POSTGRADUATE PROGRAMME HANDBOOK 2020/2021

FACULTY OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY
UNIVERSITY OF MALAYA

University of Malaya

Faculty of Computer Science and Information Technology

POSTGRADUATE PROGRAMME HANDBOOK

2020/2021

The Leaders in Research & Innovation

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VISION, MISSION, AND OBJECTIVES OF THE FACULTY

Vision

A globally-influential faculty, enriching lives & shaping the future through computing technology.

Mission

To enrich lives and shape the future for the nation and humanity through education, research and technopreneurship.

Objectives

- To sustain an outstanding faculty dedicated to excellence in undergraduate and postgraduate teaching, learning and research
- To contribute towards the development of the nation through the production of quality research and publications
- To provide innovative academic programs that can respond to the changing needs of the society
- To produce quality graduates who are equipped with advanced knowledge and skills of computer science and information technology

HISTORY OF THE FACULTY

The provision of computer facilities and services at the University of Malaya (UM) began in mid-1967, soon after the Computer Centre was officially formed in 1965. This also made the university one of the pioneers in computer usage in Malaysia. In December 1969, the Computer Centre took on an additional role of teaching and research of computer science and information technology. The Computer Centre Board was formed, comprising the Vice Chancellor (as Chairman), the Director of Computer Centre (as Secretary), and a representative from each Faculty, Institute, Centre of the University, and from the University Senate.

In 1974, the Diploma in Computer Science postgraduate programme was introduced. From its inception in the 1974/75 session to the 1999/2001 session, a total of 304 students had been awarded the Diploma.

The Master of Computer Science (M. Comp. Sc.) and the Doctor of Philosophy (Ph.D.) were two higher degree research programmes approved by the Senate and had been administered by the Computer Centre since 1985. In addition, the Computer Centre offered a 4-year Bachelor of Computer Science programme. The first undergraduate enrollment for 1990/91 session was 50 students.

In April 1993, the University Senate agreed to the formation of the Computer Centre Study Board. The Board proposed the establishment of a faculty to be called the Faculty of Computer Science and Information Technology (FCSIT). The existing Computer Centre was to be annulled and replaced by a Computer Services Division which was placed under the Chancellery.

On September 22 1994, the University of Malaya Council agreed to the formation of the Faculty of Computer Science and Information Technology (FCSIT), and the Computer Services Division. A sum of RM 4.2 million was obtained from the Ministry of Education under the 6th Malaysia Plan to put up a new building for the faculty, with the necessary infrastructure for teaching, learning and research. The building was officially declared open by the then Minister of Education, Datuk Seri Najib Tun Abdul Razak on 26 September 1996.

The Bachelor of Information Technology programme started in the 1996/97 academic session, with an initial intake of 50 students. In 1997, the Faculty established four departments, Artificial Intelligence, Software Engineering, Information and Library Science, and, Computer Systems and Technology.

To accommodate an increased student population, an additional building was built in 1997-98 which was officially opened by Dato' Dr. Fong Chan Onn, the then Deputy Minister of Education on 21 September 1998. Since its establishment, the Faculty of Computer Science and Information Technology has been led by a number of distinguished persons. The following have served as Directors/Deans:

1967 – 1973	Mr. Ong Yin Fook
1973 – 1975	Professor Paul Peach
1975 – 1978	Dr. R.K. Pillay
1978 – 1982	Dr. Tan Bock Thiam
1982 – 1990	Associate Professor Ir. Dr. Mashkuri Yaacob
1990 – 1992	Professor Lee Poh Aun
1992 – 2000	Professor Ir. Dr. Mashkuri Yaacob
2000 – 2002	Associate Professor Dr. Siti Salwah Salim
2002 – 2004	Associate Professor Dr. Zainab Awang Ngah
2004 – 2005	Professor Ir. Dr. N. Selvanathan
2005 – 2006	Associate Professor Dr. Siti Salwah Salim
2006 – 2007	Professor Dato' Dr. Ir. Mashkuri Hj. Yaacob
2007 – 2009	Professor Dr. Mohd. Sapiyan Baba
2009 – 2010	Professor Dr. David Ngo Chek Ling
2010 – 2011	Professor Dr. Wan Ahmad Tajuddin Wan Abdullah
2011 – 2014	Professor Dr. Siti Salwah Salim
2014 – 2017	Professor Dr. Abdullah Gani
2017 – 2019	Professor Dr. Abrizah Abdullah
2019 – Present	Professor Datin Dr. Sameem Abdul Kareem

STAFF

DEAN'S OFFICE

Dean

: **Professor Datin Dr. Sameem Abdul Kareem**
B.Sc. (Hons) (Malaya), M.CS (UK), PhD (Malaya)

Deputy Dean
(Postgraduate)

: **Professor Ts. Dr. Miss Laiha Mat Kiah**
B.Comp.Sc. (Hons) (Malaya), M.Sc. (London), PhD (London)

Deputy Dean
(Undergraduate)

: **Associate Prof. Dr. Maizatul Akmar Ismail**
BIT (Hons) (Malaya), M.Sc. (UPM), and PhD (Malaya)

Deputy Dean
(Research)

: **Associate Prof. Dr. Chan Chee Seng**
BEng (Hons) (Multimedia), M.Sc. (Portsmouth), PhD (Portsmouth)

HEAD OF DEPARTMENT

: **Dr. Mumtaz Begum Peer Mustafa**
Dip. (PTPL), B.S.CS (Hons) (UPM), M.Sc. (Malaya), PhD (Malaya)

Software Engineering

: **Associate Prof. Dr. Norisma Idris**
B.CS. (Hons) (Malaya), M.Sc. (Malaya), PhD (Malaya)

Artificial Intelligence

: **Dr. Mohamad Nizam Ayub**
B.Comp.Sc. (Hons) (Malaya), M.Sc. (Edinburgh), PhD (Paisley)

Computer System
and Technology

: **Dr. Norjihan Abdul Ghani**
BIT (Hons) (UUM), MIT.IS (UKM), PhD (UTM)

Information Systems

: **Associate Prof. Dr. Noorhidawati Abdullah**
BIT (Hons) (UKM), MIT (UKM), PhD (Glasgow)

Library and Information Science

Head of Unit

: **Associate Prof. Dr. Ainuddin Wahid Abdul Wahab**
B.Comp.Sc. (Hons) (Malaya), M.Sc. (Malaya), PhD (UK)

DEPARTMENT OF ARTIFICIAL INTELLIGENCE

Head of Department:
Assoc. Prof. Dr. Norisma Idris

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
1.	Assoc. Prof. Dr. Norisma Idris (DS54) 	Bachelor (1999) Bachelor of Computer Science (Hons), University of Malaya. Master (2001) Master of Computer Science, University of Malaya. PhD (2011) PhD (Natural Language Processing), University of Malaya.	• Artificial Intelligence in Education • (Automated summarization assessment, Summary sentence decomposition, Adaptive learning, essay grading system) • Natural Language Processing (Text Normalization, Malay text processing, Stemming algorithm, Sentiment Analysis)
2.	Assoc. Prof. Dr. Chan Chee Seng (DS54) 	Bachelor (2003) BEng (Hons) in Electronics Engineering, Multimedia University. Master (2005) MSc in Communication Systems Engineering, University of Portsmouth, U.K. PhD (2008) PhD, University of Portsmouth, U.K.	• Fuzzy Sets & Systems and Computer Vision (Image/Video Content Analysis and Human-Robot Interaction)
3.	Prof. Dr. Loo Chu Kiong (VK7) 	Bachelor (1996) Bachelor of Engineering (Hons), University of Malaya. PhD (2004) PhD, Universiti Sains Malaysia	• Soft Computing, Affective Computing, Human-Robot Interaction (HIR), Deep Learning.

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
4.	Prof. Datin Dr. Sameem Abdul Kareem (VK7) 	Bachelor (1986) Bachelor of Science, University of Malaya. Master (1992) Master of Computer Science, University of Wales, Cardiff, UK PhD (2002) PhD, University of Malaya.	• Deep Learning • Medical Big Data • Medical Image Processing and Medical Data Analytics • Bio-medical Informatics • Machine Learning & Data Mining (ANN & Fuzzy Logic) • Genetic Algorithm • Computational Forensics • Biometrics
5.	Dr. Rohana Mahmud (DS52) 	Bachelor (1990) Bachelor of Science, University of Waikato, New Zealand. Master (1995) Master of Science Artificial, Universiti Sains Malaysia PhD (2008) PhD, University of Manchester, United Kingdom	• Natural Language Processing (Corpus Development, Discourse Analysis) • Expert System (Multi Agent Consultation Systems, Expert Tutoring System) • Machine learning and Genetic Algorithm (Text Analytic, Text to Picture System)
6.	Dr. Siti Soraya Abdul Rahman (DS52) 	Bachelor (1998) Bachelor of Science (Hons) Information Technology, University of Glamorgan, UK Master (2003) Master of Computer Science, University of Malaya PhD (2012) PhD Cognitive Science, University of Sussex, UK	• Expert System • Cognitive Science (Cognition and programming, physics problem-solving, Cognitive Load Theory) • Artificial Intelligence In Education (AIED) (Adaptive e-learning, student modelling using Fuzzy Cognitive Map)

