

**THE TAMILNADU Dr.M.G.R. MEDICAL UNIVERSITY,
No.69, Anna Salai, Guindy, Chennai – 600 032.**

**D.M/ M.Ch
SUPER SPECIALTY DEGREE COURSE**



SYLLABUS AND CURRICULUM

2021-2022

D.M. - VIROLOGY

THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY, CHENNAI
Syllabus - D.M VIROLOGY

1. AIM:

- The discipline of virology has evolved from the initial description of a virus as 'contagium vivum fluidum' in the 19th century, to the concept of the virome in the 21st century. The field is a fascinating and rapidly evolving branch of medicine with immense relevance to humanity and modern medicine.
- Viral diseases are an important contributor to morbidity and mortality instrumental in increasing infectious disease burden in the country, but are often under diagnosed and hence go undetected. Many of the new, emerging and re-emerging pathogens are viruses. Despite the felt need, services for viral diagnosis are still rudimentary at state level colleges in the country, owing to lack of both infrastructure and trained professionals in the discipline. Only a few tertiary care hospitals in the country have the set up of a clinical virology laboratory. There is strong emphasis on building capacity for viral diagnosis and research, with the Indian Council of Medical Research setting up a multi-tier network of virology laboratories across the country. This D.M. programme in virology will also help in enhancing specialized human resources for this activity.
- Much of the progress in virology has been technology and expertise driven, and huge strides were made in the discipline with the advent of cell culture, monoclonal antibodies by hybridoma technology and, finally, nucleic acid-based tests. These have truly changed the face of medical virology, particularly in medicine. It is essential to take this discipline ahead in India, with a super-speciality program in this field.

2. OBJECTIVES

The primary objective of the program is to produce a cadre of specialized medical virologists who would help establish clinical diagnostic services in various hospitals/centres in the country and provide training and knowledge dissemination in this super-speciality.

The secondary objectives of the program are manifold. The candidate is expected to acquire adequate understanding of processes involved in the pre-analytical, analytical and post-analytical phases of the clinical diagnostic laboratory testing for viral infections, as detailed below. At the end of the course, the candidate is expected to be able to:

- Know about sample collection, transportation, processing and storage in an appropriate manner
- Understand the basic principles of viral assays/techniques
- Perform the necessary assays /techniques independently
- Interpret results of assays/techniques, and their clinical significance

- Troubleshoot all problems related to the assays/techniques, after proper root cause analysis
- Discuss results with treating clinicians and advise further investigations
- Assure quality of the assays/techniques concerned
- Plan, write and implement research projects in virology, analyze their results and publish these in peer-reviewed journals
- Advise concerned agencies regarding viral diseases and their outbreaks

3. **THEORY SYLLABUS (INCLUDING BIO-ETHICS):**

a. SUBJECT SPECIFIC THEORETICAL COMPETENCIES

Cognitive domain (Knowledge domain)

At the end of the course the student should be able to understand and describe the following, in the context of the medically important viruses listed in the syllabus below:

1. The morphology and genomic organization of the virus
2. The epidemiology of the viral infection
3. The clinical presentation of the viral illness
4. The immunopathogenesis of the infection
5. The laboratory diagnosis of the virus, including conventional and molecular approaches.
6. Prophylaxis, management and treatment of infection

b.Syllabus

A. General Virology

- Principles of viral structure
- Viral taxonomy
- Replication of DNA and RNA viruses
- Innate responses to viral infections
- Adaptive immune response to viral agents
- Pathogenesis of viral infections
- Viral evolution
- Epidemiology of viral infections
- Bacteriophages
- Antiviral agents - mechanisms of action, PK/PD, clinical indications
- Antiviral resistance testing
- Immunization against viral diseases
- Diagnostic virology
- Bio safety, Bio Security & Containment Modalities

B. Systemic Virology

B.1. DNA viruses

B.2. RNA viruses

B.3. *Virions*

B.4. *Prions*

C. Clinical virology

Viral infections of the skin - including pediatric exanthems and enanthems

Viral respiratory infections - rhinitis, pharyngitis, croup, bronchiolitis, pneumonia etc.

Viral CNS infections - encephalitis, meningitis, acute flaccid paralysis, etc.

Viral gastroenteritis - viruses causing diarrhoea

Viral hepatitis – e.g., due to HAV, HBV, HCV, HDV, HEV etc.

Viral infections in the immunocompromised – e.g., in transplant recipients

Congenital viral infections – e.g., due to HCMV, rubella, VZV, HIV etc.

