

POST GRADUATE DIPLOMA PROGRAMME
IN
MOLECULAR BIOLOGY AND PATHOLOGY OF VIRUSES
2020-21



One of the premium centres for molecular genetics
Paul Hebert Centre for DNA Barcoding and Biodiversity Studies



Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY
AURANGABAD-541004 (INDIA)

POST GRADUATE DIPLOMA PROGRAMME

Duration of the course: One year (Two semesters)

Admission Process

Selection of the students in Post Graduate Diploma course will be done through written test / interview at PHCDBS, Aurangabad

No. of Seats: 10
(Reservation as per GOI guidelines)

Eligibility

B. Sc. (Life Science stream), B.Pharmacy, B.V.Sc., MBBS, Agricultural Sciences with atleast 60% marks are eligible for admission

Evaluation Procedure: As per University rules

Proposed Course fee

1. Admission Fee (One time)	Rs. 2000/-
2. Tuition Fee per semester for regular candidate	Rs. 26000/-
3. Tuition Fee per semester for sponsored candidate	Rs. 52000/-
4. Security Deposit (refundable)	Rs. 10000/-

Proposed Timeline

Commencement of academic year	April 21 st , 2021
Enrolment	April 1-10, 2021
Declaration of Results	April 11 th , 2021
Aptitude test/interview	April 15 th , 2021
Intimation to shortlisted candidates	April 16 th , 2021
Application closing	April 20 th , 2021
Date of closing	April 21 st , 2021

Postgraduate diploma in Molecular Biology and Pathology of Viruses

Overview

Student will engage with experts from many areas of virology and molecular biology in a wide range of topics. These areas have seen recent major advances in the understanding of the structure of viruses, molecular mechanisms of virus replication, virus disease pathogenesis, the emergence of novel viruses and the diseases threats that they pose. Understand viruses, the diseases they cause, and how to diagnose, control and prevent infections. Cover topically relevant viruses such as novel coronaviruses and the Ebola and Zika viruses.

This course aims to equip you with the knowledge and skills to pursue a career in academic or industrial research, providing a solid foundation to go on to study at PhD level.

By the end of the programme, student will develop the ability to critically evaluate the scientific literature. Student will enhance his written and oral communication skills and the ability to present scientific ideas. Student will acquire proficiency in a range of important research techniques during the Mini-Research project and will build on these in the 6-month research project.

Under the supervision and guidance of senior academics, student will investigate an important research problem. Student will choose your subject from those be available in one of the laboratories in Paul Hebert Centre for DNA Barcoding and Biodiversity Studies or an associated external institution.

Course description

Many of the world's greatest global health challenges arise from viral infections such as novel coronaviruses and the Ebola and Zika viruses. To tackle these major health threats, we need well-trained virologists with the knowledge and skills to diagnose, treat and prevent such disease.

Postgraduate Virology course will provide education and training in medical virology to equip Student with the molecular skills and knowledge to understand the increasingly important role molecular and bioinformatic analysis plays in modern virology.

Student will acquire in-depth knowledge and understanding of viruses, the diseases they cause and how they cause them through the taught element of the course. Student will also look at how to diagnose, control and prevent infections in individuals and communities.

Later in the course, Student will choose a research project and carry it out under the supervision of an academic or clinical supervisor, depending on interests. This is opportunity to study a relevant and topical question in medical virology using state-of-the-art techniques and facilities.

By combining academic study with the practice of clinical virology in the health service, our PG course is highly relevant and at the cutting edge of medical and molecular virology.

Study programme

The programme is comprised of two parts:

Taught component: Student will learn through lectures, seminars, and extended case study-based practical laboratories, among other teaching methods. Student will be encouraged to develop independent thinking and leadership skills.

Student will also learn to plan and design a research project using a blended learning approach through online resources and discussion with an individually assigned supervisor (5 months).

Research project: full-time laboratory based research project completed in the last term (6 months)

The taught component is comprised of lectures, laboratory practical, tutorials and student presentations and covers the most important aspects of viruses and viral diseases.

Careers

Student will acquire the skills and knowledge required for a career as a modern virologist.

Student will be well placed to pursue a career as a diagnostic laboratory scientist or manager, or as a scientist in industry or academia in medical and/or molecular virology, or in any of a number of biotechnology fields relevant to virology.

These include:

- gene therapy (where recombinant viruses are the mainstay of the technology);
- molecular biology particularly next generation sequencing and new virus discovery;
- vaccinology;
- antiviral development;
- epidemiological and public health control.