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
7.	Dr. Muhammad Shahreeza Safiruz Kassim (DS51) 	Bachelor of Engineering, Nagaoka University of Technology, Japan MSc in Artificial Intelligence (Distinction), University of Southampton, UK PhD in Computer Science, University of Southampton	• Bayesian probability modelling • Machine Learning • Parameter estimation
8.	Dr. Woo Chaw Seng (DS52) 	Bachelor (1996) Bachelor of Computer Science, University of Malaya. Master (1999) Master of Computer Science, University of Malaya. PhD (2007) PhD, Queensland University of Technology, Australia	• Artificial Neural Network • Biomedical Image Segmentation • Wavelet Transform Applications • Data Hiding and Steganography (Multimedia Watermarking) • Mobile Computing (mobile security) • Soft Computing (Swarm Behavior, Software Agent) • Security Services Sn: Digital Forensic, Steganography, Network Security, Public Key Infrastructure and Biometrics (Digital Watermarking) • National Security Sn: Including Health Aspects Such as Medicine and Medical Supply, Disaster Preparedness and Imported Diseases (Tele-Medicine) • Biometrics Security System (mobile biometric systems)

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
9.	Dr. Aznul Qalid Md Sabri (DS51) 	Bachelor (2006) Bachelor of Computer Science, University of Malaya. Master (2009) Masters in Vision and Robotics, Heriot-Watt University Master Degree, (2009) Universite De Bourgogne (Robotik) PhD (2013) Doctoral Degree (PhD), Ecole Des Mines, Douai, Perancis (Kepintaran Buatan)	• Computer Vision (Human Action Classification, Feature Extraction, Object Detection/ Recognition, Biometrics, Machine Learning, Data Analytics)
10.	Dr. Erma Rahayu Mohd Faizal Abdullah (DS51) 	Bachelor (2003) Bachelor of Computer Science (Hons)(Multimedia), University of Malaya Master, (2007) OITA University (Kejuruteraan Elektrik) PhD (2013) Doctoral Degree, Universiti Teknologi MARA (Kejuruteraan Elektrik)	• Computer Vision and Image Processing • Neural Networks, Genetic Algorithms and Fuzzy Logic (Backpropagation algorithm) • Pattern Recognition
11.	Dr. Unaizah Hanum Obaidellah (DS51) 	Bachelor (2004) Bachelor of Computer Science (Artificial Intelligence), University of Malaya. Master (2007) Master of Computer Science (Artificial Intelligence), University of Malaya. PhD (2012) Cognitive Science, University of Sussex, UK	• Cognitive Science (Diagrams, Semantic and spatial representation, Memory, Learning) • Biomedical simulation & modelling

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
12.	Dr. Zati Hakim Azizul Hasan (DS51) 	Bachelor (2004) Bachelor of Computer Science (Artificial Intelligence), University of Malaya. Master (2007) Master of Computer Science (Artificial Intelligence), University of Malaya. PhD (2014) PhD in Artificial Intelligence and Robotics, Auckland University of Technology, New Zealand	• Robotics (mobile robots, localization and mapping) • Cognitive Mapping (spatial cognition in humans and animals) • Biomedical simulation & modelling • Biometrics (Speech processing, spectral analysis)
13.	Dr. Lim Chee Kau (DS51) 	Bachelor (1996) Bachelor of Science (Hons), Universiti Sains Malaysia Master (2002) Master of Computer, Universiti Malaya PhD (2015) PhD (Comp Science), Universiti Malaya	• Fuzzy Relational Theory, Fuzzy Logic
14.	Mr. Md Nor Ridzuan Daud (DS45) 	Bachelor of Computer Science (1998), Universiti Teknologi Malaysia MPhil, Aberystwyth University (2002), Wales	• Big Data • Machine Learning • Natural Language Processing

DEPARTMENT OF SOFTWARE ENGINEERING

Head of Department:
Dr. Mumtaz Begum Peer Mustafa

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
1.	Dr. Mumtaz Begum Peer Mustafa (DS51) 	Diploma (1998) Pusat Teknologi dan Pengurusan Lanjutan (PTPL), Malaysia Bachelor (2002) Bachelor of Science (Computer Science), Universiti Putra Malaysia. Master (2006) Master of Science, University of Malaya. PhD (2012) University of Malaya.	• Component Based Software Development (Component Based Software Engineering, Software Reuse, Reusable Component) • Software Testing • Speech Recognition • Speech Synthesis • Pattern Recognition • Software Agents • Human Computer Interaction
2.	Assoc. Prof. Dr. Zarinah Mohd Kasirun (DS54) 	Bachelor (1989) Bachelor of Computer Science, Universiti Kebangsaan Malaysia. Master (1993) Master of Computer Science, Universiti Kebangsaan Malaysia PhD (2009) University of Malaya	• Requirements Engineering (Tacit knowledge elicitation, Requirements reuse) • Web-Based Computing (Web-Based Application, Recommender System, Social Network Analysis) • E-Learning (Road Mapping, Performance Visualization) • Software Reengineering (Evolution and Modernization, Reuse and Software Product Line Engineering) • Software Quality (Automatic Bug Triaging,) • Software Engineering (Knowledge Engineering, Data Engineering, Mining Software Repository)

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
3.	Assoc. Prof. Dr. Ow Siew Hock (DS54) 	Bachelor (1985) Bachelor of Arts (Hons), University of Malaya. Master (1989) Master of Computer Science, University of Malaya. PhD (2000) University of Malaya.	• Project Management (Software Project Management) • Software Metrics (Software Measurement) • Software Quality (Software Testing, Software Quality Assurance (SQA) • E-Learning (Computer-Aided Learning) • Computer-Aided Systems (Computer-Aided Healthcare System; Personality Traits Analysis System; Leadership Style Analysis System; Graphology)
4.	Assoc. Prof. Dr. Rodina Ahmad (DS54) 	Bachelor (1988) Bachelor of Computer Science and Mathematics University of Hartford, CT, USA Master (1991) Master of Computer Science Renselaer Polytechnique Institute (RPI), USA PhD (2006) Universiti Kebangsaan Malaysia	• Software Requirements Engineering, Software Process Improvement, • Empirical Software Engineering • Computer Assisted Learning and E-learning Quality
5.	Assoc. Prof. Dr. Chiew Thiam Kian (DS54) 	Bachelor (1998) Bachelor of Computer Science, University of Malaya. Master (2000) Master of Computer Science, University of Malaya. PhD (2009) University of Glasgow, Scotland	• Web Performance Analysis and Management (Web Performance) • Usability of Web-Based Systems (Web Usability) • Software Architecture (Interoperability) • Personalised and Community-Based Healthcare (ICT, Healthcare, Interdisciplinary)

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
6.	Assoc. Prof. Dr. Siti Hafizah Ab. Hamid (DS54) 	Bachelor (2000) Bachelor of Science (Hons) (Computer Science), Universiti Teknologi Malaysia, Skudai. Master (2002) Master of Science (Computer System Design), Manchester University Institute of Science and Technology. PhD (2013) University of Malaya.	• Software Verification, Validation & Testing (Test Cases, Formal Specification) • Logics and Meanings of Programs (Formal Methods) • Mathematical Logic and Formal Language (Object-Oriented Languages (OOL)) • Edutainment (Mobile Games, E-Learning, Object-Oriented Programming) • Project Management (PRINCE2)
7.	Dr. Adeleh Asemi Zavareh (DS51) 	Bachelor of Computer Science, University of Ashrafi Isfahani, Isfahan, Iran (2006) Master of Computer Science, University of Pune, India (2008) PhD of Computer Science (Artificial Intelligence), University of Malaya (2014)	• Human Computer Interaction • Evaluation of Software and Systems • Neuro Fuzzy Inference Systems • Multi Criteria Decision Analysis • Software Design • Data Analysis • Big Data • Decision Support Systems • Knowledge Based Systems • E-Commerce
8.	Dr. Nazean Jomhari (DS52) 	Bachelor (2000) Bachelor of Science (Hons) (Information Science), Universiti Kebangsaan Malaysia. Master (2001) Master of Science, University of Essex, Colchester, UK PhD (2010) Manchester University, United Kingdom	• Interface Design (Older Adult, Child, Autistic and Computer)

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
9.	Dr. Raja Jamilah Raja Yusof (DS52) 	Bachelor (1997) Bachelor of Engineering, Imperial College of Science,Technology and Medicine. Master (2000) Master of Computer Sciense, University of Malaya. PhD (2012) University of Malaya.	• Human Computer Interaction (Interface Design, Information Visualization, Hierarchical Task Analysis Model) • E-Culture (Muslim Information System, Techno-Daie, Islam, Science and Technology) • Cognitive Psychology (Reading Comprehension) • Information Processing (Arabic Stemming) • Information, Computer and Communication Technology (ICT), Software Engineering
10.	Dr. Su Moon Ting (DS52) 	Bachelor (1996) Bachelor of Computer Science (Hons), Universiti Putra Malaysia. Master (1999) Master of Science (Computer Science), Universiti Putra Malaysia. PhD (2015) University of Auckland, New Zealand	• Service-Oriented Architecture) • Education (E-Learning) • Computer Aided Software Architecture (Software Architecture Documentation, Architectural Knowledge) • Web Services (Software Engineering (Case) Tools (Syntax-Directed Programming Editor) • Virtual Reality (Vrml, Vr For Internet) • Web services composition • End-user development/programming
11.	Dr. Chiam Yin Kia (DS51) 	Bachelor (2003) Bachelor of Computer Science (Software Engineering), University of Malaya. Master (2005) Master of Science in Information Technology, Malaysia University Of Science And Technology, Malaysia. PhD (2011) Doctor of Philosophy in Computer Science &	• Software Process Modelling • Software Quality • Requirements Engineering • Software Testing • Risk Management.

