# Final Year Project Titles for DMAS (June 2022)

## Contents

# 1 Ms Aida Adha Binti Mohd Jamil

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| Lecturer: | Ms Aida Adha Binti Mohd Jamil (aidaadha@utar.edu.my) |
| Areas of Interest: | Statistics, Data Analysis |
| Project Title 1: | Survival Analysis on Clinical Data |
| Supplement Knowledge: | Applied Statistical Models |
| Outline: | This project is to analyze clinical data in order to describe factors associated with trends over time in the persistence and survival rates. The suitable hazard model has to be fitted and clinical outcomes are determined to be used to monitor the efficiency of treatments. |
| Preparation: | R programming |
| Project Title 2: | Missing Data Imputation on Environmental Data |
| Supplement Knowledge: | Applied Statistical Models |
| Outline: | The pattern of missing data and techniques will be determined to estimate the missing observation. The finding of this study will propose a feasible method of imputing missing values in any real dataset. |
| Preparation: | R programming, or Python |

# 2  Dr Avik De

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| Lecturer: | Dr Avik De (avikde@utar.edu.my) |
| Areas of Interest: | Relativity & Gravity, Differential Geometry |
| Project Title 1: | Investigating symmetric teleparallel gravity |
| Supplement Knowledge: | Calculus I and II |
| Outline: | We will look for solutions of the field equations in symmetric teleparallelism, mostly for perfect fluid. |
| Preparation: | Differentiation and plotting in mathematical software. |
| Project Title 2: | Investigating Rastall gravity theories |
| Supplement Knowledge: | Calculus I and II |
| Outline: | We will discuss about Rastall gravity theories starting from general relativity and investigate this theory and its generalizations. |
| Preparation: | Differentiation and plotting in mathematical software. |

# 3  Puan Azimah Binti Mohd

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| Lecturer: | Puan Azimah Binti Mohd (azimah@utar.edu.my) |
| Areas of Interest: | Process Control and Quality Improvement & Operational Research |
| Project Title 1: | Internal Complaints System using Quality Function Deployment (Qfd) |
| Supplement Knowledge: | Statistical Quality Control |
| Outline: | This research was applied to improve the quality of services in company in order to help the services to be delivered more effectively and efficiently by translating customer requirements into operational requirements of the organization. |
| Preparation: | Basic Microsoft Excel coding |
| Project Title 2: | An insertion heuristic algorithm for solving the bi-objective transportation problem |
| Supplement Knowledge: | Operational Research I & Operational Research II |
| Outline: | The findings of this study are significant to help in distribution management to identify a set of routes that service all the demand points within their time windows at the minimum cost and risk using an insertion heuristic algorithm. |
| Preparation: | Basic Microsoft Excel coding |

# 4 Dr Chen Huey Voon

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| Lecturer: | Dr Chen Huey Voon(chenhv@utar.edu.my) |
| Areas of Interest: | Algebra and Combinatorics |
| Project Title 1: | Non-negative Matrix Factorization and its applications |
| Supplement Knowledge: | Linear algebra |
| Outline: | There are many different ways to calculate the non-negative matrix factorization. In this project, we study the various calculation methods and the applications of non-negative matrix factorization. |
| Preparation: | Some background in linear algebra and programming skill |
| Project Title 2: | Exhaustion Numbers of subsets of finite groups |
| Supplement Knowledge: | Algebra and Combinatorics |
| Outline: | We shall generate the numerical data that satisfied the conditions of exhaustion number of subsets of finite groups. After that, we need to prove some results in this area. |
| Preparation: | Some background in algebra and programming skill |
| Project Title 3: | Total Labelling of graphs |
| Supplement Knowledge: | Discrete Mathematics and Combinatorics |
| Outline: | We shall generate the numerical data that satisfied the conditions of total labelling. After that, we need to prove some results in this area. |
| Preparation: | Some background in graph theory and programming skill |

# 5  Prof. Dr Chia Gek Ling

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| Lecturer: | Prof. Dr Chia Gek Ling (chiagl@utar.edu.my) |
| Areas of Interest: | Graph Theory and Combinatorial Designs |
| Project Title 1: | On Self-Complementary Magic Squares |
| Supplement Knowledge: | UECM1303 Discrete Mathematics |
| Outline: | A *magic square of order $n$* is a square array of integers from $1, 2, ..., n^2$ such that the sum of the entries in each row, each column and each diagonal is a constant. The first part of the project deals with the constructions of magic squares of given orders. The second part deals with a class magic squares in which the complementary magic square is equivalent to itself. |
| Preparation: | Analytical reasoning. |
| Project Title 2: | On Power Domination in Graphs |
| Supplement Knowledge: | UECM2313 Graph Theory |
| Outline: | Given an electric power system $S$, one wishes to place as few number of measuring devices as possible (for economic reason) to $S$ and at the same time keeping the system under monitored. This problem, known as the *Power Dominating Set Problem*, can be formulated as a variation of the well-known dominating set problem in graph theory. This project involves the investigation on the power dominating set with minimum cardinality for several well-known families of graphs. |
| Preparation: | Analytical reasoning and basic knowledge in graph theory. |