Sexually transmitted viral infections

Ocular viral infections

Oncogenic viral infections

HIV/AIDS

Prion diseases

D. Viral epidemiology

Viral outbreak preparedness, investigation, prevention and control

Emerging and re-emerging viruses

Conventional and molecular epidemiology of viral infections

Biosafety, containment and biosecurity for viruses (including standard precautions, use for personal protective equipment, hospital infection control and biomedical waste management)

Vectors of viral diseases and their control

E. Viral immunology

Immune responses to viral infections

Immunopathogenesis of viral diseases

Viral vaccines and vectors

F. Virological methods

Techniques for viral diagnosis (as listed under the psychomotor domain)

Principles of calibration and preventive maintenance of vital equipments
(Biomedical Engineering)

G. Research methodology

As a part of the common training of all post-graduate

c. Affective domain (attitudes including communication and professionalism)

At the end of the course, the candidate should be able to understand and apply the principles and practices pertaining to the following issues:

- Human ethics (including confidentiality, written informed consent, etc.)
- Animal ethics
- Counselling (pre- and post-test)
- Communication with patients and clinicians
- Professionalism and integrity

4. CLINICAL TRAINING:

During this period the candidates would spend the mornings in the concerned wards and the afternoons in the virology laboratory (processing and following up the clinical samples collected/ received). In the wards, they should assist in ward rounds with senior colleagues in these specialities, attend calls/consultations and participate in the bedside clinical teaching sessions related to cases with suspected viral infections.

a. Laboratory Posting for duration of two years.

1. Medicine (3 months)
2. Pediatrics (especially for congenital infections, viral respiratory infections and gastroenteritis, exanthems, etc.) (3 months)
3. Neurology (2 weeks to 1 month)
4. Transplant Medicine/ Nephrology (for opportunistic viral infections) (2 weeks to 1 month)
5. Oncology/ Haematology (for opportunistic viral infections) (2 weeks to 1 month)
6. Gastroenterology (especially for viral hepatitis) (2 weeks to 1 month)
7. HIV facilities: Counselling, ICTC, PPTCT and ART clinic (2 weeks)
8. Ophthalmology (ocular viral infections) (2 weeks)
9. Dermatology (2 weeks)
10. Community Medicine (2 weeks) with field visits with regard to suspected viral out breaks.

In addition to the above, during the course, the following learning activities should be completed during the two years (3 modules of 6 months each / year)

1. Core curriculum of research methodology, biostatistics, ethics and principles of epidemiology (1 month)
2. Viral diagnostic techniques
 - a. Viral serology: 2 months
 - b. Viral culture and identification (including cell culture): 2 months
 - c. Molecular diagnostic tests in virology: 2 months
 - d. Pathology posting: Histopathology of viral infections: 1 month

b. External postings (arrangements must be formalized by the institution):

II Year POSTINGS:

1. National Institute of Virology/ ICMR Virology Network Laboratory: 1 month

2. Any Indian Veterinary Research Institute (IVRI): 1 month
3. Any viral vaccine manufacturing facility (e.g., Central Research Institute, Kasauli; Pasteur Institute, Conoor; Serum Institute, Pune; etc.): 1 month
4. Any other academic institution with a functional diagnostic virology facility (including molecular virology/ viral culture): 1 month (for learning techniques not available in the parent department)

During II year, students are encouraged to undergo special postings for learning new advanced techniques / Procedure / Skills in institutions of higher repute where the requisite facilities are available without affecting the duties of the parent department.

5. SKILL TRAINING REQUIREMENTS

Psychomotor domain

1. Virological techniques: At the end of the course the student should be able to perform independently, interpret, validate, provide troubleshooting and assure quality, for the following practical techniques:

- Isolation of viruses - Cell (tissue) culture;
- Embryonated hen's egg inoculation (various routes)
- Animal inoculation
- Staining and microscopy for viral inclusion bodies
- Electron microscopy
- Immunofluorescence
- Enzyme immunoassay/ ELISA
- Immunochromatographic tests (ICT) and other point-of-care (PoC) tests
- Immunoblotting/ Western blot assay
- Hemagglutination and haemadsorption
- Conventional serological assays (optional): Complement fixation test (CFT), hemagglutination inhibition, etc.
- Neutralization assay
- Nucleic acid extraction
- Nucleic acid amplification techniques (target amplification, e.g., PCR, real-time PCR, signal amplification etc)
- Amplicon detection techniques – Gel electrophoresis, hybridization, etc.
- Nucleic acid sequencing and sequence analysis
- Bio informatics and Proteomics

Teaching skills/ Pedagogy:

At the end of the course, the candidate should be able to teach and train undergraduates, post-graduates and technical staff, the theoretical and practical aspects of clinical virology

6. TEACHING METHODOLOGY:

- a) Journal Club: 1 hour duration - Paper presentation/discussion - once per week.