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
		Engineering, The University of New South Wales, Australia	
12.	Dr. Mohd Hairul Nizam Md Nasir (DS52) 	Bachelor (2003) Bachelor of Computer Science (Hons), University of Malaya. Master (2005) Master of Computer Science, University of Malaya. PhD (2014) Universiti Teknologi Malaysia.	• Software Process Models • Software Process Improvement (CMM, CMMI, TSP, PSP) • Empirical Software Engineering (Empirical Research) • Software Quality • Project Management (PMBOK, PRINCE2))
13.	Dr. Asmiza Abdul Sani (DS51) 	Bachelor (2006) Bachelor of Computer Science (Hons) (Software Engineering), University of Malaya. Master (2007) University of York, UK PhD (2013) University of York, UK	• Formal methods, model-driven engineering, advance software engineering
14.	Dr. Ong Sim Ying (DS51) 	Bachelor (2007) Bachelor of Computer Science (Software Engineering), University of Malaya PhD (2015), University of Malaya	• Image, Signal and Video Coding and Processing • Information Security (Data Hiding and Encryption) • Linear Programming
15.	Dr. Hazrina Binti Sofian (DS51) 	Bachelor (2006) Bachelor of Computer Science (Hons) University of Malaya, Master (2010) Masters of Software Engineering University of Malaya, PhD (2018), Doctor of Philosophy University Putra Malaysia	• Software Requirements Engineering • Intelligent Computing Adaptive, self-adaptive and incremental learning • Semantic Web • Linked Data

DEPARTMENT OF INFORMATION SYSTEMS

Head of Department:
Dr. Norjihan Abdul Ghani

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
1.	Dr. Norjihan Abdul Ghani (DS52) 	Bachelor (2000) Bachelor of Information Technology, Universiti Utara Malaysia. Master (2002) Master of Information Technology (Infomation Science), Universiti Kebangsaan Malaysia. PhD (2013) Universiti Teknologi Malaysia.	• Database (Database Security & Privacy) • Digital Image Processing System (Image Retrieval) • Data Security (Information Security and Privacy)
2.	Assoc. Prof. Ts. Dr. Sri Devi Ravana (DS54) 	Bachelor (2000) Bachelor of Information Technology (Hons.) (Information Science), Universiti Kebangsaan Malaysia. Master (2001) Master of Software Engineering, University of Malaya. PhD (2012) University of Melbourne, Australia	• Search Engine (IR Evaluation (e.g. evaluation metrics, aggregation methods, experiments) • Web Application and Services
3.	Assoc. Prof. Dr. Salimah Mokhtar (DS54) 	Bachelor (1987) Bachelor of Science, University of Pacific, Stockton Master (1988) Master of Computer Science, Eastern Washington University, Washington PhD (2017) University of Malaya	• Information system development methodology • E-leaning • E-Commerce • Big Data Application

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
4.	Assoc. Prof. Dr. Suraya Hamid (DS54) 	Bachelor (1998) Bachelor of Information Technology (Hons. in Industrial Computing), Universiti Kebangsaan Malaysia. Master (2002) Master of Information Technology, Universiti Kebangsaan Malaysia. PhD (2013) Computing and Information Systems, The University of Melbourne, Australia	• Information Services (e-Government, e-Learning, e-commerce, cybersecurity awareness and IS for Sustainability • ICT and Emergent Information Technology (Information Seeking, Online Behaviour and Its Impact, Activity Theory, Qualitative Research and Social Media)
5.	Prof. Dr. Teh Ying Wah (VK7) 	Bachelor (1994) Bachelor of Computer Science, Oklahoma City University, USA Master (1995) Master of Computer Science, Oklahoma City University, USA PhD (2004) University of Malaya	• Data Mining • Database
6.	Assoc. Prof. Dr. Maizatul Akmar Ismail (DS54) 	Bachelor (1999) Bachelor of Information Technology, University of Malaya. Master (2002) Master of Science, Universiti Putra Malaysia. PhD (2011) University of Malaya.	• Management Information System, Semantic Web in Education, Knowledge Management, E-Commerce.
7.	Dr. Norizan Mohd Yasin (DS52) 	Diploma (1983) Diploma in Public Administration (DPA), Universiti Teknologi MARA Bachelor (1985) Bachelor of Business Administration (Finance), University of Miami, Coral Gables, Florida, USA Master (1988) Masters of Business Administration (MBA), University of Miami, Coral Gables, Florida, USA	• Management Information System • Business intelligence • Decision Support System • E-Commerce • E-Government • Knowledge management

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
		Masters of Science in Computer Information System, University of Miami, Coral Gables, Florida, USA PhD (2007) Manchester University, UK	• Technology in Education (e-learning, Learning Style, Personalization) • CRM and customer services
8.	Assoc. Prof. Dr. Fariza Hanum Nasaruddin (DS54) 	Bachelor (1985) Bachelor of Science (major: Computer Science), Northern Illinois University, Dekalb Master (1987) Master of Science (major: Management Information System), Northern Illinois University, Dekalb PhD (2012) University of Malaya (UM)	• Database, Knowledge management; Information System
9.	Assoc. Prof. Dr. Nor Liyana Mohd Shuib (DS54) 	Bachelor (2005) Bachelor of Science (Computer)(Hons), Universiti Teknologi Malaysia, Skudai Master (2008) Master of Information Technology, Universiti Kebangsaan Malaysia (UKM) PhD (2013) University Malaya	• Management Information System (Decision Support System, Expert System) • Information Management (Database, Data Mining, Information Retrieval, Recommender System, Social Media) • Mobile Computing • Educational Technology and Media (E-learning, Learning Style, Personalization, Information Seeking, Social Media)
10.	Assoc. Prof. Dr. Vimala Balakrishnan (DS54) 	Bachelor (1998) Bachelor of Computer Science (Hons), Universiti Sains Malaysia Master (2002) Master of Sciense (Computer Science), Universiti Sains Malaysia PhD (2008) Universiti Multimedia Malaysia	• Data and Knowledge Engineering (Data Mining, Opinion Mining), • Information Retrieval • Social Media • Recommender Systems

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
11.	Dr. Kasturi Dewi Varathan (DS51) 	Bachelor (2002) Bachelor of Information Technology (Hons), Universiti Tenaga Nasional. Master (2005) Master of Computer Science, University of Malaya. PhD (2012) Universiti Kebangsaan Malaysia.	• Big Data • Information Retrieval • Data Storage and Representations
12.	Dr. Azah Anir Norman (DS52) 	Bachelor (2000) Bachelor of Information Technology, Universiti Kebangsaan Malaysia. Master (2004) Master of Information Security, Royal Holloway University of London, UK PhD (2014) University of Malaya.	• Management Information System (Electronic Commerce Security, Information Security Management, Information Systems)
13.	Dr. Mohd Khalit Othman (DS52) 	BSC (1994) University of Malaya (UM) MIT (2000) Universiti Kebangsaan Malaysia (UKM) PhD (2016) University of Malaya.	• Management Information System (MIS). • Information Services: Including Information Services, Business Intelligence Services, Education and Training Services, Health Information Services, Social and Community Information Services and Internet (ICT). • Analysis of Algorithms and Complexity (Algorithm). • E-Government and E-Service. • Discrete Mathematics and Logic.

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
14	Dr. Hoo Wai Lam (DS51) 	Bachelor (2010) Bachelor of Computer Science (Hons) (2010), University of Malaya (UM) PhD (2015), University of Malaya (UM)	• Data Analytics • Machine Learning • Computer Vision • Artificial Intelligence
15	Dr. Muneer A. Malik (DS51) 	Bachelor(1997) Bachelor in Sciences University of Punjab Lahore, Pakistan Master (2002) Master of Computer Science Islamia University Bahawalpur, Pakistan PhD (2014) Information Technology Universiti Teknologi Petronas (UTP), Malaysia	• Digital Signal Processing • Data Science • Machine Learning • DNA sequence analysis

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

Head of Department:
Assoc. Prof. Dr. Noorhidawati Abdullah

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
1.	Assoc. Prof. Dr. Noorhidawati Abdullah (DS54) 	Bachelor (2000) Bachelor of Information Technology (Hons) (Sains dan Pengurusan Sistem), Universiti Kebangsaan Malaysia) Master (2003) Master of Information Technology, (Sains dan Pengurusan Sistem), Universiti Kebangsaan Malaysia. Phd (2008) University of Strathclyde, Glasgow, Scotland.	• Digital Library, Library 2.0, Information Needs and Behavior, E-Library. (e-books, Information Seeking Behavior, Social Tagging, Digital Library, Open Access Repositories, Library 2.0)
2.	Prof. Dr. Abrizah Abdullah (VK7) 	Diploma (1991) Diploma in Education (TESL), Maktab Perguruan Ilmu Khas, Cheras Bachelor (1988) Bachelor of Science (Engineering), Temple University, Philadelphia, Pennsylvania USA Master (1998) Master of Library and Information Science, University of Malaya. PhD (2007) University of Malaya.	• E-Library (Digital Libraries; Library 2.0; Social media Presence; Library Automation; Institutional Repositories; Open Access Initiatives) • Bibliometric; Scholarly Communication; Journal Studies; Open Access Publishing • Library & Information Science; Embedded Librarianship; School Librarianship; Situated Information Literacy; Information Seeking and Behaviour