# 6  Dr Chong Zhi Lin

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| Lecturer: | Dr Chong Zhi Lin (chongzl@utar.edu.my) |
| Areas of Interest: | Statistical Quality Control |
| Project Title 1: | Design of the Shewhart Median Scheme Based on the Percentile-Based Approach when the Process Parameters are Unknown |
| Background Knowledge: | UECM2293 Statistical Quality Control |

| Outline: | Quality of services and products is vitally viewed in the current competitive and challenging business environment. To ensure high-quality services and products, Statistical Process Control (SPC) is widely applied. The Shewhart median ($\tilde{X}$) scheme is a good substitute to the Shewhart mean ($\overline{X}$) scheme. The rationale is because compared to the Shewhart $\tilde{X}$ scheme, the Shewhart $\overline{X}$ scheme is not robust to contamination, outliers, and even slight deviation from the normality assumption. The Percentile-Based (PL) approach allows the design of control schemes where practitioners can ensure the desired conditions on in-control (IC) and out-of-control (OOC) run length (RL) performances are satisfied with chosen probabilities. In other words, using the PL approach, we can guarantee the IC and OOC RL performances with desired probabilities. Note that in real-life situation, the process parameters are usually unknown, hence it would be interesting to study the Shewhart $\tilde{X}$ scheme based on the PL approach when the process parameters are unknown. |
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| Preparation: | Knowledge in programming and control chart |
| Project Title 2: | Performance comparison of the Max-EWMA Scheme and Other Schemes based on the Expected Average Run Length criterion |
| Background Knowledge: | UECM2293 Statistical Quality Control |
| Outline: | Control charting techniques for monitoring the magnitude and frequency of an event are important in many industries. Recently, the maximum exponentially weighted moving average (Max-EWMA) chart is proposed for jointly monitoring the magnitude and frequency of an event at the same time. The Max-EWMA chart's statistic is based on the maximum of the absolute values of two EWMA statistics - one for controlling the magnitude and the other for the frequency of an event. The Max-EWMA scheme in the literature is design based on the Average Run Length (ARL) criterion. However, in practical situation, the shift sizes are usually unknown. In this research, we design the Max-EWMA scheme based on the Expected Average Run Length criterion to account for unknown shift sizes situation, and compare this scheme with other competing schemes. |
| Preparation: | Knowledge in programming and control chart, R programming |

# 7 Dr Denis Wong Chee Keong

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| Lecturer: | Dr Denis Wong Chee Keong (deniswong@utar.edu.my) |
| Areas of Interest: | Cryptography |
| Project Title 1: | Cryptographic Primitives in E-Voting System based on Blockchain Technology |
| Supplement Knowledge: | UECM3383 Cryptology, UECM3373 Introduction to Coding Theory |
| Outline: | Study and construct cryptographic primitives such as PKE, DSA, ZKP, etc use in E-Voting system based on blockchain technology. |
| Preparation: | UECM3383 Cryptology, UECM3373 Introduction to Coding Theory |
| Project Title 2: | Heritage Building Preservation with Blockchain Technology |
| Supplement Knowledge: | UECM3383 Cryptology |
| Outline: | Preform a thorough survey on Malaysia heritage building preservation's works and propose a system to improve current practice. |
| Preparation: | UECM3383 Cryptology |

# 8  Dr Goh Yong Kheng

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| Lecturer: | Dr Goh Yong Kheng (gohyk@utar.edu.my) |
| Areas of Interest: | Statistical mechanics, computational finance, bioinformatics |
| Project Title 1: | Numerical simulation of Swift-Hohenberg equation |
| Supplement Knowledge: | Numerical analysis, partial differential equations, Python |
| Outline: | The Swift-Hohenberg is a 2D partial differential equation that exhibit patterns formation under different parameters. In this project, student are expected to review the equation and solve it numerically by using psedo-spectral method. Student then could explore different patterns formed by changing different parameters and non-linear noise. |
| Preparation: | try out some Python tutorials, find and read information on Swift-Hohenberg equations. |
| Project Title 2: | Probability distribution construction via Deep Learning |
| Supplement Knowledge: | Python, taken predictive modelling or data mining |
| Outline: | The idea is to use Generative Adversarial Network (GAN) to construct the marginal and conditional probability of some events from data. GAN is a deep learning algorithm. When given a set of sample data, GAN will be able to generate data that is similar to the input sample. In recent years there were operations in cyberspace to crackdown media generated from the DeepFake algorithm. This DeepFake is an example of a GAN application. Other applications of GAN are in recommender systems and artist styles classification. The idea of the algorithm is the competition between two AI entities: a generator and a discriminator. One tries to generate artificial data, and one tries to uncover the imposters. Once the algorithm is trained, the generator will be able to generate artificial samples that are similar enough to the input data. In this project we would like to try out if this method if it can help to construct probability distributions from sample data non-parametrically. |
| Preparation: | Be familiarize scikit-learn and tensorflow. Revision on probability distributions. |

