

Final Year Project Titles for DMAS (May 2021)

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1 Ms Aida Adha Binti Mohd Jamil

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

Lecturer:	Dr Avik De (avikde@utar.edu.my)
Areas of Interest:	Differential Geometry, Mathematical Physics
Project Title 1:	General Relativity using Matlab
Supplement Knowledge:	Calculus I and II, Fundamentals of Linear Algebra
Outline:	Introduction to Tensors and find exact solutions of Einstein's Field Equations
Preparation:	Read any "Linear Algebra" book to know about vector space and its dual.
Project Title 2:	Derivatives and their significances
Supplement Knowledge:	Calculus I and II
Outline:	We discuss about various type of derivatives in literature.
Preparation:	Be familiar with several variable calculus.

3 Puan Azimah Binti Mohd

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

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 Mr Chew Chun Yong

Lecturer:	Mr Chew Chun Yong (chewcy@utar.edu.my)
Areas of Interest:	Actuarial Science/Finance, Mathematical Physics
Project Title 1:	Reserving and PRAD
Supplement Knowledge:	N/A
Outline:	Reserving is an important task in Actuarial industry, there are many approaches in estimating the best estimate of reserves. Student will need to perform reserving calculation using various methods for general insurance. Student will also need to study different methods on estimating actuarial reserves and Provision for Adverse Deviation (PRAD).
Preparation:	R Programming, Excel/VBA, Basic financial knowledge
Project Title 2:	Casimir Effect of Elliptic Cylinders
Supplement Knowledge:	Partial Differential Equations, Numerical Analysis
Outline:	Casimir effect is a phenomena observed when two conducting plates are being placed into vacuum. Forces appear in between these plates. In this project, student will have to study the effect of elliptic cylinders to Casimir effect and compute the interaction energy by using numerical methods.
Preparation:	Programming language, and basic information about Casimir effect.

6 Prof. Dr Chia Gek Ling

Lecturer:	Prof. Dr Chia Gek Ling (chiagl@utar.edu.my)
Areas of Interest:	Graph Theory and Combinatorial Designs
Project Title 1:	The Game of Nim and its Mathematics
Supplement Knowledge:	UECM1084 Basic Mathematics
Outline:	The game of Nim is a 2-person game. It consists of k piles of objects where the players take turns to choose a pile and remove from it at least one object, $k \geq 2$. The player who removes the last object is the winner. The topics to be explored include: winning strategy of the game, some variations of the game of Nim, Sprague-Grundy Theorem, game of Nim on graphs.
Preparation:	Analytical reasoning.
Project Title 2:	Domination in Graphs and Monitoring Devices in Electric Power Network
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 <i>Power Dominating Set Problem</i> , 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.

7 Dr Denis Wong Chee Keong

Lecturer:	Dr Denis Wong Chee Keong (deniswong@utar.edu.my)
Areas of Interest:	Cryptography
Project Title 1:	Investigation of polynomial time algorithm to approximate Lattice Problems
Supplement Knowledge:	UECM 3383 Cryptology
Outline:	Study various types of lattice problems – SVP, CVP, LWE, RLWE, MLWE, LWR, etc and investigate algorithms that might approximate these problems in polynomial time.

Preparation:	UECM 3383 Cryptology
Project Title 2:	Investigation of Rounded Normal Distribution in Learning-With-Errors Schemes
Supplement Knowledge:	UECM 3383 Cryptology
Outline:	Study probability distributions in lattice-based cryptography constructed based on LWE problems.
Preparation:	UECM3383 Cryptology
Project Title 3:	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 4:	Heritage Building Preservation with Blockchain Technology
Supplement Knowledge:	UECM3383 Cryptology
Outline:	Perform a thorough survey on Malaysia heritage building preservation's works and propose a system to improve current practice.
Preparation:	UECM3383 Cryptology
Project Title 5:	Graph-, Lattice- and Code – Based Cryptography
Supplement Knowledge:	UECM3373 Introduction to Coding Theory, UECM3383 Cryptology, UECM3393 Combinatorics
Outline:	Investigate the relation between graph theory, lattice and error correcting codes in applications to modern cryptography.
Preparation:	Coding, Cryptography and Combinatorial theories
Project Title 6:	Modular Group Algebra with application to cryptography
Supplement Knowledge:	UECM3363 Modern Algebra
Outline:	Investigate various algebraic properties for modular group algebra and hence seek for possible applications in cryptography.
Preparation:	UECM3363 Modern Algebra

