

M.Sc. DEGREE COURSE IN CLINICAL VIROLOGY

Introduction to the course:

- Clinical management of patients today depends on results of laboratory investigations and disease diagnosis.
- New and emerging viral infections have emphasized the need to impart specialized training in Virology.
- Rapid advances in the field of virology, improvements in technology and automation and the necessity of quality investigation reports requires well trained professionals in Clinical Virology.
- There is a requirement for translational research in emerging viral infections to bring new techniques from research to the diagnostic level.

Learning outcomes:

A student completing the course would be:

- Trained in basic aspects of Microbiology
- Trained in the different disciplines of Virology such as the biology and distribution of viruses and viral diseases, the structure, replication, biochemistry, physiology, molecular biology, ecology, evolution of viruses and clinical aspects of viral diseases such as pathogenesis, diagnosis, prevention and treatment.
- Able to carry out basic and advanced laboratory investigations in the field of virology and related aspects of microbiology, and interpret the test results in the context of clinical setting.
- Able to interact with physicians and solve diagnostic problems
- Able to train undergraduate students and technical staff
- Able to carry out research and publish papers

Admission criteria:

A bachelor's degree in Microbiology or related field such as Microbiology, Molecular biology, Biotechnology, Life Sciences, Medical Laboratory Technology, BPharm, BTech(Biotechnology), MBBS, BDS, BVSc, BSMS, BAMS and BHMS with minimum 50% aggregate in the qualifying examination.

Duration: Two years

Course fee: 1,00,000

SYLLABUS

First year:

Semester 1:

Unit	Topics	Credits	Hours
1	Introduction to Human Anatomy	2	30
2	Introduction to Human Physiology and Biochemistry	2	30
3	General Virology Basics in Microbiology and Introduction to Virology, Taxonomy, Classifications, General properties of Viruses, Pathogenesis of viral infections, Tissue culture and Cell Biology, Laboratory safety, Laboratory design, Infection control and Bio-medical waste management,	2	30

Semester 2:

Unit	Topics	Credits	Hours
4	RNA viruses Hepatitis A,C,E virus, Orthomyxovirus, Paramyxovirus, Picornavirus, Reovirus, Rotavirus, Calcivirus, Ebola virus, SARS, retrovirus including adult Human T-cell lymphotropic virus type 1 and human immunodeficiency virus (HIV), Rabies virus and other RNA viruses.	2	30
5	DNA viruses Pox virus, Herpes virus, Varicella zoster, Adenovirus, Parvovirus, Hepadna viruses and other DNA viruses.	2	30

Second year:**Semester 3:**

Unit	Topics	Credits	Hours
6	Viral Genetics and Immunology Viral genome, Replication of viruses, Viral Immunology and Viral vaccines.	2	30
7	Other viral infections, neurotropic viruses, oncogenic viruses, Arboviruses, Viral haemorrhagic fevers, Slow viruses, Prion disease, Bacteriophages: Classification, Structure, Life cycle, Uses.	2	30
8	Diagnosis, Prevention and Treatment Recent advances in Viral diagnostics, QA/QC, Good Clinical Laboratory Practices (GCLP), Epidemiology of infectious diseases, Pandemic preparedness. General prevention methods, Antiviral agents, Viral vaccines and viral vectors.	2	30

Semester 4:

Unit	Topics	Credits	Hours
9	Recent advances in molecular virology, Hybridoma Technology and Monoclonal antibodies, Sequencing methodology and its applications, Data bases, sequence alignments, database similarity searches- BLAST, FASTA.	2	30
10	Epidemiology, Biostatistics, Research methodology	2	30

Theory Total = 20 credits

Practicals:**1st year Semester 1: 10 credits (5 hrs per week x 16 weeks)**

1. Glassware Preparation (Decontamination, Washing, Sterilization and Packing)
2. Media & Reagents Preparation, Sterility Checks
3. Sample Collection & Processing

1st year Semester 2: 10 credits (5 hrs per week x 16 weeks)

1. Preparation, Maintenance of Cell Cultures & Viral Inoculation
2. Inoculations in Embryonated Eggs
3. Estimation of TCID₅₀
4. Serological tests, ELISA, TLC, Agar Gel Diffusion, IFA and Lymphocyte Separation.
5. HA test, HAI test.