# 9  Dr Goh Yann Ling

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| Lecturer: | Dr Goh Yann Ling (gohyl@utar.edu.my) |
| Areas of Interest: | Applied Statistics, Applied Mathematics |
| Project Title 1: | Curve Fitting in Industry |
| Supplement Knowledge: | probability and statistics, linear regression |
| Outline: | The research project requires some understanding in least squares regression. Student will learn how to fit the "best" polynomial through a set of uncertain data points and evaluate the validity of the results. |
| Preparation: | Strong background in linear regression, good programming skill. |
| Project Title 2: | Big Data Analysis in Business |
| Supplement Knowledge: | probability and statistics |
| Outline: | In the project, the student will conduct the data analysis in business and provide interpretations for the final conclusions. |
| Preparation: | Good programming skill |

# 10  Ms Hii Siew Chen

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| Lecturer: | Ms Hii Siew Chen (hiisc@utar.edu.my) |
| Areas of Interest: | Statistical Quality Control, Applied Statistics |
| Project Title 1: | A study of robust statistics in analyzing data. |
| Supplement Knowledge: | Students must have strong robust statistics knowledge. |
| Outline: | An introduction to robust statistics and will study some methods in analyzing data. Meeting with supervisor for further discussion. |
| Preparation: | Good R-programming skill. |
| Project Title 2: | A study of a specific control chart in various areas. |
| Supplement Knowledge: | Students must have strong statistical quality control knowledge. |
| Outline: | An introduction to a specific control chart and a study of its application. The details will be discussed when meeting with supervisor. |
| Preparation: | Good R-programming skill. |

# 11 Mr Kuang Kee Seng

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| Lecturer: | Mr Kuang Kee Seng (kuangks@utar.edu.my) |
| Areas of Interest: | Mathematical Theory of Investment, Universal Portfolio |
| Project Title 1: | Universal Portfolio generated by some positive definite matrices |
| Supplement Knowledge: | None |
| Outline: | The student will be introduce with basic theory of universal portfolio and some basic stock trading investment strategies. Meet supervisor for more detail. |
| Preparation: | Basic Microsoft Excel coding. Matlab would be helpful. |
| Project Title 2: | Universal Portfolio generated by some probability distribution functions |
| Supplement Knowledge: | None |
| Outline: | The student will be introduce with basic theory of universal portfolio and some basic stock trading investment strategies. Meet supervisor for more detail.Meet supervisor for more detail. |
| Preparation: | Basic Microsoft Excel coding. Matlab would be helpful. |

# 12 Dr Koh Siew Khew

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| Lecturer: | Dr Koh Siew Khew (kohsk@utar.edu.my) |
| Areas of Interest: | Statistics, Queueing Theory, Machine Learning, Markov Chain |
| Project Title 1: | Home Activities Pattern Analysis |
| Supplement Knowledge: | Probability and Statistics |
| Outline: | In this project, the activities of living alone elderly will be analyzed and those activities that could never happened will be identified. The work could be extended to anomaly detection to help in monitoring the elderly's health condition. |
| Preparation: | Python/ Java |
| Project Title 2: | Health Anomalies Detection |
| Supplement Knowledge: | Probability and Statistics |
| Outline: | Data collected on daily activities using evolving technology will be processed and analyzed. Basic statistical measures and graphical representations will be calculated and created in order to get better insight about the data set. A system will then be designed to detect anomaly performed by the individual. |
| Preparation: | Python/ Java |
| Project Title 3: | Maintenance of Queueing Systems with deterioration |
| Supplement Knowledge: | Stochastic Processes, Fundamental of Queueing Theory |
| Outline: | This project will study a system in which the server would deteriorate due to random shocks and hence find the specified maintenance level such that the long run average cost is minimized. |
| Preparation: | Python/ Java |