For medically qualified applicants, the course will benefit those wishing to specialise in virology or infectious diseases, or pursue a clinical academic route in this or related subjects.

The course is also an excellent stepping stone to PhD research in virology or a related subject.

Postgraduate diploma in Molecular Biology and Pathology of Viruses

Course teaching and evaluation Structure

Course Code	Subjects	Contact Hrs. per Week				Examination Scheme					Credits	Duration of Examination
		L	T	P	Total	TA	CT	PR	ESE	Grand Total		
PGDV-001	Introductory Medical & Molecular Virology	2	0	4	6	10	20	30	40	100	4	2 Hrs.
PGDV-002	Molecular Biology of viruses	2	0	4	6	10	20	30	40	100	4	3 Hrs.
PGDV-003	Viral Pathology & Evolution	2	0	4	6	10	20	30	40	100	4	3 Hrs.
PGDV-004	Viruses & Disease 1	2	1	2	5	10	20	30	40	100	4	3 Hrs.
PGDV-005	Viruses & Disease 2	2	1	2	5	10	20	30	40	100	4	3 Hrs.
	Seminars & Review on the Research paper	0	0	2	2	25	25	25	25	100	1	3 Hrs.
Total of Semester-I										600	21	
PGDV-006	Bioinformatics & Statistics	2	0	0	2	10	20	30	40	100	2	3 Hrs.
PGDV-007	Research Skills in Practice	0	2	12	14	10	20	20		100	8	
	Scientific report/review publication/submission	-	-	-	-	-	-	-	50			
PGDV-008	Research Projects (Dissertation + Viva-Voce examination)	0	0	20	20	20			60	100	10	
Total of Semester										300	20	
Course Total										900	41	

Periods:

L: Lecture Hrs. per week
 T: Tutorial Hrs. per week
 P: Practical Hrs. per week

Evaluation Scheme:

TA: Teachers Assessment
 CT: Class Test
 PR: Practical
 TOT: Total for sessional examination of evaluation scheme.
 ESE: End Semester examination.

Class Test Duration: 1 hour; Semester end Examination: 3 hours

COURSE DETAIL

Student take all of the core modules below

Course PGDV-001: Introductory Medical and Molecular Virology

Overview

The unit will focus on the general concepts in medical and molecular virology. These will include the varied structure and replication mechanisms of viruses and how the host immune system responds to infection. This understanding will be used to explore how viruses cause disease and how the immune response and molecular structure can be helpful in informing diagnosis, management and prevention of infection and disease.

The unit will comprise a mixture of lectures, seminars and practical laboratory classes.

Aims

Develop and/or consolidate the knowledge and understanding of the concepts and tools used in medical and molecular virology. This learning is essential to allow access to the advanced material delivered in the following 3 units of the programme.

Teaching and learning methods

Teaching and Learning processes will include lectures, structured practical laboratory classes, and seminars. Resource materials will be provided via Blackboard.

Knowledge and understanding

A systematic understanding of viral structure, classification and replication and how this differs between viral species.

Understand the normal human immune response to viral infection and how this influences disease pathogenesis.

Systematic understanding of how viruses are detected and viral infections are diagnosed to enable critical evaluation of the most appropriate diagnostic methods for particular situations.

Current and comprehensive understanding of the principles of control and prevention of virus infection including knowledge of the science underlying antiviral chemotherapy and vaccine development.

Critical awareness of management and treatment strategies for viral infections

Intellectual skills

Critically analyse, evaluate and interpret the results of controlled experiments and from different technological platforms and integrate theory and practice

Be able to articulate orally and in writing why particular diagnostic and management strategies are, or are not, appropriate.

Begin to consider ethical issues associated with viral infections and formulate independent views on these.

Show development of planning and organisational skills

Practical skills

Be able to carry out standard laboratory techniques in medical and molecular virology demonstrating competency and awareness of health and safety issues.

Use conventional and electronic resources to synthesise and analyse relevant scientific information. Present information clearly in the form of written reports

Transferable skills and personal qualities

Efficiently utilise resources in a laboratory environment where data is required within a given timeframe and using limited reagents

Start to work effectively in a team by carrying out tasks within a small group in a structured laboratory situation, and by problem solving within a group setting.

Be able to assimilate complex ideas and translate them in written form to present new information in a concise but understandable format.

