteriology	3 Months	<ol style="list-style-type: none"> 1. To perform laboratory techniques for identification and susceptibility testing of bacterial isolates, identification and susceptibility testing of bacterial isolates, state of art instruments like MALDI-TOF, Film Array, Vitek Compact, BacT alert etc. 2. To perform laboratory techniques for identification and susceptibility testing of bacterial isolates, state of art instruments like MALDI-TOF, Filmarray, Vitek Compact, BacT alert etc. 3. To assure Quality Control instruments like MALDI-TOF, Filmarray, Vitek Compact, BacT alert etc.

			<p>pertaining to bacteriological techniques</p> <p>4. Timely communication and follow up of the MDR strains isolated and reported in the laboratory</p> <p>5. Making of Antibiogram</p>
2	Serology	2 Months	<p>1.To perform laboratory techniques for various serologic tests like ELISA, VIDAS, Rapid tests</p> <p>2.To assure Quality Control pertaining to serological techniques</p>
3	Mycobacteriology	1 Months	<p>1.To perform laboratory techniques for identification of M tuberculosis, M. leprae, Atypical Mycobacteria.</p> <p>2.To perform laboratory techniques for antitubercular drug testing</p> <p>3.To assure Quality Control pertaining to mycobacterial techniques</p>
4	Mycology / Parasitology	2 Month	<p>1.To perform laboratory techniques for identification of various pathogenic fungi</p> <p>2.To perform laboratory techniques for antifungal susceptibility testing</p> <p>3.To assure Quality Control pertaining to serological techniques</p> <p>4.To perform laboratory techniques for identification of various protozoa, helminths</p> <p>5. To perform PCR for parasitic identification</p>
5	Virology	2 Month	<p>1.To perform laboratory techniques for various tests like PCR, ELISA, FilmArray etc. for identification of viral agents</p> <p>2. To assure Quality Control pertaining to virology techniques</p>

5. Project work

The PDCC student should complete a short project work on relevant subject before appearing for the professional exam.

6. Assessment Plan

6.1 Formative Assessment

A	Theory	50 marks	MCQs = 20 x 1 = 20 marks Short Notes – 4 x 5 = 20 marks LAQ – 1 x 10 = 10 marks
B	Practical	50 marks	Case presentation – 1 x 20 = 20 marks OSPE – 15 marks VIVA – 15 marks

6.2 Eligibility for Professional Assessment:

- Candidate should secure a minimum of 40% marks in Theory and Practical separately in formative assessment, in order to be eligible to appear for Professional Examination
- 75% attendance is mandatory
- Progress report at the end of six months should be satisfactory
- Completion of project work is mandatory
- It is desirable that PDCC students should present one poster/ paper presentation at National/State/Regional conference and to submit one research paper (sent/accepted for publication/published) during period of their PDCC course.

6.3 Final Professional Assessment

A	Theory	50 marks	MCQs = 20 x 1 = 20 marks Short Notes – 4 x 5 = 20 marks LAQ – 1 x 10 = 10 marks
B	Practical	50 marks	Case presentation – 1 x 20 = 20 marks OSPE – 15 marks VIVA – 15 marks

Note:

- For certification the Qualifying marks will be 50% Marks Separately in Theory & Practicals in the Summative exam.
- Repeat Summative Exam in 45 Days after results.

7. Eligibility Criteria for Appearing in Professional Exam

Sr. No.	Parameters	Criteria
1	Internal Assessment marks	40% Marks in formative exam separately in Theory & Practical
2	Project work	Successful completion
3	Attendance	≥75%
4	Poster & Paper presentation in conference	Minimum 1 poster (&/or) paper presentation
5	Peer reviewed Indexed Publication	Minimum one (Accepted / published /sent for publication)
6	Progress Report (at the end of 6 months)	Satisfactory Progress Report