# 13   Ms Lee Yap Jia

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| Lecturer: | Ms Lee Yap Jia (yjlee@utar.edu.my) |
| Areas of Interest: | Universal Portfolio |
| Project Title 1: | Investment Strategies by the Reverse Kullback-Leibler Divergence Universal Portfolio |
| Supplement Knowledge: | Information Theory and Portfolio Theory |
| Outline: | This project aims to produce good investment strategies by studying the empirical performance in the real stock market of universal portfolio. |
| Preparation: | Microsoft Excel (VBA), R Programming (RStudio) |
| Project Title 2: | Universal Portfolio Generated by the Kullback-Leibler and Chi-Square Divergences |
| Supplement Knowledge: | Information Theory and Portfolio Theory |
| Outline: | This project aims to explore and discuss more applications of minimum distance methods in generating universal portfolio. |
| Preparation: | Microsoft Excel (VBA), R Programming (RStudio) |

# 14   Dr Liew How Hui

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| Lecturer: | Dr Liew How Hui (liewhh@utar.edu.my) |
| Areas of Interest: | Computers and Mathematics |
| Project Title 1: | Mathematics of 2D Modelling |
| Supplement Knowledge: | UECM1703 Introduction to Scientific Computing |
| Outline: | This project will explore the mathematics related to 2D modelling, which is used in typesetting and Calculus (e.g. the drawing of function graph). The methodology will involve the identification of mathematical representations and operations related to 2D graphics and the various mathematical techniques to generate 2D patterns. |
| Preparation: | https://en.wikipedia.org/wiki/2D_computer_graphics |
| Project Title 2: | Mathematics of Typesetting with Troff |
| Supplement Knowledge: | UECM1703 Introduction to Scientific Computing |
| Outline: | This project will explore the mathematics related to typography, which analyses the mathematical representation behind vector fonts (and bitmap fonts) and the simple and advanced mathematics in breaking paragraphs into lines. The methodology will involve the analysis of truetype and opentype fonts and the decision tree for unicode paragraph breaking. |
| Preparation: | https://en.wikipedia.org/wiki/Typography and installing GNU/Linux (https://ubuntu.com/ or https://linuxmint.com/) |
| Project Title 3: | Computer Proving in Elementary Real Analysis |
| Supplement Knowledge: | Discrete Mathematics, C Programming, Real Analysis |
| Outline: | Logic is the foundation of mathematics. Logic is supposed to be coded in symbols. In this project, we will investigate how to encode real analysis in a computer program called Coq. Coq is a computer program that allows us to prove mathematics using intuinistic (and classical) logic. |
| Preparation: | Study Coq (the book "Interactive Theorem Proving and Program Development Coq'Art: The Calculus of Inductive Constructions" by Yves Bertot, Pierre Castéran can be found in the library and also look at https://coq.inria.fr/) |

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| Project Title 4: | Computer Algebra System based on C-like Language |
| Supplement Knowledge: | Willingness to learn modern C++ language |
| Outline: | Investigate and extend the algorithms used in C++-based computer algebra system such as Mathomatic (https://github.com/mfillpot/mathomatic), Yacas (http://www.yacas.org/), Xcas (http://www-fourier.ujf-grenoble.fr/ parisse/giac.html) etc. |
| Preparation: | C++11 / Java and reading books on computer algebra. |

# 15   Ms. Ng Jing Wen

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| Lecturer: | Ms. Ng Jing Wen (ngjw@utar.edu.my) |
| Areas of Interest: | Statistical Quality Control |
| Project Title 1: | An Exponentially Weighted Moving Average (EWMA) Control Chart to monitor process median |
| Background Knowledge: | UECM2293 Statistical Quality Control |
| Outline: | The fundamental principle of a control chart is to discover irregular incidents as early as possible and to assess the effectiveness and sustainability of an industrial production. The sensitivity of the traditional Shewhart control chart in detection of large process shift is high but the detection for small process shift is low. For cases with the focus on the detection of small process mean shifts, EWMA chart are chosen as an effective replacement of the traditional control chart. In this project, we will study the use of EWMA median chart when the process running for some times and the dataset might contains outlying values |
| Preparation: | MS Excel / SAS / R programming |
| Project Title 2: | Design of the synthetic chart to monitor process median based on ranked set sampling |
| Background Knowledge: | UECM2293 Statistical Quality Control |
| Outline: | In this project, we will study the use of ranked set sampling in the construction of synthetic chart. The run length performance of synthetic chart based on simple random sampling (SRS) and ranked set sampling (RSS) is compared. An example is also given to demonstrate how the chart is constructed in the real-life situation. |
| Preparation: | MS Excel / SAS / R programming |