Assessment methods

Method	Weight
Written assignment	50%
Set exercise	50%

Study hours

Independent study hours	
Independent study	150

Course PGDV-002: Molecular Biology of Viruses

Overview

The unit will focus on the general concepts of molecular biology, and genetics. These will include the DNA replication mechanisms transcription, translation, signaling pathways and gene regulations. More emphasis will be given on structure of virus particles, capsids, nucleocapsids and membranes; virus assembly; cell receptors and entry mechanisms; intracellular transport and virion release; virus transmission; effects of viruses on host cells; virus genome structures and coding strategies; transcriptional and post-transcriptional control of gene expression; the virus replication cycle in RNA viruses, DNA viruses and retroviruses; the role of virus non-structural proteins in genome replication. This understanding will be used to explore how viruses cause disease and molecular structure can be helpful in informing diagnosis, management and prevention of infection and disease.

The unit will comprise a mixture of lectures, seminars and practical laboratory classes.

Aims

Develop and/or consolidate the knowledge and understanding of the concepts and tools used in molecular genetics. This learning is essential to allow access to the advanced material delivered in the following 3 units of the programme.

Teaching and learning methods

Teaching and Learning processes will include lectures, structured practical laboratory classes, and seminars. Resource materials will be provided e-resources and in the class.

Knowledge and understanding

A systematic understanding of DNA, molecular processes at genomic and proteomic level.

How viral DNA/RNA interfere cellular processes and cause disease. Understanding viral genetics and its diagnostics.

Intellectual skills

Critically analyse, evaluate and interpret the results of genetic analysis of controlled experiments and from different technological platforms and integrate theory and practice

Be able to articulate orally and in writing why particular diagnostic and management strategies are, or are not, appropriate.

Begin to consider ethical issues associated with viral infections and formulate independent views on these.

Show development of planning and organisational skills.

Practical skills

Be able to carry out standard laboratory techniques in medical and molecular genetics demonstrating competency and awareness of health and safety issues.

Use conventional and electronic resources to synthesise and analyse relevant scientific information

Present information clearly in the form of written reports

Transferable skills and personal qualities

Efficiently utilise resources in a laboratory environment where data is required within a given timeframe and using limited reagents

Start to work effectively in a team by carrying out tasks within a small group in a structured laboratory situation, and by problem solving within a group setting.

Be able to assimilate complex ideas and translate them in written form to present new information in a concise but understandable format.

Assessment methods

Method	Weight
Written assignment	50%
Set exercise	50%

Study hours

Independent study hours	
Independent study	150

Course PGDV-003: Viral Pathology and Evolution

Overview

The unit will focus on the innate and adaptive immune responses to virus infection; evasion of host defenses by viruses; mechanisms of cell injury; virus-related diseases; acute, persistent and latent infections; viruses and cancer; diagnostics; vaccines; antiviral therapy; gene therapy strategies; epidemiology; vectors and routes of transmission; genetic variation and evolution of viruses; emergence and re-emergence of viruses; virus-like agents and the origins of viruses. The unit will comprise a mixture of lectures, seminars and practical laboratory classes.

Aims

Develop and/or consolidate the knowledge and understanding of the concepts and virus evolution at molecular level. This learning is essential to allow access to the advanced material delivered in the following 3 units of the programme.

Teaching and learning methods

Teaching and Learning processes will include lectures, structured practical laboratory classes, and seminars. Resource materials will be provided e-resources and in the class.

Knowledge and understanding

A systematic understanding of viral evolution and related genetic engineering.

How virus DNA/RNA changes interfere cellular processes and cause disease.
Understanding viral genetics and its diagnostics.

Intellectual skills

Critically analyse, evaluate and interpret the results of genetic analysis of controlled experiments and from different technological platforms and integrate theory and practice

Be able to articulate orally and in writing why particular diagnostic and management strategies are, or are not, appropriate.

Begin to consider ethical issues associated with viral infections and formulate independent views on these.

Show development of planning and organisational skills.

Practical skills

Be able to carry out standard laboratory techniques in medical and molecular evolution demonstrating competency and awareness of health and safety issues.

Use conventional and electronic resources to synthesise and analyse relevant scientific information

Present information clearly in the form of written reports

Transferable skills and personal qualities

Efficiently utilise resources in a laboratory environment where data is required within a given timeframe and using limited reagents

Start to work effectively in a team by carrying out tasks within a small group in a structured laboratory situation, and by problem solving within a group setting.

Be able to assimilate complex ideas and translate them in written form to present new information in a concise but understandable format.

Assessment methods

Method	Weight
Written assignment	50%
Set exercise	50%

Study hours

Independent study hours	
Independent study	150

Course PGDV-004: Viruses and Disease 1

Overview

This course will cover Virology and clinical features, Diagnosis including molecular diagnosis
Epidemiology and global Impact, Treatment, management and prevention of diseases in the following disease settings:

- Congenital and antenatal viral infections
- Childhood infections
- Respiratory viral infections.