8 Dr Goh Yong Kheng

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:	Feymann-Kac Theorem
Supplement Knowledge:	Numerical analysis, partial differential equations, Python
Outline:	The Black-Schole equation is a typical example of application of Feyman-Kac theorem to the pricing function of a financial product under risk free rate. In this project, student will explore the relationship between a stochastic differential equation and a related PDE obtained under Feymann-Kac formula via computer simulation
Preparation:	try out some Python tutorials, find and read information on Feymann-Kac theorem.
Project Title 3:	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 distribution

9 Dr Goh Yann Ling

Lecturer:	Dr Goh Yann Ling (gohyl@utar.edu.my)
Areas of Interest:	Applied Statistics, Applied Mathematics
Project Title 1:	Curve Fitting
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:	Numerical Differentiation and Integration
Supplement Knowledge:	calculus
Outline:	We will normally evaluate the derivative or integral of a simple function by using calculus. When the functions are complicated, we have to apply some numerical techniques to obtain the approximate values for their derivatives and integrals.
Preparation:	Strong background in differential and integral calculus, good programming skill.
Project Title 3:	Big Data Analysis
Supplement Knowledge:	probability and statistics
Outline:	In the project, the student will conduct the data analysis and provide interpretations for the final conclusions.
Preparation:	Good programming skill

10 Ms Hii Siew Chen

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

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

Lecturer:	Dr Koh Siew Khew (kohsk@utar.edu.my)
Areas of Interest:	Queueing Theory
Project Title 1:	Queue Length and Waiting Time Distributions in a GI/G/1 queue
Supplement Knowledge:	Fundamental of Queueing Theory
Outline:	This project aims to find the stationary queue length distribution and waiting time distribution of a customer who arrives when the queue is in the stationary state. The interarrival time and service time distributions are assumed to have a constant asymptotic rate.
Preparation:	Strong knowledge in Java.
Project Title 2:	Maintenance of a Deteriorating Queue with Random Shocks
Supplement Knowledge:	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:	Strong knowledge in Java.

13 Ms Lee Yap Jia

Lecturer:	Ms Lee Yap Jia (yjlee@utar.edu.my)
Areas of Interest:	Universal Portfolio
Project Title 1:	Investment Strategies by Universal Portfolios
Supplement Knowledge:	None
Outline:	This project aims to produce good investment strategies by studying the empirical performance in the real stock market of universal portfolios generated by different methods.
Preparation:	Microsoft Excel
Project Title 2:	Universal Portfolio generated by Some Distance Measures
Supplement Knowledge:	None
Outline:	This project aims to explore and discuss more applications of minimum distance methods in generating universal portfolio.
Preparation:	Microsoft Excel

14 Dr Liew How Hui

Lecturer:	Dr Liew How Hui (liewhh@utar.edu.my)
Areas of Interest:	Computers and Mathematics
Project Title 1:	Python Data Visualisation
Supplement Knowledge:	UECM1703 Introduction to Scientific Computing
Outline:	This project will explore the data visualisation libraries in Python and techniques to build dashboards.
Preparation:	Software: For Windows user, Anaconda Python; For others, standard Python
Project Title 2:	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 intuitionistic (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/)
Project Title 3:	Python Computer Algebra System
Supplement Knowledge:	UECM1703 Introduction to Scientific Computing
Outline:	Study the algorithms used in the Symbolic Python library (https://www.sympy.org/en/index.html) to perform symbolic manipulation for simple algebra and calculus.
Preparation:	Python and reading books on computer algebra.
Project Title 4:	Lisp-Based Computer Algebra System
Supplement Knowledge:	Willingness to learn new programming language
Outline:	Investigate and extend the algorithms used in Lisp-based computer algebra system such as Maxima (https://maxima.sourceforge.io/), Jacal (http://people.csail.mit.edu/jaffer/JACAL.html), etc.
Preparation:	Scheme / Common Lisp and reading books on computer algebra.
Project Title 5:	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 Mathematica (https://github.com/mfillpot/mathomatic), Yacas (http://www.yacas.org/), Xcas (http://www-fourier.ujf-grenoble.fr/~parisse/giac.html) etc.

15 Dr Ng Kooi Huat

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.