# 16   Dr Ng Kooi Huat

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| Lecturer: | Dr Ng Kooi Huat (khng@utar.edu.my) |
| Areas of Interest: | Statistical Process Control, Time Series Forecasting, Applied Statistical Modelling, Data Analysis etc. |
| Project Title 1: | Change Point Detection in Financial Time Series Forecasting. |
| Supplement Knowledge: | Elementary Statistics, Time Series Analysis, Applied Statistical Model etc. |
| Outline: | Change point analysis prevents the omission of relevant data as well as the forecasting that may be based on irrelevant data. The project demonstrates that the change point techniques may increase the accuracy of forecasts. |
| Preparation: | Knowledge of R Programming. |
| Software: | R Programming or Other Statistical Softwares. |
| Project Title 2: | Monitoring of Contaminated Data Using Robust Control Charts |
| Supplement Knowledge: | Elementary Statistics, Statistical Process Control etc. |
| Outline: | In this project, we investigate the advantage of using control charts based on robust statistics. Through the use of Monte Carlo simulations, we compare these charts in terms of its robustness and performance. |
| Preparation: | Knowledge of R Programming. |
| Software: | R Programming or Other Statistical Softwares. |

# 17   Dr Ng Wei Shean

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| Lecturer: | Dr Ng Wei Shean (ngws@utar.edu.my) |
| Areas of Interest: | Linear Algebra |
| Project Title 1: | Interpolative decomposition and its applications |
| Supplement Knowledge: | Interpolative decomposition, some programming skill |
| Outline: | Study the structure of the decomposition and find its applications. Investigate and/or improvised the algorithms used. |
| Preparation: | Read about interpolation decomposition and learn at least one programming language. |
| Project Title 2: | Compound-commuting mappings on skew-Hermitian matrices |
| Supplement Knowledge: | Linear Algebra |
| Outline: | Classify compound commuting mappings on skew-Hermitian matrices |
| Preparation: | Strengten the background of Linear Algebra by extensive reading |

# 18   Dr Ong Poh Hwa

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| Lecturer: | Dr Ong Poh Hwa (ongph@utar.edu.my) |
| Areas of Interest: | Graph Theory |
| Project Title 1: | Self-clique Graphs |
| Supplement Knowledge: | Discrete Mathematics, Graph Theory |
| Outline: | This project will study the characterization of all connected self-clique graphs with given clique sizes. After that, we need to find some graphs with certain clique sizes. |
| Preparation: | None. |
| Project Title 2: | On Isomorphisms of Cayley Graphs |
| Supplement Knowledge: | Discrete Mathematics, Graph Theory |
| Outline: | This project will study the isomorphism problems of Cayley graphs and some enumeration results on Cayley graphs. After that, we need to prove some results in this area. |
| Preparation: | None. |

# 19  Dr Pang Sook Theng

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| Lecturer: | Dr Pang Sook Theng (pangst@utar.edu.my) |
| Areas of Interest: | Universal Portfolio , Mathematics Education |
| Project Title 1: | Comparative analysis of the performace of universal portfolios during COVID 19 Pandemic |
| Supplement Knowledge: | Have knowledge in investment strategy |
| Outline: | Using different investment strategy in maximizing the return |
| Preparation: | knowledge in Matlab, Excel or Python. |
| Project Title 2: | Impact of lockdown on learning status of undergraduate students during COVID-19 pandemic in a private universiti in Malaysia. |
| Supplement Knowledge: | Knowledge in statistics. |
| Outline: | Differential the method in analyzing the data. |
| Preparation: | knowledge in any statistical software |

# 20  Dr Pan Wei Yeing

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| Lecturer: | Dr Pan Wei Yeing (panwy@utar.edu.my) |
| Areas of Interest: | Computers and Mathematics |
| Project Title 1: | Analyzing investment performance |
| Supplement Knowledge: | Probability and Statistics |
| Outline: | The proposed title is to analyze the return on an investment portfolio. The investment performance is analyzed by using the risk-adjusted performance measures over a specific period of time. |
| Preparation: | Knowledge in programming, i.e. R, Python or Java |
| Project Title 2: | Predicting medical expenses by using a machine learning model |
| Supplement Knowledge: | Probability and Statistics |
| Outline: | The proposed title is to predict medical expenses by using a machine learning model. Basic statistical measures and graphical representations will be used to observe the relationships of variables. A model will be formed to predict the medical expenses. |
| Preparation: | Knowledge in programming, i.e. R, Python, or Java |

