**SINGAPORE MANAGEMENT UNIVERSITY**

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| **Study and Research Plan for Doctor of Engineering (EngD)** | | | | |
| Prepared by: | Tan Ming Hui | | Intake: | Aug 2020 |
| Reviewed and Agreed by | Chair: | Associate Prof Tan Kar Way | Co-Chair: | Prof Lau Hoong Chuin |
| Review Version & Date: | Version 1.1 for Year 1 [29 Jan 2021] | | | |
| Academic Load | Full Time  Part Time | | Duration: | 2020 to 2025 |

| **Year** | **Term** | **Empirical Research Project (ERP)**   1. **Topic** 2. **Purpose** | **Modules (Coursework)** | **Rationale** |
| --- | --- | --- | --- | --- |
| 1 | Term 1  Aug 2020 to Dec 2020 |  | IS711: Learning and Planning in Intelligent Systems | This course covers advanced topics in building these intelligent systems that make decisions or provide support to humans in making decisions. Furthermore, the topics explored are at the intersection of Artificial Intelligence, Machine Learning and Operations Research. |
| Library Training 1 Workshop | **Orientation Package:** Library overview by research librarians (1hr) that covers basic library resources for searching databases, Zotero Basics |
| IRB Training for SMU Researchers  (completed on 5th Aug 2020) | Increase knowledge of, and sensitivity to issues surrounding the responsible conduct of research with human subjects.  Improve the ability of program participants to make ethical and legal choices in the face of conflicts involving scientific research with human subjects. |
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| Term 2  Jan 2021 to Apr 2021 |  | Scientific Writing Workshop (2.5 Days) | Training for writing technical conference and journal publications. |
| IS703: Algorithms and Optimisation | This course is similar to the pre-requisite for CS608 Recommender Systems. It will also lay the foundation for skills required for machine learning that is imperative to building a recommender model which is related to my research theme. |
| Term 3  May 2021 to Aug 2021 | **ERP 1**  **Topic**: Location Allocation Problem. A study on optimising the placement of retail stores (coin laundromats) in Japan.  **Purpose**:   1. A survey of on approaches of using socio demo attributes and geospatial analysis for location-allocation 2. Determine research gap in existing literature 3. Propose a framework incorporating (i) socio demo attributes, (ii) Points of interest (POI) and (iii) traditional Location Allocation approaches.   **Outcome**: Paper + Coded solution for proposed framework | ISSS610: Applied Machine Learning | To apply for exemption from ISSS617 Python for Data Science via assessment test. ISSS610 will set the foundation and is also a pre-requisite for CS604 Deep Learning for Visual Recognition. Both ISSS617 and CS604 are relevant to analysis of satellite imagery in my dissertation. |
| Research Seminar (Part 1) | Attendance: minimum 5 seminars per AY from the following   * AI Translation Seminars * Translational Research Seminar delivered by industry professionals, visiting researchers/faculty * Graduating PhD in IS/CS and EngD (pre-conference talks) * MITB Monthly Seminars/In-Conversation Series   Output   1. a completed SIS EngD Seminar Form 2. 1 Summary Report of 2 pages 3. Printout copies of 5 seminar emailers. |
| Library Seminar 1 | Getting started with your research (3hours), covering   * Mapping your literature review * Current awareness * Managing research data |
| Scientific Presentation | Develop effective technical presentations during conferences |
| 2 | Term 1  Aug 2021 to Dec 2021 | **ERP 2**  **Topic**: Systematic Review of using alternative data for economic understanding  **Purpose**:   1. A survey on various approaches using alternative data for economic understanding, focusing on various techniques of change detection in multitemporal satellite images 2. Assess suitability and availability of using publicly available satellite imagery for 2nd tier cities in ASEAN countries for economic understanding 3. Automated pipeline for data collection in preparation for ERP 3   **Outcome**: Paper + Coded Solution for data collection in preparation for ERP 3 | ISSS612  Big Data: Tools & Techniques | This course is designed to develop capability to work on novel business problems with extremely large or extreme high-frequency data. This is helpful in manipulating large volume of transaction data for stores to develop a recommendation model. |
| Library Bite-Sized Workshop | Complete 5 bite-sized workshops offered in Year 2, Term 1 & 2 |
| Library Seminar 2 | Getting started with academic publishing (3hours), covering   * Academic Publishing * Predatory Conference, Fake Scholarly Articles * Research Impact/Profiles |
| Term 2  Jan 2022 to Apr 2022 |  | CS604: Deep Learning for Visual Recognition | This course is designed to train students both fundamentals and practical skills of deep learning architectures for several popular visual recognition tasks, such as image recognition and object detection. This will be applied in my dissertation in object recognition for satellite imagery. |
| Term 3  May 2022 to Aug 2022 | **ERP 3**  **Topic**: Change Detection using Satellite Imagery in 2nd tier cities of ASEAN countries  **Purpose**:   1. Assess efficiency of existing approaches for change detection 2nd tier cities 2. Propose improvement to existing approaches to increase efficiency of economic understanding, by incorporating additional datapoints, e.g. Points of Interests, Road networks   **Outcome**: Paper + Coded Solution for improved change detection technique. | CS608: Recommender Systems | This course provides a conceptual understanding of fundamental algorithms for recommender systems. It also covers the design, training and deployment of a recommender system in various applications. This is related to my dissertation of implementing a recommender system for products in physical stores. |
|  |  |  | Research Seminar (Part 1) | Attendance: minimum 5 seminars per AY from the following   * AI Translation Seminars * Translational Research Seminar delivered by industry professionals, visiting researchers/faculty * Graduating PhD in IS/CS and EngD (pre-conference talks) * MITB Monthly Seminars/In-Conversation Series   Output   1. a completed SIS EngD Seminar Form 2. 1 Summary Report of 2 pages 3. Printout copies of 5 seminar emailers. |
| 3 | Term 1  Aug 2021 to Dec 2021 |  |  |  |
| Term 2  Jan 2023 to Apr 2023 |  | Qualifying Exam (QE) | QE is scheduled in the 3rd Year, 2nd Term, Week 8 and students are given a maximum of 2 attempts. Student should pass QE by end of Year 3. Oral Exam (30 papers) & Written Exam (1 ERP or 1 Publication) |
| Term 3  May 2023 to Aug 2023 | **Dissertation**: Implementation of a recommender model, supported by effective placement of wholesale stores, for in 2nd tier cities in ASEAN countries and support effective distribution of products and maximise sales  **Sub Topic 1** – Quantifying effectiveness of using alternative data against conventional measurements in 2nd Tier cities of ASEAN countries for economic understanding |  |  |
| 4 | Term 1  Aug 2023 to Dec 2023 | **Sub Topic 2** – Segmentation of cities and neighbourhoods based on economic indicators inferred from alternative data |  |  |
| Term 2  Jan 2024 to Apr 2024 | **Sub Topic 3** – Optimisation of wholesaler store location to maximise product distribution |  |  |
| Term 3  May 2024 to Aug 2024 | **Sub Topic 4** – Implementation of recommender system  **Outcome**: Paper + Coded Solution + Pilot at a market (if business permits) |  |  |
| 5\* | Term 1  Aug 2024 to Dec 2024 |  |  |  |
| Term 2  Jan 2025 to Apr 2025 |  | Revised and Submit Approved Report to PGR |  |
| Term 3  May 2025 to Aug 2025 |  |  |  |