The unit will also cover current areas of research interest in each of these viral syndromes.

Aims

Develop the conceptual knowledge and understanding gained in the previous unit and apply it to specific viral diseases and syndromes. In particular the unit will cover disease in a congenital and antenatal setting, viral infections of childhood and respiratory viral infections and disease.

Teaching and learning methods

Teaching and Learning processes will include lectures, structured practical laboratory classes, and seminars. Resource materials will be provided.

Knowledge and understanding

Be able to identify and show depth of knowledge of the viruses that cause disease in pregnancy and infancy, childhood and via respiratory infection.

Have a critical understanding of the particular problems and ongoing challenges that viral infections cause in these settings.

Understand how the above viral infections are diagnosed including the importance and limitations of molecular methods.

Demonstrate a knowledge of current viral treatment and prevention strategies, how they are applied with respect to these infections and how effective they are.

Understand how the above viral infections are transmitted and how they impact on and affect global health.

Identify a current area of research in at least one of these areas of viral infection.

Intellectual skills

Synthesise and critically evaluate relevant scientific literature.

Present scientific and clinical data in an appropriate format.

Formulate a critical argument

Apply knowledge about viruses to solve clinical case studies.

Practical skills

Present information clearly in written form

Competently and safely carry out supervised laboratory tasks.

Begin to handle bioinformatic data sets

Clearly record laboratory methods and data

Transferable skills and personal qualities

Critically evaluate information from a variety of sources.

Interpret data and understand its significance to a particular viral infection

Demonstrate good time management and organisational skills in the laboratory setting.

Make a valuable contribution within a team

Assessment methods

Method	Weight
Written exam	50%
Written assignment (inc essay)	50%

Study hours

Independent study hours	
Independent study	150

Course PGDV-005: Viruses and Disease 2

Overview

Virology and clinical features
Diagnosis including molecular diagnosis
Epidemiology and global Impact
Treatment, management and prevention of diseases
In the following disease settings:

- HIV and other Retroviruses
- Hepatitis viruses
- Viral infections in immunocompromised patients
- The unit will also cover current areas of viral research interest in each of these three areas.

Aims

Provide students with a detailed and applied knowledge and understanding of the viruses which cause hepatitis, the human retroviruses including human immunodeficiency virus and of the role of viruses in causing disease in immunocompromised persons.

Teaching and learning methods

Teaching and Learning processes will include lectures, structured practical laboratory classes, and seminars and student-led presentations. Resource materials will be provided via Blackboard.

Knowledge and understanding

Be able to identify and show depth of knowledge of the hepatitis viruses, of HIV and other retroviruses and of the viruses that are particularly problematic in immunocompromised patients.

Have a critical understanding of the particular problems and ongoing challenges that these types of viral infections cause.

Understand how the above viral infections are diagnosed including the importance and current limitations of molecular methods.

Demonstrate a knowledge of current viral treatment and prevention strategies, how they are applied with respect to these infections and how effective they are.

Understand how the above viral infections are transmitted and how they impact on and affect global health.

Identify a current area of research in at least one of these areas of viral infection.

Intellectual skills

Synthesise and critically evaluate relevant scientific literature.

Present scientific and clinical data in an appropriate format.

Understand ethical issues associated with virology, particularly with regards to diagnosis and treatment of HIV infection, including different cultural and societal viewpoints and be able to articulate these.

Practical skills

Manipulate and analyse bioinformatic data and be able to use it to identify antiviral drug resistance

Work with increasing independence to design and carry out laboratory assays.

Carry out routine laboratory techniques competently and safely.

Keep clear records of methods and data collection in the laboratory.

Present information clearly and concisely in written and oral form

Transferable skills and personal qualities

Critically evaluate information from a variety of sources.

Interpret data and understand its significance to a particular viral infection

Demonstrate good time management and organisational skills in the laboratory setting.

Demonstrate oral presentation skills.

Make a valuable contribution within a team

Assessment methods

Method	Weight
Written exam	50%
Written assignment (inc essay)	50%

Study hours

Independent study hours	
Independent study	150

Course PGDV-006: Bioinformatics & Statistics

Overview

Bioinformatics is a broad scientific research field that combines biology, computer science, data science, mathematics and statistics to drive the analysis of the vast amount of data associated with modern bioscience.

In this post-genomics revolution era, a huge amount of that information relates to the study of DNA, RNA, and proteins, and the complex networks and ecosystems in which living organisms interact, as well as the crucially important metadata - data about data - which puts “omics” data in context.