8. Recommended Reading

- Principles and Practice of Infectious Diseases. Mandell, Douglas, and Bennett's
- Principles of Internal Medicine. Harrison's
- National and internal guidelines of laboratory diagnosis and management of infectious diseases- WHO/CDC/MOFHW/ICMR/NCDC/ISHAM/HICSI/IAP/ Various clinical guidelines.
- Medical Mycology, a practical approach, IRL Press E G V Evans and M D Richardson
- Anaerobic microbiology, A practical approach, IRL press. P N Levett
- Bacterial Pathogenesis, a molecular approach, ASM press. Abigail A Salyers and Dixie D. Whitt
- Bailey Scott's Diagnostic Microbiology. Ellen Jo Baron lance R Peterson and Sidney M Finezold.
- Molecular Cloning, a laboratory manual 2nd edition J Sambrook, E F Fritsch and T Maniatis CS Hpress.
- AIDS causes and prevention, Mittal publications T B L Jaiswal
- Medical Mycology 3rd edition, W B Saunders John W Rippon Company
- Mackie & McCartney, Practical Medical Microbiology 14th edition, Churchill Livingstone. J G Collee, J P Duguid, A G Fraser and B P Marmion
- Topley & Wilson, Principles of Bacteriology, Virology and immunity 10th edition, Edward Arnold M Tom Parker and Leslie H Collier
- Current protocol immunology, Current Protocols. J E Coligan, A M Kruisbeek, A H

- Margulies, E M Shevach and W Strober
- Gradwohl's Clinical Laboratory methods and A C Sonnenwirth and L Jarett Dial Tosis 8th edition, B I Publications Ltd
 - Clinical Microbiology procedures hand book, ASM press H D Isenberg
 - Manual of Clinical Microbiology, ASM press. A Balwos, W J Hausler, K L Herrmann, HD Isenberg and H J Shadomy.
 - Textbook of Medical Virology. Bajjayantimala Mishra Edition: 2nd Ed. Publisher: CBS Publishers, New Delhi.
 - Fields Virology, 6th Edition. Edited by David M. Knipe and Peter M. Howley. Philadelphia, PA, USA. Lippincott Williams & Wilkins.
 - Medical Virology 4th Edition. by D. E. White (Author), Frank J. Fenner
 - Textbook of Microbiology. 4th revised/ 2012. C.P. Baveja. Aarya publishers.
 - Essentials of Medical Microbiology. 3rd edition. Apurba Sankar Sastry, Sandhya Bhat K. Jaypee publishers.
 - Parasitology: Protozoology & Helminthology. K D Chatterjee. CBS Publishers & Distributors Private Limited.

List of Journals:

- Infection & Immunity.
- Clinical infectious diseases.
- Nature Medicine.
- Am J Epidemiology.
- J Infection Disease.
- J Virological Method.
- J Clin Microbiology
- Antimicrobial Agents & Chemotherapy.
- J. Immunology.
- New England J Med.
- J Clin Microbiology.
- JAMA.
- American J ClinPathol.
- Lancet.
- J Med Virology
- J Clin Virology

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LOG BOOK

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Department of Microbiology

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Department of Microbiology



Certificate by the Head of Department

This is to certify that the performance of Dr. _____, during the period _____ to _____, has been **satisfactory/ average / unsatisfactory.**

Overall Grading:_____

Date:_____

Name and Signature of HOD:

अखिल भारतीय आयुर्विज्ञान संस्थान, नागपुर
ALL INDIA INSTITUTE OF MEDICAL SCIENCES, NAGPUR
Department of Microbiology



Certificate by the PDCC Guide

This is to certify that project entitled _____
_____ is a project carried out
by Dr. _____ PDCC student in the Department of Microbiology
admitted in the session _____ under my guidance
and supervision at All India Institute of Medical Sciences (AIIMS), Nagpur in
fulfilment of the requirement for the PDCC in Infection Control in the Department of
Microbiology by All India Institute of Medical Sciences (AIIMS), Nagpur.
He / She has an attendance of _____%, during the period _____ to _____.