- b) Seminar: One seminar every week of one hour duration (Afternoon)
- c) Lecture/discussion: Lectures on newer topics by faculty, in place of seminar as per need.
- d) Case presentation: Presentation of clinical cases/ case scenarios of viral infection. Residents will present a clinical case for discussion before a faculty and discussion made pertaining to its laboratory infection and management.
- e) Combined Round/Grand Round: These exercises are to be done for the hospital once every 2-3 months involving presentation of unusual or difficult cases of viral infections. Presentation of cases in clinical combined / grand rounds and clinical series/ research data for the benefit of all clinicians and other related disciplines
- f) Practical (laboratory bench-side) learning-teaching activities: During the laboratory postings, this will be ongoing, where the candidate will learn from senior colleagues and peers, as well as teach virology to the microbiology post-graduate students
- g) Microbiology undergraduate and post-graduate teaching programmes: The candidates will participate in conducting these programmes (theory classes and practical exercises)
- h) CMEs/Workshops: The candidates should attend at least 2 of these during their course.

Z. RESEARCH WORK:

The candidate is introduced to the field of research in Virology, and is trained in research methodology, both at laboratory and clinical level.

The candidate will be trained in the ability to

- Frame a research question.
- Plan a study to answer the question.
- Execute the study
- Collect the relevant information from the study and
- Evaluate appropriately the collected data to draw a conclusion.

The candidate should become conversant with the reporting of these results as a research paper, in journals and as a presentation in conferences.

The activities would consist of:

Planning and organizing relevant studies to be submitted as a Research paper at the end of the course.

Students should compulsorily attend Research Methodology workshop conducted by the University within first six months of D. M Course.

8. LOG BOOK:

Postgraduate students shall maintain a log book of the work carried out by them and the training programme undergone during the period of training including details of laboratory exercises, ward rounds, case presentation and work done independently by the D.M. candidates. The log book shall be checked and assessed periodically by the faculty members imparting the training, including the clinical and external postings (described below).

The resident is required to work full time in the virology section/ department, and participate in the patient care-related and academic and research activities as described below.

The orientation during the first year at the institution would include participation in the undergraduate teaching programmes, during all activities pertaining to virology. The candidate should also participate in all postgraduate (M.D. Microbiology) academic activities pertaining to virology throughout their tenure. These may be arranged in collaboration with another local institution running these courses with MCI approval if they are not available within the same institution.

The Post Graduate student of a Post Graduate Degree Course in Super specialties shall maintain Log Book of the work carried out by them and training including details of surgical operations assisted or done independently.

The Log Book shall be checked and assessed by the faculty members imparting the training.

Periodical evaluation of Log Book to be done by the Head of the Department as per 52nd SAB.

The Evaluation of the candidates in both theory and practical aspects will help the candidate in the improvement of his/her knowledge skills & attitude.

9. COMPETENCY ASSESSMENT:

Overall:

- | | |
|--|------------|
| 1. Communication / Commitment / Contribution / | |
| Compassion towards patients and Innovation | - 10 Marks |
| 2. Implementation of Newly learnt techniques | - 10 Marks |
| 3. Documentation of case sheets / discharge | |
| Summary / Review | - 10 Marks |
| 4. Number of cases presented in Clinical Meetings/ | |
| Journal Clubs / Seminars / Papers presented in | |
| Conference. | - 10 Marks |
| 5. No. Of Medals/ Certificates won in the conference | |

/ Quiz competitions and other academic meetings
with details.

- 10 Marks

Total 50 Marks

Assessment	I	- February	-	First Year
	II	- August	-	First Year
	III	- February	-	Second Year
	IV	- August	-	Second Year
	V	- February	-	Third Year
	VI	- May	-	Third Year

VIVA INCLUDING COMPETENCY ASSESSMENT – 100 Marks (50+50)

10. Theory Exam (DM Virology)

Paper I	Basic Virology, Bioethics, Research methodology & Viral epidemiology	100 marks
Papers II	Systemic Virology & Diagnostic methods, Viral immunology & Entomology	100 marks
Paper III	Clinical Virology & Outbreak response	100 marks
Paper IV	Recent advances, Novel diagnostics, Anti-virals / Therapeutics & Vaccines	100 marks

Each paper will contain:

I Essay 2 x 15 = 30 marks

II Short notes 10 x 7 = 70 marks

Total 100 marks

11. Practical Exam (DM Virology)

Sl. No.	Particular	Time for candidates	Maximum Marks
1	Total duration	3 days	
2	Serology exercise	1 day	100
	Molecular exercise	2 days	100
	Cell Culture exercise	3 days	100
3	OSPE (5 stations, 5 x10 marks or 10 stations, 10 x 5 marks)	Maximum – 1 hr	50