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
3.	Assoc. Prof. Dr. Kiran Kaur Gurmit Singh (DS54) 	Bachelor (1990) Bachelor of Science in Education, Universiti Kebangsaan Malaysia. Master (1998) Master of Library and Information Science, University of Malaya. PhD (2011) University of Malaya	• Infometrics (Bibliometrics, Scientometrics) • Academic Librarianship Service Quality, Services Marketing, Quality Management, Reference Services, Customer Service Relationship Management) • Information Services (Digital Library Services, Web Information Services, Social & Community Information Services, • Information Behavior • Information Literacy
4.	Dr. Nordiana Ahmad Kharman Shah (DS51) 	Bachelor (2004) Bachelor of Science (Information System), Universiti Teknologi MARA Master (2010) Master of Business Information Management, University of Western Australia. PhD (2016) University of Sheffield, Sheffield, UK	• HCI, social media, social computing, social network.
5.	Dr. Yanti Idaya Aspura (DS51) 	Bachelor (2000) Bachelor in Human Sciences (Honour) (Political Science), International Islamic University Malaysia. Master (2002) Master in Library and Information Science, International Islamic University Malaysia. PhD (2014) Universiti Kebangsaan Malaysia	• Library System and Automation • Digital Library • Information Literacy • Information Needs • Bibliometric • Ontology • Information Retrieval

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
6.	Mr. Ali Fauzi Ahmad Khan (DS45) 	Diploma (1995) Diploma (Public Administration), Universiti Teknologi MARA. Bachelor (1998) Bachelor of Science (Management), University of Oregon, Eugene, USA. Master (2000) Master of Science (Information Management), Universiti Teknologi MARA (UiTM)	• Social Media Research, E-Democratization, Social Innovation, Social Informatics, Information Systems, Qualitative Research Methods.
7	Dr. Samsul Farid Samsuddin (DS51) 	Bachelor (2010) Bachelor of Science Information Studies (Library & Information Management) University of Technology MARA (UiTM) Master (2012) Master of Library & Information Science (2012) University of Malaya (UM) PhD (2017), University Putra Malaysia (UPM)	• Library Services & Information Management • Information Services for Rural Advancement • Information Literacy (User Education) • Use of ICT for Development • ICT Usage • Rural Library • Rural Communities

DEPARTMENT OF COMPUTER SYSTEM AND TECHNOLOGY

Head of Department:
Dr. Mohamad Nizam Ayub

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
1.	Dr. Mohamad Nizam Bin Ayub (DS52) 	Bachelor (2000) Bachelor of Computer Science (Hons), University of Malaya. Master (2001) Master of Science, Herriot-watt University PhD (2016), University of the West of Scotland	• Interactive Multimedia • Serious Game
2.	Prof. Ts. Dr. Miss Laiha Mat Kiah (VK7) 	Bachelor (1997) Bachelor of Computer Science, University of Malaya Master (1999) Master of Science, University of London PhD (2007) University of London	• Security Protocols (Group Communication, Key Management, Wireless Mobile Environments) • Communication Protocols (Wireless Security, Ad-Hoc Network Security, Mobile Communication Security) • Information Security (Applied Cryptography, Applied Steganography)
3.	Assoc. Prof. Dr. Ling Teck Chaw (DS54) 	Bachelor (1992) Bachelor of Science (Hons), University of Malaya Master (1996) Master of Computer Science, University of Malaya PhD (2005) University of Malaya	• Software Defined Networking • Cloud Computing, Core Network Technology • High Performance Computing (Grid Scheduling, Qos) • Parallel Architecture and Processing (Cloud Computing, Distributed Systems)

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
4.	Assoc. Prof. Dr. Rosli Salleh (DS54) 	Bachelor (1994) Bachelor of Computer Science (Hons), University of Malaya Master (1997) Master of Science, University of Salford PhD (2001), University of Salford	• Wireless Communication And Technologies Sn: Including Communication Equipment (Mobile Ipv6, Handoff)
5.	Assoc. Prof. Dr. Mazliza Othman (DS54) 	Bachelor (1992) Bachelor of Science (Hons), Universiti Kebangsaan Malaysia Master (1995) Master of Science, University of London PhD (1999), University of London	• Mobile Network Technologies (Mobile Computing, Pervasive Computing, Ubiquitous Computing)
6.	Assoc. Prof. Dr. Nor Badrul Anuar Juma'at (DS54) 	Bachelor (2001) Bachelor of Computer Science (Hons), University of Malaya Master (2003) Master of Computer Science, University of Malaya PhD (2012), University of Plymonth, UK	• Intrusion Detection System (Intrusion Detection Systems, Intrusion Response Systems, Security Event And Incident Management, Digital Forensic, Network Security) • High Speed Network (Switching, Routing, Ipv6, Multicast) • Management Information System (E-Thesis, Library Systems, Online Systems)
7.	Assoc. Prof. Dr. Rafidah Md Noor (DS54) 	Bachelor (1998) Bachelor of Information Technology, Universiti Utara Malaysia Master (2000) Master of Science, Universiti Teknologi Malaysia PhD (2010), Lancaster University, UK	• Mobile Network Technologies (Network Mobility, Quality of Service, Quality of Experience, Vehicular Ad Hoc Networks)

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
8.	Assoc. Prof. Dr. Nor Aniza Abdullah (DS54) 	Bachelor (1997) Bachelor of Computer Science (Hons) University of Malaya Master (1999) Master of Science, University of London PhD (2006), University of Southampton	• Adaptive Multimedia • Image Processing • E-Learning
9.	Assoc. Prof. Dr. Ang Tan Fong (DS54) 	Bachelor (2000) Bachelor of Information Technology (Hons), University of Malaya Master (2001) Master of Computer Science, University of Malaya PhD (2011), University of Malaya	• Cloud Computing • Software Defined Networking • Internet of Things • Game-based Learning
10.	Dr. Liew Chee Sun (DS52) 	Bachelor of Computer Science (Hons), Universiti Sains Malaysia Master of Computer Science, Universiti Sains Malaysia PhD, University of Edinburgh, UK	• Distributed Computing (Grid, P2p, Scientific Workflow)
11.	Assoc. Prof. Dr. Mohd Yamani Idna Idris (DS54) 	Bachelor (2000) Bachelor of Engineering (Hons), University of Malaysia Master (2002) Master of Computer Science, University of Malaya PhD (2013), University of Malaya	• Image and Signal Processing • Embedded Systems (FPGA, SOC) • Sensor Networks

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
12.	Assoc. Prof. Dr. Por Lip Yee @ Por Khoon Sun (DS54) 	Bachelor (2001) Bachelor of Computer Science (Hons), University of Malaya. Master (2003) Master of Computer Science, University of Malaya. PhD (2012), University of Malaya	• Security Services Sn: Digital Forensic, Steganography, Network Security, Public Key Infrastructure and Biometrics (Information Hiding, Steganography)
13.	Dr. Zaidi Razak (DS52) 	Bachelor of Computer Science (Hons), University of Malaya Master of Computer Science, University of Malaya PhD (2016), University of Malaya	• Chip Design, System on Chip
14.	Madam Fazidah Othman (DS45) 	Bachelor (1999) Bachelor of Computer Science (Hons), Universiti Teknologi Malaysia Master (2004) Master of Science (Computer Science), Universiti Teknologi Malaysia	• Security Services Sn: Steganography, Network Security, Public Key Infrastructure.
15.	Dr. Amirrudin Kamsin (DS52) 	Bachelor (2001) Bachelor of Computer Science (Hons), University of Malaya. Master (2002) Master of Science, NCCA, Bournemouth University, UK PhD (2014), University College London, UK	• Computer Animation • Human Computer Interaction

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
16.	Dr. Nurul Fazmidar Mohd Noor (DS52) 	Bachelor (1999) Bachelor of Computer Science (Hons), University of Malaya Master (2000) Master of Interactive Multimedia, Liverpool John Moores University, UK PhD (2011), Lancaster University, UK	• 3d Information Visualization • Virtual Reality • Serious Game • Affective Computing
17.	Dr. Tey Kok Soon (DS51) 	Bachelor (2011) Bachelor of Engineering (Electrical Engineering), University of Malaya PhD (2014), University of Malaya (Power Electronics and Drivers)	• Embedded System, • System on Chip, • Control and Implementation • Photovoltaic System
18.	Dr. Ismail Ahmedy (DS51) 	Bachelor (2006) Bachelor of Science(Hons)(Computer) (2006), Universiti Teknologi Malaysia Master (2009) Master of Science (Computer Science) (2009), University of Queensland PhD (2015) Universiti Teknologi Malaysia	• Internet of Things • Wireless Sensor Networks • Wireless Technologies • Embedded Systems
19.	Assoc. Prof. Dr. Ainuddin Wahid Abdul Wahab (DS54) 	Bachelor (2002) Bachelor of Computer Science, University of Malaya Master (2006) Master of Computer Science, University of Malaya PhD (2011), Surrey University, UK (Multimedia Network)	• Digital Forensic, Information Security