Overall Grading: _____

Date: _____

**Name and Signature of PDCC
Guide:**

अखिल भारतीय आयुर्विज्ञान संस्थान, नागपुर
ALL INDIA INSTITUTE OF MEDICAL SCIENCES, NAGPUR



PDCC Course Hospital Infection Control

SECTION I

Name of the PDCC student: _____

Department: _____

Admitted in (Month and Year): _____

Name of the PDCC Guide: _____

Attendance: _____ days out of _____ days (__ %)

SECTION II

1. Case Presentations:

Sr. No.	Title of case	Date	Faculty I/C	Marks (10 Marks)

2. Tutorials

Sr. No.	Topic	Date	Faculty I/C	Marks (10 Marks)

3. Seminars:

Sr. No.	Title of presentation	Date	Faculty I/C	Marks (10 Marks)

4. Journal Clubs:

Sr. No.	Article presented in Vancouver style	Date	Faculty I/C	Marks (10 Marks)

5. Marks obtained in formative test:

Sr. No.	Date	Theory (100 M)	Practical (100 M)	Marks obtained (out of 200 Marks)

6. Any other academic activity conducted: _____

SECTION III

1. Papers presented

Sr. No.	Title of Paper	Authors	Event	Date

2. Posters presented

Sr. No.	Title of Poster	Authors	Event	Date

3. Publications

(Note: Mention only those publications that are published or are accepted for publication during the said period only)

Sr. No.	Title of Paper	Authors	Journal	Year/Vol/ Issue	Page Nos	Index/ Non-Indexed	Status

SECTION IV

Any other significant achievement:

12. National action plan for antimicrobial resistance was started in India in
- 2015
 - 2016
 - 2017
 - 2018
13. All of the following are Restricted Antimicrobial except
- Colistin
 - Cefotaxime
 - Carbapenem
 - Polymyxin
14. Cross resistance of isoniazid is seen with
- Rifampicin
 - Ethionamide
 - Cycloserine
 - Ethambutol
15. Drug resistance in mycobacterium tuberculosis is due to
- Conjugation
 - Transduction
 - Mutation
 - None of the above
16. Drug of choice to treat acyclovir resistant Herpes Simplex virus (HSV) infection is
- Foscarnet
 - Valacyclovir
 - Abacavir
 - Ganciclovir
17. Which clinical situation would be appropriate for treatment with a narrow-spectrum antimicrobial drug?
- Treatment of a polymicrobial mixed infection in the intestine
 - Prophylaxis against infection after a surgical procedure
 - Treatment of strep throat caused by culture identified *Streptococcus pyogenes*
 - Empiric therapy of pneumonia while waiting for culture results
18. All the following genes are found in *Staphylococcus aureus* EXCEPT –
- mecA*
 - rpoB*
 - mexS*
 - gyrA*
19. Recommended initial therapy for *Candida auris* by CDC –
- Echinocandins
 - Azoles
 - Polyenes
 - Antimetabolites
20. Which organism is intrinsically resistant to Colistin?
- Pseudomonas aeruginosa*
 - Stenotrophomonas maltophilia*
 - Burkholderia cepacia*
 - Acinetobacter baumannii*

Short Answer Questions (5 X 4 = 20 marks)

- A hospital outbreak of *Clostridioides difficile* infection has been reported. What infection control measures should be implemented to limit the spread within the healthcare setting?
- A 45-year-old immunocompromised patient presents with a chronic cough, haemoptysis, and weight loss. A chest X-ray shows cavitory lesions in the lungs. How will you proceed to manage this patient?
- A 14-year-old boy was admitted to the emergency with a history of fever, myalgia, sweating, and vomiting for the last 7 days. On examination, he had inguinal lymphadenopathy and a necrotic, scab-like black eschar on his thigh. Discuss laboratory diagnosis and management of this case.
- Evaluate the management of opportunistic infections in HIV-positive patients.

Long Answer Questions (1 X 10 = 10 marks)

- Assess the challenges and successes of the National Viral Hepatitis Control Program (NVHCP). What steps are needed to achieve the goal of eliminating hepatitis C as a public health threat by 2030?