		Each station 5 or 10 minutes	
4	Outbreak investigation – 25 marks log book – 25 marks		50
5	Competency assessment (obtained during 3 years course)		50
6	Viva voce		50
Total			500
PRACTICAL EXAM			
	Day 1	Viral Culture	
	Day 2	Molecular Diagnosis	
		OSPE	
	Day 3	Serological Diagnosis	
		VIVA including Competency Assessment	
		Log book & Out break investigation	
	Day 1 Viral Culture One clinical case scenario leading onto viral culture		
	I. Cell Culture		
	a. Differential Diagnosis		05
	b. Sample collections and Selection of Cell lines		10
	c. Inoculation in Cell Lines		20
	d. Interpretation of Cell Lines & Confirmation by Direct IF (Day 2 &3)		20
	e. Quality Assurance & Trouble Shooting		20
	II. Routes of Inoculation in Embryonated Egg		25
	Day 2 Molecular Diagnostic Test One clinical case scenario leading onto molecular diagnosis for a specific Virus – Conventional PCR / Real time PCR		
	a. Differential diagnosis		10
	b. Sample collection & processing		10
	c. Nucleic acid extraction		20
	d. PCR Reaction Mix preparation & Target addition		20
	e. Interpretation / Identification of PCR amplified products		20
	f. Quality assurance & Trouble Shooting		20
	Day 3 Serological Diagnostic Test One clinical case scenario leading onto one serological diagnosis for a specific virus Rapid / ELISA/ CLIA/ HAI / IIF /WESTERN BLOT/ FLOW CYTOMETRY		
	a. Differential diagnosis		10

	b. Sample collection & processing		10
	c. Performance test		40
	d. Interpretation / Trouble Shooting		20
	e. Quality assurance		20
4	OSPE (5 stations, 5 x10 marks or 10 stations, 10 x 5 marks) 1. Phylogenetic relationships of related viruses/variants 2. Bioinformatics and viral genetics 3. Clinical scenarios, Differential diagnosis, tests and interpretation 4. Vaccines 5. Establishment of Virology laboratory 6. Infection control- outbreak in a nursery / ICU 7. ICU set up for ID case 8. Special virology assays, eg; Heam agglutination & Heam agglutination inhibition or ELISA, Interpretation 9. Evaluation of new diagnostic assays 10. Quality control & Quality Assurance method 11. Proficiency testing programme in Virology. 12. Nasopharyngeal Swab collection 13. Point of care NAAT 14. Uninfected & infected cell lines 15. Microscopy for viral inclusion bodies	Maximum – 1 hr Each station 5 or 10 minutes	50

As per Medical Council of India Post Graduate Medical Education Regulations 2000 (amended upto 10th August 2016) clause 13.9 A Postgraduate student of a Postgraduate degree Course in broad specialties/ Super Specialties would be required to present one poster presentation to read one paper at a National/State conference and to present one Research paper which should be published/accepted for publication/sent for publication during the period of his Postgraduate studies so as to make him eligible to appear at the Postgraduate Degree Examination.

Apart from Poster/Oral paper presentation in National/State conferences, the Research paper published by the candidate in the University Journal of Medical Sciences will be considered as equivalent to the Research Paper as mentioned in 13.9. clause. Case Reports can also be published in University Journal of Medical Sciences but case reports will not be considered as Research Paper.

The candidate can also present Research Paper as per Clause 13.9 of Post Graduate Education Regulation 2000, and if the article sent for publication by the candidate as primary author [as per 53rd SAB] or corresponding author which has not yet been published/accepted for publication, the candidate should submit a letter from the

HOD, stating that the article sent for publication is of publishable merit and the proof of the Research Article submitted to the Journal for publication should be sent to the university forwarded through the HOD [as per 53rd SAB]

The student can submit articles for the University journal anytime from the time of registration till 6 months prior to theory examination.

12. REFERENCE BOOKS:

- Reviews of Medical Microbiology (Jawetz)
- Lennette's Laboratory Diagnosis of Viral Infections
- Clinical Virology Manual (ASM)
- Medical Virology (White and Fenner)
- Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases
- Field's Virology
- Topley and Wilson (Virology) and Harrison's Text book of Medicine

****Note:** The editions are as applicable and the latest editions shall be the part of the syllabus.

13. JOURNALS:

Journals- J Clin Microbiol, J Clin Virol, J Med Virol, Diag Microbiol Infect Dis, J Virol Methods, Clin Microbiol Rev, Emerg Infect Dis, IJMR, IJMM, Indian J Virol. Lancet Journal on Infectious diseases. Journal of infectious diseases.