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
20.	Dr. Muhammad Reza Z'aba (DS51) 	Bachelor (2004) Bachelor of Science (Computer), Universiti Teknologi Malaysia PhD (2010) (Cryptography), Queensland University of Technology	• Symmetric Cryptography (Design and Analysis) • Information Security • Blockchain
21.	Dr. Saaidal Razzalli Azzuhri (DS51) 	Bachelor (2004) Bachelor of Engineering (Telecommunication) University of Malaya Master (2008) Master of Science (IT) Malaysia University of Science & Technology PhD of Computer Networks (2014), University of Queensland	• Computer & Wireless Networks • Fiber Optical Communication • Unmanned Aerial Vehicle (UAV)
22.	Assoc. Prof. Dr. Hamid Abdalla Jalib Al-Tulea (DS54) 	Bachelor (1979) Bachelor of Science (Engineering), University of Technology, Baghdad, Iraq. Master of Computer System (1986), Odessa Polytechnic University, Russia. PhD (1991), Odessa Polytechnic University, Russia.	• Image Processing • Computer Vision • Information Security
23.	Assoc. Prof. Dr. Shivakumara Palaiahnakote (DS54) 	Bachelor of Science (B.Sc) in Computer Science in 1995 Master of Science (M.Sc) in Computer Science in 1999 Master of Science Technology (by Research) in 2002 PhD (2006) Mysore University, India	• Video and Image Processing • Pattern Recognition • Document Image Analysis • Video Text Analysis

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
24.	Mr. Emran Mohd Tamil (DS45) 	Bachelor of Engineering, Universiti Teknologi Malaysia Master of Science, Universiti Teknologi MARA	• System-On-Chip (Soc) (System-On-Chip, Circuit Design, Embedded System, Scada) • Signal Analysis and Processing (Biosignal Processing, Feature • Extraction, Pattern Classification, Artificial Intelligence)
25.	Mr. Noorzaily Mohamed Nor (DS45) 	Bachelor (1995) Bachelor of Science (Hons), University of Malaya Master(1999), Master of Computer Science University of Malaya	• Detection and Estimation • Arithmetic and Logic Structures • Embedded System
26.	Madam Hannyzzura Pal @ Affal (DS45) 	Bachelor (1997) Bachelor of Computer Science (Hons), University of Malaya Master (1998) Master of Science University of Westminster	• Image Processing • Pattern Recognition • Multimedia Technology • E-Learning • Interactive Multimedia
27.	Madam Nornazlita Hussin (DS45) 	Bachelor (1999) Bachelor of Computer Science (Hons), University of Malaya Master (2000) Master of Science, University of Bath, UK	• Augmented Reality • Virtual Reality • Edutainment

NO.	NAME	ACADEMIC QUALIFICATION	AREA OF SPECIALIZATION
28.	Madam Mas Idayu Md Sabri (DS45) 	Bachelor (2001) Bachelor of Computer Science (Hons), University of Malaya Master (2003) Master of Science, University of Bath, UK	• Edutainment • Audio Synthesis • Serious games • Gamification

Administration and Support Staff

: Principal Assistant Registrar (N48)
Rafiza Hashim

: Assistant Registrar (N41)
Nur Hafiezah Mohd Nor Peah

: Assistant Accountant (Finance) (W32)
Adibah Sulaiman

: Assistant Office Secretary (N22)
Noordalilia Ilyana Kiwam

: Administrative Assistant
(Clerical/Operational) (N22)
Norziah Talib

: Administrative Assistant
(Clerical/Operational) (N22)
Norhazariah Husin

: Administrative Assistant
(Clerical/Operational) (N22)
Faridah Mat Yaacob

: Administrative Assistant (Finance) (W19)
Puan Haida Izwani Che Mahmood

: Assistant Office Secretary (N19)
Siti Amiza Hashim

: Assistant Office Secretary (N19)
Noorhafiza Kamaruddin

: Administrative Assistant
(Clerical/Operational) (N19)
Norazarina Bohari

: Administrative Assistant
(Clerical/Operational) (N19)
Norazirah Mohd Supi

: Administrative Assistant
(Clerical/Operational) (N19)
Norhafidzan Ahmad

: Administrative Assistant
(Clerical/Operational) (N19)
Nur Nadia Azizan

: Administrative Assistant
(Clerical/Operational) (N19)
Rohayu Mohd Nor

: Administrative Assistant
(Clerical/Operational) (N19)
Shahidah Mohd Ainun Shamsuddin

: Operational Assistant (N11)
Shaiful Izwan Awang

: Operational Assistant (N11)
Zarudin Zainal

: Driver (H11)
Sabasri Udin

Technical Staff

: Information Technology Officer (F44)
Noorsyahidah Abd Wahab

: Assistant Information Technology Officer (FA32)
Hamisah Redzwan

: Assistant Information Technology Officer (FA32)
Rita Afriani Mohamad Yusu

: Assistant Information Technology Officer (FA29)
Aini Munira Ahmad

: Assistant Information Technology Officer (FA29)
Huswadi Hussain

: Assistant Information Technology Officer (FA29)
Jamal Amran

: Assistant Information Technology Officer (FA29)
Tc. Mohd Jalaluddin Ahmad

: Assistant Information Technology Officer (FA29)
Nor Shuhadah Yahiya

: Assistant Information Technology Officer (FA29)
Syazwani Nuru Mohamad

: Assistant Information Technology Officer (FA29)
Noor Shyahira Adnan

: Assistant Engineer (JA29)
Mohd Azren Misnan

: Assistant Engineer (JA29)
Mohd Nizam Ismail

: Assistant Engineer (JA29)
Muhd Amin Syaqib Arslan Mustafa

ACADEMIC CALENDAR
2020/2021

SEMESTER I

Registration	1 week	05.10.2020	-	09.10.2020
Lectures	5 weeks*	12.10.2020	-	15.11.2020
Mid-Semester Break	1 week	16.11.2020	-	22.11.2020
Lectures	9 weeks*	23.11.2020	-	24.01.2021
Semester I Final Examinations	3 weeks*	25.01.2021	-	14.02.2021
Semester Break	3 weeks*	15.02.2021	-	07.03.2021
	22 weeks			

SEMESTER II

Registration	1 week	01.03.2021	-	05.03.2021
Lectures	10 weeks*	08.03.2021	-	16.05.2021
Mid-Semester Break	1 week	17.05.2021	-	23.05.2021
Lectures	4 weeks*	24.05.2021	-	20.06.2021
Revision Week	1 week*	21.06.2021	-	27.06.2021
Semester II Examinations	3 weeks*	28.06.2021	-	18.07.2021
	19 weeks			

SEMESTER BREAK

Break	11 weeks*	19.07.2021	-	3.10.2021

SPECIAL SEMESTER

Break	11 weeks*	26.07.2021	-	12.09.2021
Special Semester Final Examination	1 weeks	13.09.2021	-	19.09.2021
Break	2 weeks*	20.09.2021	-	03.10.2021

MASTER OF COMPUTER SCIENCE
(APPLIED COMPUTING)

MASTER OF COMPUTER SCIENCE (APPLIED COMPUTING)
PROGRAMME REQUIREMENTS

1. Programme Type

The type of programme offered for the Master of Computer Science (Applied Computing) is a programme which shall consists of coursework and research leading to the submission of a dissertation in the candidate's area of study whereby seventy percent (70%) or more of the total number of credits shall be for research.

2. Admission Requirements

(a) Qualifications for Admission

(i) Bachelor's degree with Honours or a comparable degree in a field related to Computer Science or Information Technology or in a related field with a CGPA of at least 3.0 or equivalent;

or

(ii) Diploma in Computer Science (Universiti Malaya) or post-diploma in Computer Science or Information Technology from recognized institutions with a CGPA of at least 3.0 or equivalent;

or

(iii) Other qualifications approved by the Senate from time to time.

(b) English Language Proficiency

(i) International candidates are required to:

(a) have at least IELTS (Academic) 6.0 or TOEFL 550 if their first degree is from a university where English is not the medium of instruction;

or

(b) pass an English proficiency test approved by the University.

3. Duration of Study

The programme of study : three (3) to eight (8) semesters.

4. Programme Structure

(1) The Master of Computer Science (Applied Computing) Programme through coursework and dissertation shall have a total of forty-two (42) credits.

(2) The elective courses under Master of Computer Science (Applied Computing) Programme shall offer areas as stated below:

- Data Communications and Computer Network
- Information Systems
- Multimedia
- Artificial Intelligence

(3) Through Coursework and Dissertation Programme

(i) The programme shall consist of two parts:

(a) Part I comprises:

(i) **two (2)** core discpline courses, each three credits; and

(ii) **two (2)** elective courses, each three credits from any area.

(b) Candidates may be imposed to enroll in other courses and obtain satisfactory results deemed necessary by the Faculty.

(c) Part II shall consist of thirty (30) credits and shall involve research leading to the submission of a dissertation.