# 21 Mr. Phoon Sheong Wei

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|---|---|
| Lecturer: | Mr. Phoon Sheong Wei (swphoon@utar.edu.my) |
| Areas of Interest: | Universal Portfolio |
| Project Title 1: | Type I Reciprocal of Price Relatives Universal Portfolio |
| Supplement Knowledge: | None |
| Outline: | This project will study the empirical stock performance of Type I reciprocal of price relative universal portfolio. Few positive definite matrices will be used in generating the universal portfolio. Please meet the supervisor for more detail. |
| Preparation: | Microsoft Excel (VBA) or R |
| Project Title 2: | Mahalanobis universal portfolio generated by $(2k+1)$-bandwidth Toeplitz matrix |
| Supplement Knowledge: | None |
| Outline: | This project will study how the Toeplitz matrix will affect the performance of the Mahalanobis universal portfolio. Please meet the supervisor for more detail. |
| Preparation: | Microsoft Excel (VBA) or R |

# 22 Dr Qua Kiat Tat

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| Lecturer: | Dr Qua Kiat Tat (quakt@utar.edu.my) |
| Areas of Interest: | Ring theory |
| Project Title 1: | On fine clean rings |
| Supplement Knowledge: | Fundamentals of Linear Algebra |
| Outline: | The main purpose of this study is to investigate properties of fine clean rings. |
| Preparation: | Good algebra background |
| Project Title 2: | On fine clean graph rings |
| Supplement Knowledge: | Fundamentals of linear algebra, graph theory |
| Outline: | The main purpose of this study is to investigate properties of fine clean rings and its graph representation. |
| Preparation: | Moderate algebra and graph theory background and able to do some simple programming. |

# 23 Dr Sim Hong Seng

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| Lecturer: | Dr Sim Hong Seng (simhs@utar.edu.my) |
| Areas of Interest: | Optimization Techniques and Applications |
| Project Title 1: | Physics Informed Neural Network for Solving Nonlinear Partial Differential Equations |
| Supplement Knowledge: | Calculus I and II, Linear Algebra, Numerical Methods, Ordinary Differential Equations. |
| Outline: | Optimization techniques will be incorporated in the Physics Informed Neural Network in solving nonlinear partial differential equations. The efficiency of the modified method will be compared with some existing methods in terms of number of iterations and computational time. |
| Preparation: | MATLAB / Python |
| Project Title 2: | Solving of Linear System using Optimization Techniques |
| Supplement Knowledge: | Calculus I and II, Linear Algebra, Numerical Methods |
| Outline: | Optimization techniques will be modified in order to solve linear system of equations. The efficiency of the modified method will be compared with some existing methods in terms of number of iterations and computational time. |
| Preparation: | MATLAB / Python |

# 24 Dr Tan Wei Lun

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| Lecturer: | Dr Tan Wei Lun(tanwl@utar.edu.my) |
| Areas of Interest: | Rainfall Modeling, Environmental Statistics, Markov Chain, Hidden 'Markov Chain |
| Project Title 1: | Parameter Estimation for Generalized Extreme Value in extreme rainfall analysis. |
| Supplement Knowledge: | Knowledge in Statistics |
| Outline: | In this project, we will determine the best method to estimate parameters of Generalized Extreme Value (GEV) distribution on extreme rainfall data. |
| Preparation: | Matlab or R-programming |
| Project Title 2: | Markov chain model for daily rainfall |
| Supplement Knowledge: | Stochastic Processes |
| Outline: | In this project, we will demonstrates the application of Markov chain model to study the rainfall pattern in Malaysia. |
| Preparation: | Matlab or R-programming |

# 25   Mr Tan Zong Ming

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| Lecturer: | Mr Tan Zong Ming (tanzm@utar.edu.my) |
| Areas of Interest: | Applied Statistics, Financial Mathematics |
| Project Title 1: | Research on Stock Analysis and Trading Strategies |
| Supplement Knowledge: | Financial Statement Analysis, Mathematics Statistic/Predictive Modelling/Statistical Decision |
| Outline: | Fundamental and Technical analysis on selected public listed company. Construct model to evaluate the public listed company thus estimate the entry and exit price. Monitor the stock price and suggest short-term and long-term stock trading strategics. |
| Preparation: | Microsoft Excel or any other programming software |
| Project Title 2: | Research on Candle Stick chart for stock trading |
| Supplement Knowledge: | Statistics |
| Outline: | Build Candle Stick chart based on stock price and/or trading volume. Construct model that consists of decision tree that can provide any decision or trading strategics. Compare the performance of the model with other existing technical analysis tools. |
| Preparation: | Microsoft Excel or any other programming software |

