2025 EECMS Summer Internship Application Form

Main Supervisor	Dr Sourav Das
Other supervisors (if applicable)	Prof Celia Tan, SingHealth Duke-NUS Global Health Institute
Project Title	Optimisation of Manpower Projection for Healthcare Workers
Student location(s) for the project	SingHealth, Singapore
Duration of project (ideally six weeks)	Six weeks
Project Description	Project Objective: The primary objective of this project is to develop a data-driven model to optimise manpower projection for healthcare workers. The model should accurately predict the required number of healthcare workers based on various factors such as patient inflow, seasonal trends, and other relevant metrics. This project aims to equip students with practical experience in data analysis, machine learning, and optimisation techniques, which are crucial for addressing real-world challenges in the healthcare sector. Project Scope: 1. Data Collection and Preprocessing: • Collect historical data on patient inflow, staffing levels, seasonal variations, and other relevant factors from available healthcare databases or public datasets. • Clean and preprocess the data to ensure it is suitable for analysis. This includes handling missing values, outlier detection, and normalisation. 2. Exploratory Data Analysis (EDA): • Perform EDA to understand the underlying patterns and relationships within the data. • Visualise trends, correlations, and distributions using appropriate data visualisation tools. 3. Model Development: • Develop predictive models using machine learning algorithms such as linear regression, decision trees, or time-series forecasting methods to project the required number of healthcare workers. • Compare the performance of different models using evaluation metrics like Mean Absolute Error (MAE), Mean Squared Error (MSE), and R-squared. 4. Optimisation Techniques: • Implement optimisation algorithms to refine the manpower projections. This may include techniques like linear programming, genetic algorithms, or constraint satisfaction. • Ensure that the optimisation model considers constraints such as budget limits, staff availability, and required skill levels. 5. Validation and Testing: • Validate the developed models using a separate test dataset to ensure their accuracy and robustness.

	• Conduct sensitivity analysis to understand the impact of various factors on the manpower projections. 6. Implementation and Documentation: • Develop a user-friendly interface or dashboard to display the optimised manpower projections. • Document the entire project process, including data preprocessing steps, model development, optimisation techniques, and final results. 7. Presentation and Reporting: • Prepare a report summarising the project findings, methodologies used, and conclusions drawn. • Present the project outcomes to stakeholders, highlighting the practical implications and potential improvements in healthcare workforce management. Project Deliverables: 1. Cleaned and pre-processed dataset. 2. Exploratory Data Analysis (EDA) mini report with visualisations. 3. Predictive models with evaluation metrics. 4. Optimisation model and its validation results. 5. User-friendly interface or dashboard for displaying projections. 6. Comprehensive project documentation. 7. Final project report and presentation slides. Skills Required: 1. Basic understanding of data preprocessing and cleaning techniques. 2. Knowledge of machine learning algorithms and their implementation. 3. Familiarity with optimisation techniques and algorithms. 4. Proficiency in programming languages such as Python or R. 5. Experience with data visualization tools Project Timeline: Week 1: Project kickoff, data collection, and preprocessing. Week 2: Exploratory Data Analysis (EDA) and initial findings. Week 3: Development of predictive models and performance evaluation. Week 4: Implementation of optimisation techniques and model refinement. Week 5: Validation, testing, and development of the user interface/dashboard. Week 6: Documentation, final report preparation, and project presentation.

Please email completed form to Tele Tan at t.tan@curtin.edu.au