It's quite complicated, and sometimes divisive, to unravel precisely what bioinformatics is, and it depends on who you ask, but that definition will make do for the purposes of this article.

Course PGDV-007: Research skill in practice

Overview

Student will be provided with research methods, material and expertise to safely perform laboratory based experimental work and to analyse and interpret your data to address the objectives of the project.

Research Evaluation and Communication

Student will develop your critical judgement and communication skills. Student will learn and develop techniques and strategies to study the structure of research publications and the functions of the different elements; carry out critical analysis of propositions and findings based on detailed evaluation of the evidence presented; optimise literature reference searches; compile bibliographies; write effectively; produce reviews on specific topics; design research projects; write applications for funding support.

Course PHCDBS-1-006: Laboratory Based Research Project

During the 6-month research project Student will be working in one of the research laboratories at Paul Hebert Centre for DNA Barcoding and Biodiversity Studies or an associated external institution to experimentally address one specific scientific project. Student will be allocated a project based on several criteria: project availability, students' choice and prospective supervisors' comments. You will meet with the prospective supervisors to discuss their projects before you state their preferences for specific projects.

Research Module

Student begin his/her research project in the second term and continue to work on his project for six-months. Student will complete a 10,000 word thesis and give an oral presentation at the end of the academic year.

Most projects are carried out at the Paul Hebert Centre for DNA Barcoding and Biodiversity Studies, with the option to conduct his project at other external research institutions and companies in Aurangabad.

Teaching and assessment

Teaching methods

Student will be an active participant in a variety of learning and teaching approaches. These focus on the knowledge, skills and abilities required by working scientists. Student will be required to study independently and in teams prior to face to face sessions.

These will be in the form of:

- Seminars
- Group tutorials
- Lectures
- Journal clubs
- Data interpretation sessions
- Group work sessions
- Laboratory skills sessions

Student will have the opportunity to attend a conference (registration fees, accommodation and transport costs are covered by the programme). Here student will gain insight into the forefront of the discipline from the conference speakers.

During your laboratory based project, student will learn from interacting on a daily basis with researchers, presenting in lab meetings, attending seminars, observing others and receiving feedback on his/her work.

Assessment methods

Summative assessments will be in the form of:

- Written examinations
- Short abstract or summary of scientific writing
- Production of a poster and an oral poster presentation
- Individual written project report (Mini-Research Project)
- Literature review
- Research grant proposal
- Research project thesis and oral exam (viva voce)

Facilities available

First established as a core genomics facility to enable research programs of the PHCDBS's scientific team, is now the India's largest analytical hub for DNA barcoding with the primary goal of delivering the most reliable and comprehensive species genetic identification service.



Sanger Sequencing Platforms

PHCDBS developed own protocol to cut the sequencing costs, affordable to our users



Next Generation Sequencing Platforms for second line massive sequencing of genomes and metagenome projects



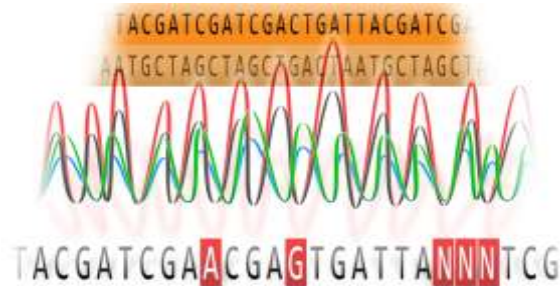
Services

The Paul Hebert Centre for DNA Barcoding and Biodiversity Studies provides analytical support to its academic partners, government researchers, and private sector clients. Building on its expertise in field operations, molecular biology, and bioinformatics and strengthened by more than a decade of leadership in the DNA barcoding community, the PHCDBS offers a wide range of services.



Sequencing Services

Our end-to-end DNA barcoding and other genomic solutions begin with user consultation and finish with a sample-to-answer workflow. All stages are completed in our core analytical facility.



The PHCDBS has the research infrastructure and expertise to support both discovery science and applied research. Whether your project involves assembling a barcode reference library or environmental assessment, our staff can complete every step from sampling and databasing to data generation and interpretation.

For every project – from a single sample to thousands of specimens, from high to low DNA concentrations, from single source to mixed samples, from biological traces to eDNA detection – we use conventional protocols and break-through patented techniques powered by liquid handling platforms and sequencing technologies from Sanger and third



COVID 19 Testing and Research Facility

PHCDBS is operating a state-of-the-art COVID 19 testing and research facility in the service of common public in Marathwada region.