Proposal for announcing seat under the Institute Internship Program

(separate form to be filled for seat under Institute funding and project funding)

1. **Name of faculty member proposing**: Dr. Vijayalakshmi Gosu
2. **Department/Centre**: Department of Chemical Engineering
3. **Topic on which work is proposed**: Development of Machine Learning Models to Predict Glycerol Monolaurate Production
4. **Preferred period of internship (after May 20th):** Between June 1, 2024 to July 15, 2024
5. **Qualification of student (branch/semester of study):** B.Tech and M.Tech
6. **Brief description of work (300-500 words):**

   The present study aims to develop machine learning (ML) models to optimize the production process parameters of glycerol monolaurate (GML). Recently, GML received significant attention due to broad spectrum of applications, spanning across numerous industries, including cosmetics, healthcare, pharmaceuticals, food processing, and process industries. It can be synthesized through various routes utilizing glycerol as the primary feedstock. Among these, particular emphasis has been placed on the esterification of lauric acid with glycerol, employing various catalysts such as enzymatic, homogeneous, and heterogeneous catalysts due to their significant scalability prospects. The production of GML involves a complex process that requires deciphering unknown nonlinear relationships between input variables (reaction parameters and catalyst properties) and output data (glycerol conversion, GML yield, and selectivity). To navigate this complexity, accurate and efficient modeling tools such as machine learning (ML) become essential.

   Machine learning tools are crucial in various fields due to their ability to analyse complex data, identify patterns, and make predictions. This study evaluates the performance of various ML algorithms including recurrent neural network (RNN), random forest (RF), adaptive boosting (AdaBoost), Bayesian ridge (BR), and elastic net linear regression (ENLR) for the prediction of GML production and identify the influencing parameters interaction.

Expected learning of student (upto 100 words):

Students will be expertise in machine learning techniques for process optimization, including data analysis, model training, and performance evaluation. This practical knowledge will be enhance their problem-solving and critical thinking skills, preparing them for research and development roles.

Nature of work: *(Experimental/simulation/mathematical modelling/data collection-analysis etc.): upto 50 words*

This study includes literature review, experimental, mathematical modelling, and data analysis.

7. **If the seat is under project sponsored category**: Yes/No: No
   a) If yes, number of seats announced: NA
   b) Name and ID no. of project from which stipend is chargeable:

Signature of faculty member

Name of department/Centre: Department of Chemical Engineering

Note:

a) Proposing faculty member needs to be available at the Institute during the period internship is offered
b) No extra space or funding than the stipend will be provided by the institute for this purpose