2nd year Semester 3: 10 credits (5 hrs per week x 16 weeks)

1. Neutralization Test, MTT Assay
2. Extraction and Detection of DNA & RNA
3. PCR, RT-PCR, Real Time PCR
4. Agarose Gel Electrophoresis.

2nd year Semester 4: 10 credits (5 hrs per week x 16 weeks)

1. Lab. animal handling and experiments – Mice, Guinea Pig, Rabbit & Goose.
2. Data analysis: Mean, Median, Mode, Standard Deviation, & ANOVA.
3. Biostatistics (Sampling Technique, Sample Size, Biostatistics tools in health research)

Electives: Two electives each year

1st year: 30 hours (2 Cr)

Semester 1 & Semester 2

Applied Biotechnology
Cancer Biology
Human Genetics
Biostatistics
Bioinformatics

2nd year : : 30 hours (2 Cr)

Semester 3 & Semester 4

Bio-medical instrumentation
Public and global health
Pharmacology in drug discovery
Diagnostic laboratory accreditations
Clinical trials.

Electives credits: 1st Year 4 and 2nd Year 4, Total credits 8.

Seminars /Journal discussions: 20 hrs per semester: 5 credits per semester.

Examinations and Assessment:

(20% of total marks will be for continuous assessment)

FIRST YEAR

	Theory paper/Practicals	Max	Min
Semester 1			
PAPER I	Introduction to Human Anatomy. Introduction to Human Physiology and Biochemistry.	100	50
PAPER II	General Virology	100	50
Practical 1	General laboratory methods	100	50

Semester 2			
PAPER III	RNA viruses	100	50
PAPER IV	DNA viruses	100	50
Practical 2	Viral culture and serology.	100	50

SECOND YEAR

Semester 3	Theory paper/Practicals	Max	Min
PAPER V	Viral Genetics and Immunology	100	50
PAPER VI	Diagnosis, Prevention and Treatment	100	50
Practical 3	Molecular diagnostic methods	100	50
Semester 3			
PAPER VII	Recent Advances in Molecular Virology	100	50
PAPER VIII	Epidemiology, Biostatistics, Research methodology		
Practical 4	Animal experiments and data analysis	100	50

Project Dissertation

Credits : 20

a) All candidates admitted to the course shall be assigned a topic for dissertation.

The dissertation / thesis shall be a bound volume of a minimum of 50 pages and maximum of 100 pages of typed matter (Double line spacing and on one side only)

b) Three hard copies of dissertation shall be submitted three months prior to the commencement of the theory examinations in the second year on the prescribed date to the Controller of Examinations of this University. One electronic version in CD format will also be submitted.

c) For Dissertation Max Marks 200, Viva-voce on Dissertation / Presentation Marks 50 and IA 50 – Total 300 Minimum mark to pass 150.

Total Credits:

	Semester 1	Semester 2	Semester 3	Semester 4	
Theory	6	4	6	4	
Practical	10	10	10	10	
Electives	2	2	2	2	
Seminar/ Journal discussions	5	5	5	5	

Dissertation	-	-	-	20	
Total	23	21	23	41	108 credits

Marks:

Theory – 800

Practicals - 400

Dissertation – 100

Electives - 400

Recommended books :

1. Jawetz Melnick & Adelbergs Medical Microbiology 28 E (A & L LANGE SERIES), 2019, 28th Edition
2. Introduction to Modern Virology, Author: Nigel Dimmock, Andrew Easton, Keith Leppard, 7th Edition, 2016, Wiley Blackwell
3. Virology: Principles and Applications
John Carter, Venetia Saunders, 2nd edition, 2013, Wiley
4. Principles of Virology: Molecular Biology, Pathogenesis, and Control
Flint,S.J., Enquist L.W., Robert,M., etal , 5th edition, 2020, Wiley
5. Basic Virology, Martinez J. Hewlett, David Camerini, David Bloom. 2021, 4th Edition, Wiley-Blackwell