# Subject Description Form

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| **Subject Code** | AMA494 |
| **Subject Title** | Case Study II |
| **Credit Value** | 3 |
| **Level** | 4 |
| **Pre-requisite/ Co-requisite/ Exclusion** | Nil |
| **Objectives** | To familiarize students with the various ways for analyzing data and presenting analysis results, through extensive hands-on experience, using commercial database system such as EXCEL, as well as statistical packages such as MINITAB and SPSS. |
| **Intended Learning Outcomes** | Upon satisfactory completion of the subject, students should be able to:<br>1. carry out their own study and learn independently for problem solving and solution seeking;<br>2. use data within the context of socially acceptable professional and ethical practices;<br>3. integrate knowledge and techniques in various disciplines to formulate mathematical models for real-life problems with a critical awareness of the appropriateness of competing models;<br>4. integrate knowledge and techniques in various disciplines in the analysis of real-life mathematical models and to discuss and assess critically the appropriateness of analysis methods used;<br>5. interpret analysis results and make recommendations for actions based on analysis results;<br>6. work as a team as well as independently;<br>7. write well-structured report for analysis results and present analysis results effectively. |
| **Subject Synopsis/ Indicative Syllabus** | Students will be provided with relevant case materials, which they will study in detail and produce a case report. The report is expected to include problem identification, relevant data, methodology of analysis, solutions, implementation, interpretations, conclusions, and so on. Oral presentation sessions will be arranged for students to report their work and findings. Class participation in the form of questions and discussions will be promoted in these sessions. Students will be allowed to propose their own real-life case if they so wish, provided it is academically sound and relevant. Independent research, critical thinking, and raising own ideas by students will be encouraged.<br><br>There will be two cases for each student, supervised by two or more lecturers to ensure an adequate coverage of mathematical techniques and application areas. Each case will take roughly 7 weeks. A case may be conducted as follows: |

| Week | Activities |
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| 1 | Students are given relevant case materials. Group discussion on case materials to identify problems and work out objectives. |
| 2 | Group report on problem identification and objectives formulation. Comments and feedback. Group discussion on data, methodology of analysis and solutions. |
| 3 | Group report on data, methodology and solutions. Comments and feedback. Further discussions, comments, suggestions, etc. |
| 4 | Practical session on finding solutions. |
| 5 | Group discussion on results, implementations, conclusions and interpretations. |
| 6 | Each student submits an individual case report. Oral presentation of individual reports. Questions, comments and discussions. |
| 7 | Oral presentation of individual reports. Questions, comments and discussions. |

Each student is required to present his/her case reports orally.

Case Examples:

1. Analysis of questionnaires: Students may be assigned to analyse questionnaire data collected by the Department in surveys conducted each year for various organisations. Under the supervision of the teaching staff, students will be guided to explore and utilise more advanced statistical techniques than descriptive techniques, such as partial correlation, logistic regression, bootstrap, etc.
2. Forecasting: Students may take up case studies in forecasting with seasonal data such as fire insurance claims or typhoon damage claims. They will be given data from real-life situations and can use standard time series techniques such as exponential smoothing or Box-Jenkins approach. For stronger students, more advanced methods such as Bayesian forecasting or combination of forecasts can be considered.
3. Fitting survival data: Students may collect data such as insurance claims and use appropriate computer software to fit the data with various well-known survival distributions, such as exponential, Weibull, and gamma distributions or their mixtures, and to discover new distributions better fitting the data by modifying and/or combining the traditional ones.
4. Portfolio optimization: This case study is to provide a chance for students to learn some optimization models for the portfolio selection problem in financial market. Students are required to collect data from some data base, to carry out simulation and to analysis simulation results.
5. Mathematical programming: Students may take up case studies in mathematical programming for real-life problems. Students are required to formulate the problems as mathematical programming models (e.g. linear programming and quadratic programming), apply appropriate solution techniques to the models, discuss the solutions of the models and perform post-optimal analysis.
6. Inventory control: Students may take up case studies concerning real-life inventory systems. Students are expected to investigate and evaluate the existing inventory policies of the systems, compare them with formal mathematical approaches and explore better inventory policies.

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| | 7. Queueing systems: Students may take up case studies concerning real-life queueing systems. Students are required to investigate the queueing systems by analysing system configurations, arrival patterns and service-time distributions etc. so as to determine the operating characteristics of the systems by queueing theory and, if necessary, simulation techniques. |
| **Teaching/Learning Methodology** | Project Supervision 42 hours<br><br>While the basic knowledge and techniques are learned via various subjects, students are required to learn some specific techniques by themselves jointly and independently with minimum guidance from the lecturer. Through the self-learning in groups as well as independently, 1, 2, 3, 4 and 6 are developed. Cases requiring different mathematical techniques and background knowledge other than mathematics will be given so that 3, 4 and 5 can be achieved by the students. 5 and 7 are major elements of the individual report. |

**Assessment Methods in Alignment with Intended Learning Outcomes**

| Specific assessment methods | % weighting | Intended subject learning outcomes to be assessed (Please tick as appropriate) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| a Case reports | 100 % | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Total | 100 % | | | | | | | |

100 % Continuous Assessment

Progress reporting including oral reporting and written reports are used to monitor students' progress and to assess in particular, outcomes 1, 2, 3, 4, 5 and 7. Group presentations will be used to assess 6. The final report submitted individually enables to assess all outcomes.

| **Student Study Effort Required** | | |
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| | Class contact: | |
| | ▪ Lecture | 28 Hrs. |
| | ▪ Tutorial | 14 Hrs. |
| | Other student study effort: | |
| | ▪ Self-study | 70 Hrs. |
| | Total student study effort | 112 Hrs. |

**Reading List and References**

Textbook:

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|---|---|---|
| Sekaran, U. | Research Methods for Business, 2nd Edition | John Wiley & Sons, Inc., 1992 |

Reference:

| | | |
|---|---|---|
| Howard, K., & Sharp, J.A. | The Management of a Student Research Project | Gower, 1983 |