



Module **PMRF-ISSS023/III/2025**

Mathematical modeling analyses in intracellular signaling network and metabolic pathways in biology

Name of the PMRF student

Sayoni Maiti

Details of the content of the module

Introduction to mathematical modeling in biology

- What does it mean to model something?
- Process of mathematical modeling in biosciences
- Basics on linear algebra and differential equations
- Math models in different disciplines
- Types of mathematical models

Mathematical analyses

- Model calibration and validation
- Model stability
- Initial condition sensitivity
- Parameter sensitivity
- Nullcline
- Bifurcation analysis

Experimentation

- Glucose uptake assay
- ATP determination assay
- Western blotting
- Transfection

Understanding the fundamentals of equation writing in biology

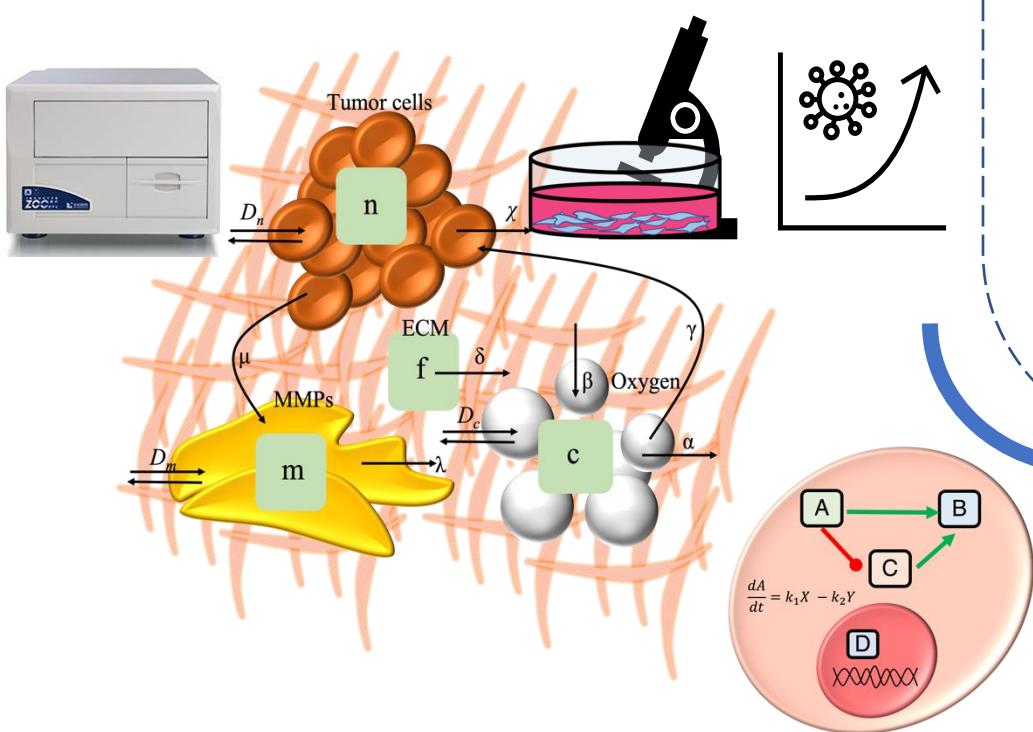
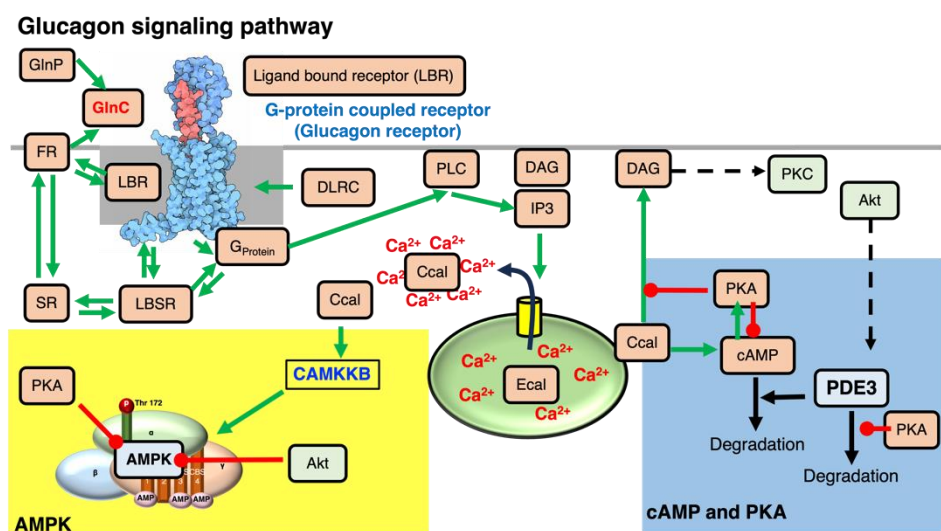
- Identification of variables in biological systems
- Drawing integrated network using variables
- Writing mass balance, rate equations and differential equations
- Understanding mathematical tools like MATLAB

Nature of module: Lectures, discussions and assignments

Required background of the students taught

Undergraduate in science or engineering
(Any discipline)

Interested to learn an interdisciplinary approach and apply principles of physics, chemistry, mathematics and coding to understand biological systems



Schedule of the module

Start date: 15th March 2025

End date: 30th May 2025

Day and time: Saturday, 11-1 pm

Meeting link : Will be shared later

Contact email ID: sayonimaiti@iisc.ac.in

Registration link:

<https://forms.gle/AayEcg2CXgCQr15M8>