(4) Details of courses offered shall be of those approved by the Senate from time to time on the recommendation of the Faculty and shall be made known to the candidates at the start of each session.

(5) The list of Senate approved courses for the Master of Computer Science (Applied Computing) Programme shall be as indicated in List 1. Candidates shall be informed of the prescribed combination of courses for this programme prior to registration at the start of their study programme.

5. Determination of Research Area

(1) Through Coursework and Dissertation Programme

The determination of research area shall be done prior to candidate's embarkation on research work. Candidate is required to select the specialization by filling up a form as in Appendix I.

PROGRAMME GOALS AND OUTCOMES
MASTER OF COMPUTER SCIENCE (APPLIED COMPUTING)

AIM OF THE PROGRAM

Vision

To become a center of excellence known internationally through research and education in Computer Science and Information Technology.

Mission

To develop and disseminate knowledge through research, teaching and learning in Computer Science and Information Technology in accordance with the expectations and aspirations of the community and the country.

Objective

To produce competitive graduates in the field of research and equipped with high knowledge and skills in Computer Science.

PROGRAMME LEARNING OUTCOMES

At the end of Master of Computer Science (Applied Computing) programme, graduates will be able to:

No	Programme Learning Outcomes	PO	Taxonomic Category*
1.	Master important concepts and theories in Computer Science, coupled with in-depth knowledge in various expertise such as Artificial Intelligence, Data Communication and Computer Networking, Information System and Multimedia.	PO1	K
2.	Apply knowledge using techniques, skills, current methodologies, as well as appropriate hardware and software tools to design and develop models, algorithms, systems, applications and networks.	PO2	P
3.	Study the impact of computing, locally and globally on humans, organizations, and environtments to create useful green computing technologies to the world.	PO3	A
4.	Adopting philosophy, principles, high ethical values and intellectual freedom in professional practice of various contexts and social interactions.	PO4	A
5.	Communicate (verbally and in writing) clearly, effectively and faithfully and can serve as a team leader or team member to efficiently and efficiently conduct research or development projeccts & systems & networks.	PO5	A
6.	Identify problems in various industries that can be utilized with Computer Science knowledge and solve them through scientific computing research.	PO6	K

No	Programme Learning Outcomes	PO	Taxonomic Category*
7.	Engage in the development of information management professionals and continuos learning activities.	PO7	P
8.	Demonstrate entrepreneurial intelligence and be able to apply management pronciples in related activities and able to suggest creative, innovative ideas of commercial value	PO8	K

At the end of the program, graduates will be able to produce a dissertation as well.
(List the 8 programme learning outcomes following the MQF domain. Please refer to the Appendix. Additional learning outcomes can be given if required)

Reference notes:
The Domain of the MQF in Programme Learning Outcomes program (PO)

PO	Domain
PO1	Knowledge
PO2	Practical Skills
PO3	Social Skills and Responsibility
PO4	Values, Attitudes and Professionalism
PO5	Communication, Leadership and Team Skills
PO6	Problem Solving and Scientific Skills
PO7	Information Management and Life Long Learning Skills
PO8	Managerial and Entrepreneurial Skills

Reference notes:
Taxonomic Category*

K	Cognitive
A	Affective
P	Psychomotor

CANDIDATURE REQUIREMENTS

Master of Computer Science (Applied Computing)

No	Requirement
1.	Fulfill the minimum candidature duration of 3 semesters.
2.	Fulfill the University language requirement (Bahasa Malaysia and English) not later than the second (2^{nd}) semester of candidature
3.	Fulfill the residential requirement of 6 months
4.	**Presentation** • Proposal presentation at the beginning of the research component registration • Present research progress in a Candidature Defence session as required by the Faculty

Graduate on Time (GOT) Schedule For Masters by Mixed Mode Candidates

Semester	Activities	Output/Milestone	Comments
1	**Register for Part I: Courses** • Attend Bahasa Melayu course* • Attend English Language course** • Complete all courses in Semester I • and Semester II • Attend relevant workshops/ research seminars (Compulsory: EndNote, Turnitin, Stylewriter) • Come up with a study plan to decide on programme specific and elective courses to take as suitable foundation for research area of interest • Complete Research Methodology Course	**OUTPUT OF SEM 1:** • Completed Bahasa Melayu course • Completed English Language course • Completed a portion of required courses • Familiarized with EndNote, Turnitin, Stylewriter	
2	• Complete all courses in Semester I and Semester II • Consult coordinator/supervisor to determine broad area of interest to research on. • Choose a research topic from a list collated by programme coordinator. **Register for Part II : Dissertation** • Prepare and present proposal ➢ Research Plan (Gantt Chart) ➢ Prepare research instruments (if applicable) ➢ Plan data collection procedures (identify research site, seek permission)	**OUTPUT OF SEM 2:** • Completed all courses • Familiarized with EndNote, Turnitin, Stylewriter • Identified research topic • Research Proposal Approved by Panel • Completed draft of chapters 1, 2 & 3 (Approved by supervisor)	

3	• Collect data/conduct experiment • Analyse data • Expand Research Proposal into drafts of Chapters 1, 2, 3 • Finalize Draft of Chapter 1 (Introduction) and 3 (Methodology) • Begin Chapter 4 (Results/Analysis) and Chapter 5 (Discussion and Conclusion) • Prepare and present Candidature Defence	**OUTPUT OF SEM 3:** • Collected data. • Analysed data • Reviewed and completed all chapters • (Approved by supervisor) • Completed Candidature Defence	
4	• Submit 3 Months Notice • Finalize all chapters • Submit dissertation for examination • Committee of Examiners meeting	**OUTPUT OF SEM 5:** • Submitted 3 Months Notice (early semester) • Submitted dissertation for examination • Outcome of Committee of Examiners meeting	

Notes:
Monitoring Panel

1. Chairman & 1 member who is an expert in the field and a supervisor. A fourth member is allowed to be appointed if necessary.
2. The same panel should follow through the proposal presentation and Candidature Defence.
3. It is strongly recommended that one member is appointed as internal examiner.
4. The main responsibilities of the panel should include the following:-
   a) Advise the student to improve the research proposal.
   b) Monitor the progress of the student
   c) Improve the research plan.

*Applicable to all international candidates.
** Applicable to international candidates who are writing their dissertation in languages other than English.

COURSE PLAN FOR MASTER OF COMPUTER SCIENCE (APPLIED COMPUTING) ACADEMIC SESSION 2020/2021

MASTER OF COMPUTER SCIENCE (APPLIED COMPUTING)		Credits	Semester I 2020/2021	Semester II 2020/2021	Semester I 2020/2021
Discipline Core Courses					
WOX7001*	Research Methodology	**3**	√	√	√
WOA7001	Advanced Algorithms	**3**	√	√	√
WOA7002**	Dissertation	**30**		√	√
Elective Courses [Students are required to choose any 2 courses from the lists below]					
Data Communication and Computer Networking					
WOA7003	Advanced Network Technology	**3**	√		√
WOA7004	Mobile Technology	**3**		√	
WOA7005	Special Topics in Data Communication and Computer Network	**3**			
Information Systems					
WOA7006	Emerging Technologies in Information Systems	**3**	√		√
WOA7007	Data Analytics and Visualization	**3**			
WOA7008	Information Assurance	**3**		√	
Multimedia					
WOA7009	Virtual Reality Concepts and Technology	**3**	√		
WOA7010	Computer Graphics and 3D Animation Technology	**3**	√		√
WOA7011	Games Development	**3**		√	
Artificial Intelligence					
WOA7012	Image Processing and Computer Vision	**3**		√	
WOA7013	Theory and Applications of Natural Language Processing	**3**		√	
WOA7014	Robotics and Intelligent Systems	**3**	√		√

*** Students are only allowed to register for Dissertation after completing 6 credits of coursework.*
Registration of the Dissertation should also be made along with WOX7001- Research Methodology **OR students should have completed*

WOX7001- Research Methodology before registering for the Dissertation.

Note: The courses that will be offered every semester are subject to change, depending on the availability of staff and the number of students registering.

LIST OF COURSES AND COURSE CONTENT

DISCPLINE CORE COURSES

Code	Course	Credits
WOX7001	Research Methodology *	3
WOA7001	Advanced Algorithms	3
WOA7002	Dissertation **	30

ELECTIVE COURSES

(NOTE: *Students are required to choose any 2 courses from the lists below*)

DATA COMMUNICATION & COMPUTER NETWORK

Code	Course	Credits
WOA7003	Advanced Network Technology	3
WOA7004	Mobile Technology	3
WOA7005	Special Topics in Data Communication and Computer Network	3

INFORMATION SYSTEMS

Code	Course	Credits
WOA7006	Emerging Technologies in Information Systems	3
WOA7007	Data Analytics and Visualization	3
WOA7008	Information Assurance	3

MULTIMEDIA

Code	Course	Credits
WOA7009	Virtual Reality Concepts and Technology	3
WOA7010	Computer Graphics and 3D Animation Technology	3
WOA7011	Games Development	3

ARTIFICIAL INTELLIGENCE

Code	Course	Credits
WOA7012	Image Processing and Computer Vision	3
WOA7013	Theory and Applications of Natural Language Processing	3
WOA7014	Robotics and Intelligent Systems	3

Note :
*** Students are only allowed to register for Dissertation after completing 6 credits of coursework.*
**Registration of the Dissertation should also be made along with WOX7001- Research Methodology OR students should have completed WOX7001- Research Methodology before registering for the Dissertation.*

Not all courses will be offered every semester; the actual courses offered will depend on the availability of staff and the number of students registering.