16 Dr Ng Wei Shean

Lecturer:	Dr Ng Wei Shean (ngws@utar.edu.my)
Areas of Interest:	Linear Algebra
Project Title 1:	Factorizations of matrices in information extraction
Supplement Knowledge:	Linear Algebra, some programming skill
Outline:	Study various types of matrix factorization used in information extraction. Investigate and/or improvised the algorithms used.
Preparation:	Strengthen the background of Linear Algebra by extensive reading 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:	Strengthen the background of Linear Algebra by extensive reading

17 Dr Ong Poh Hwa

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.

18 Dr Pang Sook Theng

Lecturer:	Dr Pang Sook Theng (pangst@utar.edu.my)
Areas of Interest:	Universal Portfolio , Mathematics Education
Project Title 1:	Universal Portfolio Investment
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:	Using statistical method to analyze the student mathematics achievement.
Supplement Knowledge:	Knowledge in statistics.
Outline:	Differential the method in analyzing the data.
Preparation:	knowledge in any statistical software

19 Dr Pan Wei Yeing

Lecturer:	Dr Pan Wei Yeing (panwy@utar.edu.my)
Areas of Interest:	Computers and Mathematics
Project Title 1:	An investigation of mathematical models on the COVID-19 pandemic: the case of Malaysia
Supplement Knowledge:	Probability and Statistics
Outline:	This project will use mathematical forecasting models and the curve fitting method with the least-squares as a standard approach in regression analysis and compares the Covid-19 outbreak data in Malaysia.
Preparation:	Knowledge in programming, i.e. R, Python or Matlab
Project Title 2:	An analysis of the discrete model for stock price
Supplement Knowledge:	Mathematics of Finance, Black-Scholes formula
Outline:	The discrete model for stock price contains two parameters. In this project, we will investigate how these parameters influence a stock price.
Preparation:	Knowledge in programming, i.e. R, Python, or Matlab

20 Mr. Phoon Sheong Wei

Lecturer:	Mr. Phoon Sheong Wei (swphoon@utar.edu.my)
Areas of Interest:	Universal Portfolio
Project Title 1:	Nonparametric Investment by Universal Portfolio which using strategies generated from positive definite matrices.
Supplement Knowledge:	None
Outline:	This project will study the empirical stock performance which using the Universal Portfolio generated by different positive definite matrices. Please meet supervisor for more detail.
Preparation:	Microsoft Excel (VBA)
Project Title 2:	Low Order Universal Portfolios generated by special distributions.
Supplement Knowledge:	None
Outline:	This project will study how different distributions will affect the performance of the low order Universal Portfolio. Please meet supervisor for more detail.
Preparation:	Microsoft Excel (VBA)

21 Dr Qua Kiat Tat

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.

22 Ms. Seoh Yee Kam

Lecturer:	Ms. Seoh Yee Kam (seohyk@utar.edu.my)
Areas of Interest:	Statistical Quality Control
Project Title 1:	Application of Control Chart in Servicing Industry
Supplement Knowledge:	None
Outline:	The project aims to study and discuss the application of control chart in servicing industry.
Preparation:	Microsoft Excel/Minitab
Project Title 2:	Application of Control Chart in Supply Chain
Supplement Knowledge:	None
Outline:	The project aims to study and discuss the application of control chart in supply chain.
Preparation:	Microsoft Excel/Minitab

23 Dr Sim Hong Seng

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 Sim Shin Zhu

Lecturer:	Dr Sim Shin Zhu (simsz@utar.edu.my)
Areas of Interest:	Statistical Modelling and Inference, Data visualization
Project Title 1:	A study of the parameter estimation in count data based on optimization algorithm
Supplement Knowledge:	Statistical inference
Outline:	Maximum likelihood estimation (MLE) is a very popular statistical estimation method which provides consistent and efficient estimators. One of the methodology to solve for unknown parameters under MLE is through the numerical optimization of the log-likelihood function. A study on the performance of some chosen optimization algorithms will be carried out.
Preparation:	Parameter estimation methods; programming skill; basic knowledge in simulation
Project Title 2:	Data visualization on housing prices
Supplement Knowledge:	Strong Excel skills and basic data visualization knowledge
Outline:	Presenting the housing price data in a visual form (a dashboard) to showcase and communicate the findings of the research. Microsoft Excel will be used. Besides that, some skills in data sorting and filtering are essential to make sure the data is with the highest quality information.
Preparation:	data visualization; Microsoft Excel; basic statistics knowledge

