

VALUE ADDED COURSE

COURSE NAME	MOLECULAR DIAGNOSIS OF COVID - 19
COURSE CODE	VACMDC
DURATION	30HR

COURSE CONTENT

- Introduction to Virology and Corona viruses
- Molecular Biology Fundamentals
- Principles of Molecular Diagnostics
- PCR and Real-Time PCR
- Advanced Diagnostic Techniques
- Diagnostic Kit Development and Validation
- Bioinformatics and Data Analysis
- Practical Considerations in Molecular Diagnostics

UNIT – I Introduction to Virology and Corona viruses

- Basics of Virology
- Structure and function of viruses
- Virus replication and life cycle
- Corona viruses
- History and classification
- Structure of SARS-CoV-2
- Pathogenesis and epidemiology of COVID-19

UNIT – II Molecular Biology Fundamentals

- DNA, RNA, and Proteins
- Structure and function of nucleic acids
- Central dogma of molecular biology:- transcription and translation
- Genetic Mutations and Variants
- Types of mutations




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UNIT – III Principles of Molecular Diagnostics

- Basics of Molecular Diagnostics
- Overview of molecular diagnostic techniques
- Importance in infectious disease detection
- Nucleic Acid Extraction
- Techniques for RNA extraction

UNIT – IV PCR and Real-Time PCR

- Polymerase Chain Reaction (PCR)
- Principles of PCR
- Components and steps of a PCR reaction
- Real-Time PCR (qPCR)
- Differences between PCR and qPCR
- Quantification of viral RNA
- Interpretation of qPCR results

UNIT - V Advanced Diagnostic Techniques

- Reverse Transcription PCR (RT-PCR)
- Conversion of RNA to DNA
- Use of RT-PCR in COVID-19 diagnostics
- Digital PCR and Isothermal Amplification
- Principles and applications
- Advantages and limitations

UNIT - VI Diagnostic Kit Development and Validation

- Designing Diagnostic Assays
- Selection of target regions
- Primer and probe design



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UNIT - VII Bioinformatics and Data Analysis

- Bioinformatics Tools
- Sequence alignment and analysis
- Phylogenetic analysis
- Data Interpretation Analyzing qPCR and NGS data
- Reporting and clinical relevance

UNIT – VIII Practical Considerations in Molecular Diagnostics

- Sample Collection and Handling
- Best practices for sample collection
- Transport and storage conditions
- Laboratory Safety and Bio safety

REFERENCES

- Xian-En Zhang - National Laboratory of Biomacromolecules, Institute of Biophysics, Chinese Academy of Sciences, No. 15 Datun Road, Beijing, China 100101; <http://orcid.org/0000-0003-1347-3168>; Email: zhangxe@ibp.ac.cn
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