WOX7001 Research Methodology

Learning Outcomes
At the end of the course, students are able to:
1. Explain the concepts and roles of research in computer science.
2. Differentiate the approaches and steps involved in conducting research in computer science.
3. Describe the principal methods of research used in computer science and related areas.
4. Use appropriate statistics to characterize and analyze data.
5. Provide a proposal for a research project, and make an oral presentation of the research proposal.

Synopsis of Course Content
Topics included are: nature of research in computer science; major considerations and tasks in scientific research; selecting a research project; project planning, tools and techniques for planning; review of literature; empirical research methods in computer science; writing a research proposal; managing the research project; data analysis and presentation of results/writing the research report.

Evaluation and Weightage
Continuous Assessment : 100%

WOA7001 Advanced Algorithms

Learning Outcomes
At the end of the course, students are able to:
1. Demonstrate familiarity with major advanced algorithms.
2. Apply advanced design and analysis techniques.
3. Analyze the performance of algorithms.

Synopsis of Course Content
This course introduces students to the analysis and design of computer algorithms. Students will learn advanced design techniques, important classical algorithms and data structures, and their implementation in modern programming environment.

Evaluation and Weightage
Continuous Assessment : 100%

WOA7002 Dissertation

Learning Outcomes
At the end of the course, students are able to:
1. Perform a critical investigation of topics related to computer science research.
2. Choose the appropriate information and resources related to the research topic.
3. Linking the theories and concepts that are appropriate, and using appropriate techniques to draw conclusions.
4. Apply qualitative and/or quantitative evaluation processes to original data.
5. Communicate research findings clearly and effectively both in writing and orally.

Synopsis of Course Content
The dissertation presents a guided independent research on a topic agreed between the student and their supervisor in the field of Computer Science. It typically involves a literature review and an appropriate form of critical analysis of sources of primary and /or secondary data; it may involve field and/or laboratory work. The dissertation must show evidence of wide reading and understanding of critical analysis and/or appropriate use of advanced research techniques.

Evaluation and Weightage

Continuous Assessment	:	100 %

The dissertation will be assessed by an external examiner, an internal examiner and the candidate's appointed supervisor. The candidate's supervisor will also provide a report on the candidate's performance during the research project.

WOA7003 Advanced Network Technology

Learning Outcomes
At the end of the course, students are able to:
1. Discuss the basic technologies that support the implementation of high-speed networks.
2. Plan, configure, and verify the implementation of LAN and WAN routing form using various routing protocols.
3. Plan, configure, and verify the implementation of complex switching.

Synopsis of Course Content
The course will provide knowledge and practical view of network technology. It includes advanced issues in IPv4 and IPv6, routing protocols, router and routing Security, multilayer switching, network monitoring and high-speed networks.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WOA7004 Mobile Technology

Learning Outcomes
At the end of the course, students are able to:
1. Discuss the issues pertinent to the differences between wired and wireless networks.
2. Compare the strengths and limitations of various wireless networks.
3. Describe issues unique to the design of mobile systems.
4. Evaluate the impact of mobility and location-awareness on quality of life.
5. Discuss the infrastructure and applications of mobile networks.

Synopsis of Course Content
This course provides students with the knowledge and practical skills in the field of mobile technology which includes; wireless network infrastructure; Mobile IP; ad- hoc network of mobile; positioning systems and location-awareness and portable model .

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

WOA7005 Special Topics in Data Communication and Computer Network

Learning Outcomes
At the end of the course, students are able to:
1. Identify the key principles and values pertinent to the special topic which underlie data communication and computer network.
2. Apply current practices and trends of the special topics in modern network.

3. Suggest solution on the key issues in the special topic which affect the development of data communication and computer network.

Synopsis of Course Content
The course provides an opportunity for a faculty member or a visiting scholar to offer a relatively new subject in data communication and computer network (DCN) that is not currently available in the curriculum. The course will provide an opportunity for in-depth study of DCN-related topics. It may consist of lectures, seminars, readings, papers review, assignments, presentation and project determined by the lecturer. Suggested DCN-related special topics are such as Network virtualization, Software Defined Networks and Controllers, Open flow protocol, Network Functions Virtualization, Data Center Networking, Storage Networking, Content Centric Networking, QoS in Virtual Network, Advancement in Cloud computing and security, VoIP through cloud, Green network, Advanced mobile network, Beyond 10Gps, Multi Path TCP, Network Visibility, Distributed virtual routers, etc.

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

WOA7006 Emerging Technologies in Information Systems

Learning Outcomes
At the end of the course, students are able to:
1. Illustrate up to date and promising research areas in information systems.
2. Discuss the emerging technologies in the information system applications studied.
3. Solve the challenges identified in the information system applications studied.

Synopsis of Course Content
The course involved a series of seminars and lectures on current important and emerging topics in information systems. Topics will be determined later, subject to the availability of expertise and facilitator.

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

WOA7007 Data Analytics and Visualization

Learning Outcomes
At the end of the course, students are able to:
1. Explain the basic concepts of data analytics
2. Differentiate the various statistical and visualization techniques
3. Apply the appropriate statistical tests & visualization techniques

Synopsis of Course Content
This course aims to develop students' ability to describe, explore and analyze data using suitable statistical packages or scripting language.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WOA7008 Information Assurance

Learning Outcomes
At the end of the course, students are able to:
1. Introduce students to IA issues involving the triad of people, policies and procedures and technology.
2. Devise meaningful security solutions addressing the security principles of confidentiality, integrity and availability.
3. Criticize and analyze a broad range of research topics in information assurance

Synopsis of Course Content
This course provides a practical view of security that involved the triad of people, policies and procedures and technology, which include: IA strategy, policy, concepts, IA planning, risk mitigation, IA detection and recovery process and application of IA in industries selected

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

WOA7009 Virtual Reality Concepts and Technology

Learning Outcomes
At the end of the course, students are able to:
1. Describe and determine the concepts and technology (hardware and software) used in virtual reality application.
2. Discuss human factors involved in designing virtual reality devices.
3. Design and develop a virtual environment using a virtual reality editor.
4. Discuss and determine problems and identify future directions for virtual reality technologies.

Synopsis of Course Content
This course is designed to provide students with knowledge related to virtual reality concepts and its hardware and software technologies. This is followed with a discussion on how knowledge about human sensory systems (for example, visual, auditory, and touch) can facilitate in designing ergonomic virtual reality devices that match human perceptual capabilities. Students are then trained to develop a virtual reality application using a suitable programming language and 3D software. This training involves modelling of 3-Dimension objects, animations and interactions in the virtual reality world. Towards the end of the course, there will be discussions on several examples of virtual reality applications with emphasise on the contributions of the virtual reality technology for a particular application domain, arising problems especially those related to human health and safety, and future direction of this technology.

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

WOA7010 Computer Graphics and 3D Animation Technology

Learning Outcomes
At the end of the course, students are able to:
1. Explain the theory and practice of 3D animation and computer graphics
2. Discuss the animation history and background knowledge of aesthetics and design skills.
3. Illustrate the aspects of 3D animation from modeling to final rendering and demonstrate the ability to apply the aesthetic principles and technical creativity.

Synopsis of Course Content
This course will provide knowledge and practical skills in developing 3D computer animations. Topics covered includes: implementation of CGI, 2D and 3D graphics, CGI applications, production workflow for 3D Animation, material and texture mappings, lighting effects for 3D scene, camera/s for 3D scene and key-framing and other animation techniques.

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

WOA7011 Games Development

Learning Outcomes
At the end of the course, students are able to:
1. Explain the basic principles of computer games, game genre, game development life cycle and design consideration.
2. Develop a computer game taking into consideration selected game genre.
3. Conclude collision detection in game programming.

Synopsis of Course Content
This course will give an introduction to computer game development starting from concept development to implementation of a playable game prototype. Both the aesthetic and technical aspects of game development will be covered. The aesthetic component of the course will focus on story and character development, game mechanics, game play and interface design and content creation for games. The technical component of the course will focus on programming tools and concepts for games, including data structures & algorithms, computer graphics, human-computer interaction, shader programming and AI. Common topics include project management, prototype development and play testing. Students will work in groups and go through the complete pipeline starting from a basic game idea all the way through developing a playable prototype.

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

WOA7012 Image Processing and Computer Vision

Learning Outcomes
At the end of the course, students are able to:
1. Explain knowledge of image processing and computer vision techniques and methodologies.
2. Validate various image processing and computer vision methods and algorithms for particular of problems.
3. Apply various image processing and computer vision methods and algorithms in variety of open-ended design problems.

Synopsis of Course Content
This course explores how principles from theories of image processing and computer vision can be used to construct machines that exhibit nontrivial behavior. In particular, the course covers techniques from geometry, computer vision, machine learning and image processing in solving real-world problems.

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

WOA7013 Theory and Applications of Natural Language Processing

Learning Outcomes

At the end of the course, students are able to:

1. Investigate the concepts and methods of natural language processing.
2. Distinguish the various applications of natural language processing.
3. Develop a component of a natural language system.

