

I-STEM Software Request - Guide Approval Form

User Details

- Name of Researcher: Haseeb ul Arfin
- User Type: ☒ Ph.D. Scholar ☐ Postdoctoral Researcher ☐ Bachelor's ☐ Masters
- Institution Name : Jamia Millia Islamia
- Institutional Contact No: 011-26981717
- Research Topic: 'Modelling Photosynthetic Dynamics of C. reinhardtii'

Software Request Details

- Software Name: MATLAB
- Justification for Software Request: [Provide detailed explanation of how the software supports your research objectives] - Attached

Guide/Supervisor Approval

I, Dr. Amit Sharma (Guide/Supervisor Name),

- Confirm that the above-mentioned researcher is affiliated with our institution
- Have reviewed the software request and its relevance to the researcher's academic work
- Approve the software request for research purposes

Approval Confirmation

- I approve the software request
- The software aligns with the researcher's research objectives
- The request meets the institutional research guidelines

Guide/Supervisor Signature: _____

Date: 05/05/2025

Official Stamp/Seal: [Space for Institutional Stamp]

Dr. AMIT SHARMA
Assistant Professor
Multidisciplinary Centre for
Advanced Research & Studies
Jamia Millia Islamia
New Delhi-110025

Important Notes

1. This form must be signed and scanned
2. The scanned copy must be uploaded with the software request
3. Electronic signatures are acceptable if from an official institutional email

How MATLAB supports my research objectives

My research focuses on developing novel photobioreactor and studying the photosynthetic dynamics of *Chlamydomonas reinhardtii* under various illumination conditions. As part of this project, I aim to integrate systems biology approaches to understand metabolic fluxes and optimize oxygen production.

MATLAB is essential for this work because it hosts the COBRA (COntstraint-Based Reconstruction and Analysis) Toolbox, a widely used computational framework for genome-scale metabolic modelling. With this toolbox, I will build a genome-scale model of *Chlamydomonas*, perform Flux Balance Analysis (FBA), and simulate the effects of various gene deletions or modifications. These simulations will allow me to identify critical genes and pathways that influence oxygen evolution under specific light regimes used in my photobioreactor.

Specifically, MATLAB and the COBRA Toolbox will help me:

1. Reconstruct and analyse the metabolic network of *Chlamydomonas*.
2. Predict metabolic flux distributions under different environmental and genetic conditions.
3. Simulate gene knockouts to identify targets that enhance oxygen production.
4. Integrate metabolic modelling with photo physiological data from my bioreactor experiments.

This systems biology approach will provide a deeper understanding of how light, and genetics influence cellular metabolism, enabling the rational design of more efficient photobioreactor systems.