# 26  Dr Teoh Lay Eng

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| Lecturer: | Dr Teoh Lay Eng (teohle@utar.edu.my) |
| Areas of Interest: | Operations Research (transportation system) |
| Project Title 1: | Environmental Analysis for Electric Bus Operational System |
| Supplement Knowledge: | Operations Research |
| Outline: | In response to the worldwide environmental concern in particular on climate change and global warming, it is of utmost vital to capture the environmental performance of transportation system. Correspondingly, this project aims to perform environmental analysis in operating electric buses. In order to do this, student is required to determine total energy consumption, emission and noise level of the operating electric buses, by considering heterogeneous bus fleet. By identifying the best performing electric bus, a proper fleet planning can be carried out in determining the required bus size and quantity to support the entire operating system. It is anticipated that the environmental analysis and fleet planning are beneficial not only to the bus operators (in terms of cost saving) but also to the environment in reducing total pollutants. |
| Preparation: | Acquire fundamental skills in performing statistical analysis as well as in applying optimization approaches for the relevant problem-solving. |
| Project Title 2: | Fleet Planning for Electric Bus under Uncertainty |
| Supplement Knowledge: | Operations research |
| Outline: | In response to the global environmental issue and fossil oil dependency concern, electric bus has been proposed as one of the promising transports in green mobility. Correspondingly, a proper-designed fleet planning (in terms of demand and supply analysis) is indeed required to assure an environmental-friendly operation of electric bus. Thus, this project aims to perform demand and supply analysis (for fleet planning purposes) in operating electric buses under uncertainty. To do this, student is required to model the varying demand level appropriately (demand aspect) so that the corresponding fleet planning decision-making (supply aspect) can be made at a desired level for heterogeneous bus fleet. It is anticipated that the fleet planning will reveal useful insights, especially to the bus operators, in providing a sustainable and profitable electric bus operation. |
| Preparation: | Acquire fundamental skills in performing statistical analysis as well as in applying optimization approaches for the relevant problem-solving. |

# 27 Ms Wong Kuan Wai

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| Lecturer: | Ms Wong Kuan Wai (wongkw@utar.edu.my) |
| Areas of Interest: | Cryptography, information security |
| Project Title 1: | Study of cascading chaotic systems |
| Supplement Knowledge: | Cryptology |
| Outline: | The student will study existing chaotic systems and apply cascading method to enhance the chaotic behaviors of the chaotic systems. Meet supervisor for more details. |
| Preparation: | Matlab |
| Project Title 2: | Chaotic based Image Encryption Scheme |
| Supplement Knowledge: | Cryptology |
| Outline: | The student will be introduced with some basic image encryption techniques and the application of chaotic system in the design. Meet supervisor for more details. |
| Preparation: | Matlab |

# 28 Dr Wong Wai Kuan

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| Lecturer: | Dr Wong Wai Kuan (wongwk@utar.edu.my) |
| Areas of Interest: | Applied Statistics, Statistical Quality Control |
| Project Title 1: | Goodness-of-fit tests |
| Supplement Knowledge: | Probability and Statistics II |
| Outline: | Goodness-of-fit tests are used to test whether the data follows a certain distribution. This project will study some goodness-of-fit tests. Power comparison will be made among the goodness-of-fit tests studied. |
| Preparation: | Knowledge in programming. |
| Project Title 2: | Statistical control charts |
| Supplement Knowledge: | Probability and Statistics II |
| Outline: | The construction of control charts is based on the assumption that the data is normally distributed. This project will study selected control chart(s) when the data is not normally distributed. |
| Preparation: | Knowledge in programming. |

# 29   Dr Wong Voon Hee

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| Lecturer: | Dr Wong Voon Hee (wongvh@utar.edu.my) |
| Areas of Interest: | Statistical Quality Control (SQC), Data Analytics |
| Project Title 1: | An Improved Voice-to-Text Transcription for Business Solutions |
| Supplement Knowledge: | Completed industrial training at SunLife Malaysia Assurance Berhad |
| Outline: | Sun Life Malaysia is looking for the speech analytics solutions to boost the customers' engagement, to offer better customer services and to enhance the business outcomes. To achieve a "bionic" model that seamlessly combines human advisors and automated solutions. |
| Preparation: | MS Excel / Python / R Programming |
| Project Title 2: | Customer Lifetime Value Model for Business Solutions |
| Supplement Knowledge: | Completed industrial training at SunLife Malaysia Assurance Berhad |
| Outline: | Sun Life Malaysia has strived to strengthen their clients' portfolio by acquiring and retaining the most potential profitable clients. In order for this to be happened, current and potential clients had to be clearly classified in a way that not only specified how much would a client value in the near future, but also in the long run, until its relationship with the company lasted. Customer Lifetime Value (CLV) would be the solution to measure clients according to their potential monetary value over various periods of time. The main objective of this project was to apply survival model into one of the CLV model. |
| Preparation: | MS Excel / Python / R Programming |
| Project Title 3: | Operational Research Binary Integer Programming |
| Supplement Knowledge: | Completed industrial training at SunLife Malaysia Assurance Berhad |
| Outline: | Sun Life Malaysia is planning to build a collection optimization engine to maximize the collection effort. To make the most of each individual customer contact by determining how business variables – e.g., resource and budget constraints, contact policies, the likelihood that customers will respond and more that will affect outcomes. The system / engine can help in choosing which customers to target to maximize profitability, boost response rates, etc., while taking into account customer preferences, propensities, profitability, costs, contact policies and other goals. |
| Preparation: | MS Excel / Python / R Programming |