25 Dr Tan Sin Leng

Lecturer:	Dr Tan Sin Leng (tslen@utar.edu.my)
Areas of Interest:	Differential Geometry, Real and Complex Analysis
Project Title 1:	From Euclidean Geometry to Non-Euclidean Geometry
Supplement Knowledge:	None
Outline:	An introduction to Euclidean and non-Euclidean Geometries, and a study of transformation Geometry.
Preparation:	Read some books on geometry.
Project Title 2:	Univalent Functions
Supplement Knowledge:	UECM2033 Elementary Real Analysis and UECM3013 Complex Analysis
Outline:	Holomorphic functions and Riemann mapping theorem. Survey of univalent functions, and entering into new domain of univalent functions.
Preparation:	Read some books on Complex and Real Analysis.
Project Title 3:	Analysis on Manifolds
Supplement Knowledge:	UECM2033 Elementary Real Analysis and UECM3013 Complex Analysis, Calculus III
Outline:	This is an advanced course in analysis, extending topics in Calculus to Riemannian Geometry. The first part of the project is to familiarize the basic theory in Riemannian Geometry. The second part of the project will be on the structure of some examples of Riemannian manifolds.
Preparation:	Read some books on Complex and Real Analysis.
Project Title 4:	Mathematics Education: An analytical study on teaching high school mathematics.
Supplement Knowledge:	None
Outline:	This project aims to make a survey and an analytical study on local high school mathematics materials and teaching method. Quantitative survey will be conducted to study the approach and method practiced in local high schools.
Preparation:	Understanding of current high school textbooks/teaching materials.

26 Dr Tan Wei Lun

Lecturer:	Dr Tan Wei Lun(tanwl@utar.edu.my)
Areas of Interest:	Rainfall Modeling, Environmental Statistics, Markov Chain, Hidden 'Markov Chain
Project Title 1:	Autonomous language processing for business solutions
Supplement Knowledge:	Willingness to learn new knowledge
Outline:	Sun Life Malaysia is looking for the speech analytics solutions to boost customer engagement, offer better customer service and enhance business outcomes. To achieve a "bionic" model that seamlessly combines human advisors and automated solutions.
Preparation:	Software
Project Title 2:	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 3:	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

27 Mr Tan Zong Ming

Lecturer:	Mr Tan Zong Ming (tanzm@utar.edu.my)
Areas of Interest:	Applied Statistics, Financial Mathematics
Project Title 1:	Research on Stock Analysis
Supplement Knowledge:	Financial Statement Analysis.
Outline:	Research analysis on some chosen public listed company using technical analysis and fundamental analysis. Evaluate the potential risk and reward profile of the stock and determine the target price based on assumptions
Preparation:	Microsoft Excel or any other programming software
Project Title 2:	Research on Trading Strategies
Supplement Knowledge:	Economics, Programming
Outline:	Trading strategies based on fundamental analysis, technical analysis, quantitative methods, or combination of decision factors. The strategies involve trading signal generated by either technical indicators, mathematical algorithms based on market action or combination of market factors such as economic indicators.
Preparation:	Microsoft Excel or any other programming software

28 Dr Teoh Lay Eng

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.
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29 Ms Wong Kuan Wai

Lecturer:	Ms Wong Kuan Wai (wongkw@utar.edu.my)
Areas of Interest:	Cryptography, information security
Project Title 1:	Dynamical analysis of chaotic systems
Supplement Knowledge:	None
Outline:	The student will be introduced with some low- and high-dimensional chaotic systems and the chaotification methods to enhance the chaotic behaviors. Meet supervisor for more details.
Preparation:	None
Project Title 2:	Chaotic based Image Encryption Scheme
Supplement Knowledge:	None
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:	None

30 Dr Wong Wai Kuan

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:	This project will study some goodness-of-fit tests.
Preparation:	Knowledge in programming.
Project Title 2:	Statistical control charts
Supplement Knowledge:	Probability and Statistics II
Outline:	This project will study selected control chart(s) when the data is not normally distributed.
Preparation:	Knowledge in programming.

31 Dr Wong Voon Hee

Lecturer:	Dr Wong Voon Hee (wongvh@utar.edu.my)
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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
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32 Dr Yap Lee Ken

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.

33 Dr Yeo Heng Giap Ivan

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.

34 Dr Yong Chin Khian

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
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.