Note:

1. This study and research plan must be discussed and confirmed with respective Chair and Co-Chair of the EngD Programme.
2. Please update the study plan once a year and submit to the EngD Admin Office by end October every year during the EngD candidatures.
3. \* Year 5 is applicable to Part Time students.

Machine generated alternative text:
Programme Schedule (Part-time) 
SMU 
• courses (1 ct.') 
Empirical Research Project (ERP, 1 CUI 
Information Systems 
4 
• Courses (1 Cl.') 
• courses (1 
Empirical Research Projects (ERP, ICU) 
Prepare for Qualifying Exam (QE) 
Conduct Dissertation Project 
Conduct Dissertation Project 
• Courses (1 Cl.') 
Library Training part I and 5 Seminars (l CIJ) 
• courses (1 CO) 
• Empirical Research projects (ERP, 1 CO) 
courses (1 
Scientific Writing & Presentation (l CU) 
Library Training Part 2 and 5 Seminars (1 CU) 
• Form Dissertation Committee 
prepare Dissertation proposal 
Conduct Dissertation Project 
Conduct Dissertation Project 
Submit Written Report of Completed Dissertation 
Submit Written Dissertation proposal 
• Oral Defense of Proposal 
Conduct Dissertation Project 
• Present and defend the Design & Implementation 
Oral Defense of Dissertation 
Revise & Re-submit Report 
Submit Approved Report to Office of Postgraduate Research 
Programmes (28 CUs) 
Residency Period: 
Part-time EngD students are expected to spend a minimum of two blocks of five working days at SMU 
per year during the third and fourth year of their candidature (total of two weeks in duration). 
The study period at SMU is crucial as it serves as important interaction time between EngD students, 
supervisors and fellow doctoral students. There will be planned activities for the candidate such as 
research seminars, discussions, some intellectual exchanges, and etc. 

Machine generated alternative text:
Programme Structure 
Component 
Coursework 
• Technical Foundation Courses: SIS PhD Courses 
• Technology Application Courses: MITB Courses 
Option to: 
• replace up to 1 CU of Technical Foundation Course via cross-enrolment into other SMU academic/ 
professional doctoral course 
OR 
• replace up to 1 CU of Technology Application Course via cross-enrolment into other SMU professional 
master's degree course 
Professional Foundation Course 
• Scientific Presentation & Scientific Writing 
• Translational Research Seminars, Ml TB Professional Seminar Series & Library Training 
Research Foundation 
• Empirical Research Projects (ERP): 1 CU per term for 3 terms 
Doctoral Dissertation 
TOTAL 
Information Systems 
Course Units 
6 
2-4 
2-4 
0-1 
3 
2 
3 
28 
40 
*Alumni of SMU Master of IT in Business (MITE), Master of Applied Information Systems (MAIS) or MSc in Computing, who have graduated within 
the last 5 years, may be exempted up to 4 ClJs of matching courses to the EngD programme. 