# 30    Dr Yap Lee Ken

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| Lecturer: | Ms Yap Lee Ken (lkyap@utar.edu.my) |
| Areas of Interest: | Numerical Analysis |
| Project Title 1: | Numerical Solutions for Delay Differential Equations |
| Supplement Knowledge: | Numerical methods, C Programming |
| Outline: | We shall derive numerical methods for solving delay differential equations. The C-program will be compiled to test the efficiency of the numerical methods. |
| Preparation: | Strong background in numerical analysis and good programming skill. |
| Project Title 2: | Block Hybrid Collocation Methods for the Numerical Solution of Fourth Order Ordinary Differential Equations |
| Supplement Knowledge: | Numerical methods, C Programming, Matematica |
| Outline: | We shall derive numerical methods for solving fourth order ordinary differential equations. The derivation involves interpolation and collocation of basic polynomial. The C-program will be compiled to test the efficiency of the numerical methods. |
| Preparation: | Strong background in numerical analysis and good programming skill. |

# 31    Dr Yeo Heng Giap Ivan

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| Lecturer: | Dr Yeo Heng Giap Ivan (yeohg@utar.edu.my) |
| Areas of Interest: | Operations Research |
| Project Title 1: | A Batch Shipment Inventory Model With Time-varying Demand |
| Supplement Knowledge: | Calculus |
| Outline: | This project aims to develop a mathematical model of an inventory system that satisfies a time-varying demand function over a finite planning horizon by shipping out the finished product in batches. |
| Preparation: | Learn programming skills using Excel or Matlab. |
| Project Title 2: | Computer Simulation of Truels |
| Supplement Knowledge: | None |
| Outline: | This project aims to develop computer simulation of truels. Several rules will be consider, i.e. sequential fixed order, sequential random order, finite bullets, infinite bullets. |
| Preparation: | Learn programming skills using Excel or Matlab. |

# 32 Dr Yong Chin Khian

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| Lecturer: | Dr Yong Chin Khian (yongck@utar.edu.my) |
| Areas of Interest: | Applied Statistics and Financial Economics |
| Project Title 1: | Analyzing PCFCCE using Bayesian Network |
| Supplement Knowledge: | Probability and Statistics I & II or Statistical Inference, Design of Experiments |
| Outline: | This project will analyze Partially Confounded Factorial Conjoint Choice Experiments using Baysian Network. |
| Project Title 2: | Assessing Consumers' Behavior Using PCFCCE |
| Supplement Knowledge: | Probability and Statistics I & II or Statistical Inference, Design of Experiments |
| Outline: | This project will use Partially Confounded Factorial Conjoint Choice Experiments to asses consumers' behavior toward certain products. |
| Project Title 3: | Valuing Equity-Linked death benefits |
| Supplement Knowledge: | Financial Economics II or Derivative Security and Life Contingencies |
| Outline: | This project use the Option Pricing and Actuarial Present Value to price equity-linked death benefits. |
| Project Title 4: | Parameters Estimation for CIR Model |
| Supplement Knowledge: | Probability and Statistics I & II, Financial Economics II or Derivative Security |
| Outline: | This project will use Kalman Filter to estimate the parameters in CIR Model. |
| Project Title 5: | Estimating Limited Fluctuation Credibility Using Exact Distribution |
| Supplement Knowledge: | Probability and Statistics I & II, Credibility Theory |
| Outline: | This project will use certain non-normal distribution to estimated the expected number of claims for full credibility. |
| Project Title 6: | Modelling Claims Using MCMC |
| Supplement Knowledge: | Probability and Statistics I & II, Credibility Theory and Stochastic Processes. |
| Outline: | This project will use Markov Chain Monte Carlo simulation to estimated claims premiums. |
| Project Title 7: | Using GARCH Models to Estimate CTE |
| Supplement Knowledge: | Probability and Statistics I & II, Applied Stat Models, Loss Models |
| Outline: | This project will evaluate the performance of GARCH (genralized Auto Regressive Conditional Hetrocedastic) models in modelling daily Conditional Tail Expectation(CTE)of certain portfolios. |

| Project Title 8: | Interval Estimate of Credibility |
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| Supplement Knowledge: | Probability and Statistics I & II, Credibility |
| Outline: | This project will find the confidence interval of the variance hypothetical means of the Buhlmann models. |