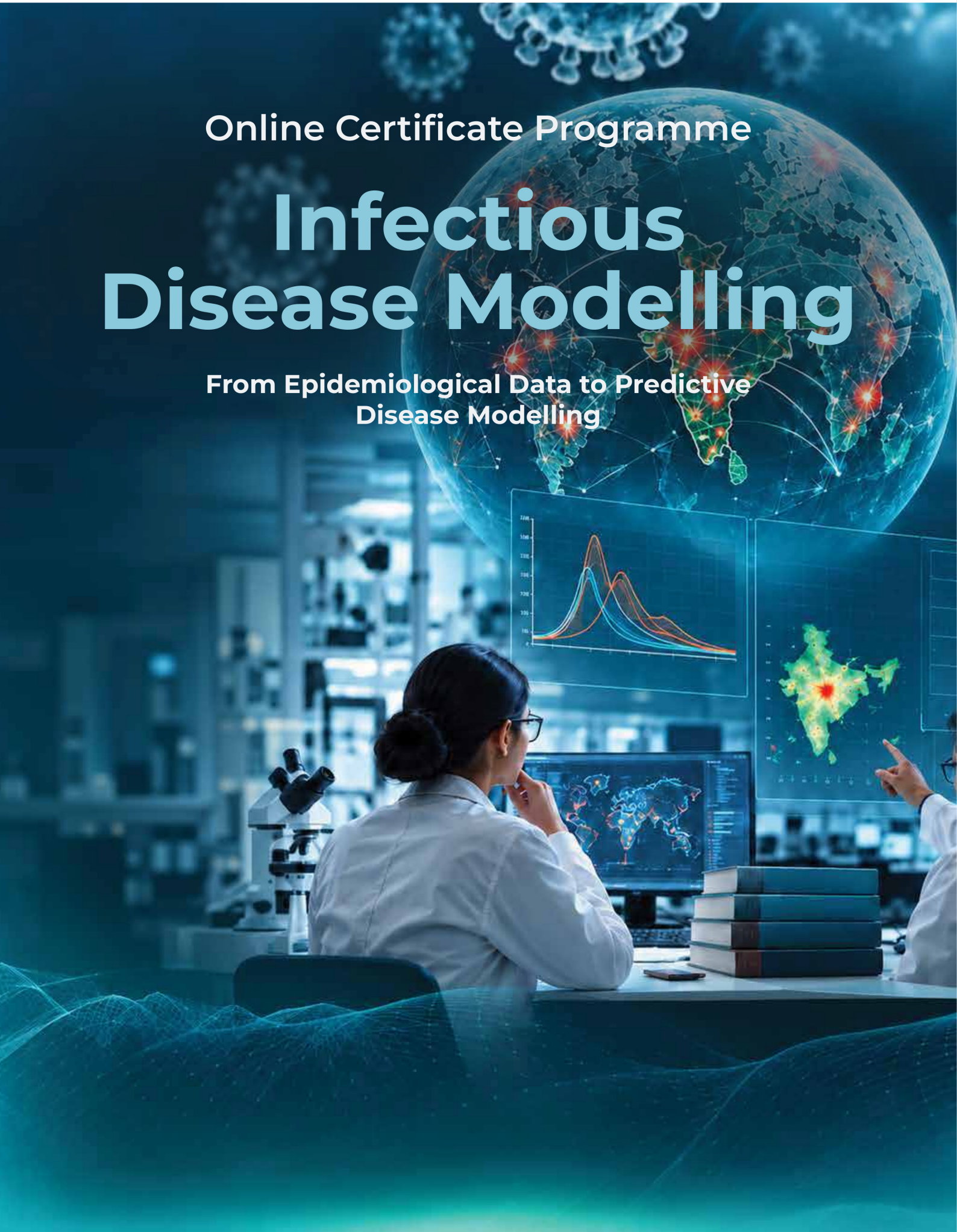
IIHMR UNIVERSITY

Online Certificate Programme

Infectious Disease Modelling

From Epidemiological Data to Predictive Disease Modelling



Background

Infectious diseases can emerge and spread rapidly, requiring public health systems to move beyond reactive surveillance towards data-driven prediction and preparedness. Mathematical and computational modelling provides powerful tools to understand disease transmission, forecast epidemic trajectories, and evaluate interventions such as vaccination and treatment.



This programme bridges epidemiology and computational modelling, enabling participants to develop practical skills in dynamic disease modelling and apply R-based approaches to real-world infectious disease challenges.

Objectives

- Develop a strong foundation in infectious disease epidemiology, outbreak investigation, and transmission dynamics.
- Build and simulate compartmental SIR models using R/RStudio
- Develop skills in model calibration and parameter estimation using real-world epidemic data.
- Apply modelling approaches to interventions, stochasticity, population heterogeneity, and vector-borne diseases.
- Critically evaluate epidemiological models and use modelling evidence to support public health policy and decision-making.

Pedagogy

The programme follows an adult-learning, problem-based and experiential approach, designed specifically for working professionals.

Learning combines interactive sessions, real-world outbreak data, guided R coding, live modelling laboratories, case study analysis, and critical review of published epidemiological models. Theoretical concepts are reinforced through hands-on simulations, data fitting exercises, and practical modelling assignments. Participants will use R, RStudio and open-access epidemiological datasets throughout the programme.

Course Contents

- **Epidemiology & Outbreak Investigation:** Disease history, epidemiological study designs, surveillance, outbreak investigation, vaccination and sero-epidemiology.
- **Foundations of Disease Modelling:** Compartmental models, epidemic dynamics, reproduction metrics and fundamental SIR structures.
- **SIR Modelling Using R:** Developing differential equations, coding dynamic transitions and simulating epidemic trajectories using R/RStudio.
- **Intervention & Model Calibration:** Treatment and vaccination modelling, leaky vaccines, parameter fitting, least-squares and maximum-likelihood approaches.
- **Advanced Disease Modelling:** Stochastic modelling, population and age heterogeneity, vector-borne disease modelling and Ross-Macdonald models.
- **Model Evaluation & Policy Application:** Critical assessment of published models, model assumptions, intervention effectiveness and implications for public health policy.

Programme Duration

Duration: 3 Months (12 Weeks)

Learning Hours:

- 24 Hours Online Instructor-led Sessions
- 24 Hours Guided Self-learning

Credits: 3 Credits

Mode: Live Online (Faculty-led sessions with hands-on practical learning)

Programme Highlights

- Build practical expertise in infectious disease modelling.
- Develop and simulate SIR compartmental models using R/RStudio.
- Learn model calibration and data fitting using least-squares and maximum-likelihood methods.
- Model real-world interventions including vaccination and treatment strategies.
- Explore stochasticity, population heterogeneity and vector-borne disease transmission.
- Develop the ability to critically audit disease models and translate modelling evidence into policy insights

Who Should Attend?

This programme is ideal for:

- Public Health Professionals, Medical Officers & Surveillance Managers
- Data Scientists, Biostatisticians, Statisticians & Quantitative Analysts
- Policymakers, Health Ministry Officials & NGO Programme Leads
- Epidemiologists, Disease Control & Pandemic Preparedness Professionals
- Researchers, Faculty Members & Postgraduate/PhD Scholars
- Professionals in Medicine, Life Sciences, Mathematics, Statistics & Data Science

The programme is particularly relevant for professionals seeking to move from descriptive disease surveillance towards dynamic, predictive and model-informed decision-making.

Eligibility

Bachelor's or Master's degree in Public Health, Medicine, Statistics, Mathematics, Data Science, Life Sciences, or a related field. Basic knowledge of statistics or public health is preferred. Prior R programming experience is helpful but not required.

Registration

For programme schedule, fee details, and registration, please contact:

Office of Online Certificate Programmes (OCP)
IIHMR University
1, Prabhu Dayal Marg, Sanganer Airport
Jaipur – 302029, Rajasthan, India
Mobile: +91 9116006536 | Tel: +91-141-392470 | Email: Onlinecertificate@iihmr.edu.in

Assessment

Participants will be evaluated through:

- Knowledge Checks / Quizzes
- R-Based Lab Assignments
- Data Fitting Exercises
- Critical Model Audit Project

Programme fee

The programme fee for Indian participants is Rs. 30,000 plus GST (18% as applicable), and for international participants it is USD 315 plus GST (18% as applicable).

Discounts on Fee

Early Bird Discount: Nominations received with payment before four weeks of the commencement of the programme will be entitled to a 10% early bird discount.

Group Discount: Any organization sponsoring four or more participants to the programme will be entitled to a 20% discount on the total fee payable, provided that at least four participants attend the programme.

Maximum Discount: Organizations can avail themselves of both discounts, subject to a maximum discount of 20%.

Certificate

Participants successfully completing the programme and fulfilling the attendance and assessment requirements will receive a Certificate of Completion from IIHMR University, Jaipur.

Programme Coordinator



Dr. Anupam Mehrotra
Assistant Professor
IIHMR University, Jaipur





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