Synopsis of Course Content

This course introduces the phases and methods of Natural Language Processing which cover phonology, morphology, syntax, semantics, discourse and pragmatic. It also introduces the main applications of the natural Language Processing such as information retrieval, machine translation and etc.

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

WOA7014 Theory and Applications of Natural Language Processing

Learning Outcomes

At the end of the course, students are able to:

1. Discuss the fundamental principles of robot system design and operation.
2. Design and program simple autonomous robots.
3. Evaluate issues related to the behavior, learning and perception of robotic systems.
4. Implement algorithms that enable the use of sensors and actuators to facilitate intelligent behavior, learning and perception.
5. Internalizing emerging human-robot interaction technologies

Synopsis of Course Content

This course examines the fundamental theory and methods behind robot-building and the deployment of intelligent systems. Topics are divided between robot architectures and cognitive robotics (intelligent systems). Robot architecture topics include control paradigms, kinematics, sensors, actuators and navigation. Cognitive robotics topics include: learning, decision-making, coordination and cooperation. This is both a theoretical and hands-on course. Software simulation environments and physical robots will be extensively used during the semester as experimentation platforms to enforce student mastery of the material.

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

MASTER OF SOFTWARE ENGINEERING
(SOFTWARE TECHNOLOGY)

MASTER OF SOFTWARE ENGINEERING (SOFTWARE TECHNOLOGY)
PROGRAMME REQUIREMENTS

1. Programme Type

The Master of Software Engineering (Software Technology) programme which shall consists of coursework and research leading to the submission of a dissertation in the candidate's area of study whereby seventy percent (70%) or more of the total number of credits shall be for research.

2. Admission Requirements

(1) Qualifications for Admission

(i) Bachelor's degree with CGPA of at least 3.0 or a comparable degree in the field of Computer Science or Information Technology or in a field related to the study of software engineering;

or

(ii) Bachelor's degree with CGPA of at least 3.0 or a comparable degree whereby courses in software engineering were included in the programme of study;

or

(iii) Bachelor's degree with CGPA of at least 3.0 or a comparable degree and have working experience of at least three years in a profession related to software development;

or

(iv) Diploma in Computer Science of University of Malaya with CGPA of at least 3.0 or a post-degree diploma in the field of Computer Science or Information Technology of another accredited institution;

or

(v) Other qualifications approved by the Senate from time to time.

AND

(iv) English Language Profiency

(2) English Language Proficiency

(a) International candidates are required to:

(i) have at least IELTS 6.0 or TOEFL 550 if their first degree is from a university where English is not the medium of instruction;

or

(ii) pass an English proficiency test approved by the University.

3. Duration of Study

Through Coursework and Dissertation Programme

(1) The programme of study : three (3) to eight (8) semesters.

4. Programme Structure

(1) The Master of Software Engineering (Software Technology) Programme consisting of coursework and dissertation shall consist of forty-two (42) credits comprising two parts, namely:

(a) Part I which consist of:

(i) **two (2)** core courses, each three credits;

and

(ii) **two (2)** elective courses, each three credits.

(b) A candidate may be imposed to enroll in other courses and obtain satisfactory results deemed necessary by the Faculty.

(c) Part II which consist of thirty (30) credits, shall consist of research leading to the submission of a dissertation.

(2) Details of courses offered are of those approved by the Senate from time to time on the recommendation of the Faculty and shall be made known to the candidates at the start of each session.

(3) The list of Senate approved courses for the Master of Software Engineering (Software Technology) is as indicated in List 1. Candidates shall be informed of the prescribed combination of courses for this programme prior to registration at the start of their study programme.

PROGRAMME GOALS AND OUTCOMES
MASTER OF SOFTWARE ENGINEERING (SOFTWARE TECHNOLOGY)

PROGRAMME GOALS

To produce a knowledgeable and competent graduate in software engineering technology who is consistently involve in academic and research activities to create new techniques and methods to fulfill the current needs of the software industries.

PROGRAMME LEARNING OUTCOMES

At the end of Master of Software Engineering (Software Technology) programme, graduates will be able to:

No	Programme Learning Outcomes	PO	Taxonomic Category*
1.	Show mastery of advanced concepts and current theories in the field of software engineering.	PO1	K
2.	Analyse, design, develop and maintain software solutions by applying principles, methodologies, standards, techniques and tools to ensure software quality.	PO2	P
3.	Apply knowledge and software engineering skills for the benefit of society and the environment.	PO3	A
4.	Demonstrate attitude and character in accordance to the professional code of ethics in the Software Engineering discipline.	PO4	A
5.	Communicate effectively, oral and written, and able to work as a team and demonstrate leadership skills in carrying out software development projects.	PO5	A
6.	Conduct research and apply logical and analytical thinking based on scientific approaches in software engineering to solve real-world problems.	PO6	K
7.	Involve oneself in professional development and lifelong learning activities.	PO7	A

Total hours of student learning time for the entire program is 42 credits.

At the end of the program, graduates are able to produce a dissertation as well.
(List of 7 domains of learning outcomes in accordance with the MQF program. Please refer to the attachment. Additional learning outcomes can be given if necessary)

Reference notes:
The Domain of the MQF in Programme Learning Outcomes program (PO)

PO	Domain
PO1	Knowledge
PO2	Practical Skills
PO3	Social Skills and Responsibility
PO4	Values, Attitudes and Professionalism
PO5	Communication, Leadership and Team Skills
PO6	Problem Solving and Scientific Skills
PO7	Information Management and Life Long Learning Skills
PO8	Managerial and Entrepreneurial Skills

Reference notes:
Taxonomic Category*

K	Cognitive
A	Affective
P	Psychomotor

CANDIDATURE REQUIREMENTS

Master of Software Engineering (Software Technology)

No	Requirement
1.	Fulfill the minimum candidature duration of 3 semesters.
2.	Fulfill the University language requirement (Bahasa Malaysia and English) not later than the second (2nd) semester of candidature
3.	Fulfill the residential requirement of 6 months
4.	**Presentation** • Proposal presentation at the beginning of the research component registration • Present research progress in a Candidature Defence session as required by the Faculty

Graduate on Time (GOT) Schedule For Masters by Mixed Mode Candidates

Semester	Activities	Output/Milestone	Comments
1	**Register for Part I: Courses** • Attend Bahasa Melayu course* • Attend English Language course** • Complete all courses in Semester I • and Semester II • Attend relevant workshops/ research seminars (Compulsory: EndNote, Turnitin, Stylewriter) • Come up with a study plan to decide on programme specific and elective courses to take as suitable foundation for research area of interest • Complete Research Methodology Course	**OUTPUT OF SEM 1:** • Completed Bahasa Melayu course • Completed English Language course • Completed a portion of required courses • Familiarized with EndNote, Turnitin, Stylewriter	
2	• Complete all courses in Semester I and Semester II • Consult coordinator/supervisor to determine broad area of interest to research on. • Choose a research topic from a list collated by programme coordinator. **Register for Part II : Dissertation** • Prepare and present proposal ➢ Research Plan (Gantt Chart) ➢ Prepare research instruments (if applicable) ➢ Plan data collection procedures (identify research site, seek permission)	**OUTPUT OF SEM 2:** • Completed all courses • Familiarized with EndNote, Turnitin, Stylewriter • Identified research topic • Research Proposal Approved by Panel • Completed draft of chapters 1, 2 & 3 (Approved by supervisor)	

3	• Collect data/conduct experiment • Analyse data • Expand Research Proposal into drafts of Chapters 1, 2, 3 • Finalize Draft of Chapter 1 (Introduction) and 3 (Methodology) • Begin Chapter 4 (Results/Analysis) and Chapter 5 (Discussion and Conclusion) • Prepare and present Candidature Defence	**OUTPUT OF SEM 3:** • Collected data. • Analysed data • Reviewed and completed all chapters • (Approved by supervisor) • Completed Candidature Defence	
4	• Submit 3 Months Notice • Finalize all chapters • Submit dissertation for examination • Committee of Examiners meeting	**OUTPUT OF SEM 5:** • Submitted 3 Months Notice (early semester) • Submitted dissertation for examination • Outcome of Committee of Examiners meeting	

Notes:
Monitoring Panel

1. Chairman & 1 member who is an expert in the field and a supervisor. A fourth member is allowed to be appointed if necessary.
2. The same panel should follow through the proposal presentation and Candidature Defence.
3. It is strongly recommended that one member is appointed as internal examiner.
4. The main responsibilities of the panel should include the following:-
   a) Advise the student to improve the research proposal.
   b) Monitor the progress of the student
   c) Improve the research plan.

*Applicable to all international candidates.
** Applicable to international candidates who are writing their dissertation in languages other than English.

COURSE PLAN FOR MASTER OF SOFTWARE ENGINEERING (SOFTWARE TECHNOLOGY) ACADEMIC SESSION 2020/2021

MASTER OF SOFTWARE ENGINEERING (SOFTWARE TECHNOLOGY)		Credits	Semester I 2020/2021	Semester II 2020/2021	Semester I 2020/2021
Core Courses					
WOC7004	Architecting Software Systems	**3**	√	√	√
WOX7001*	Research Methodology	**3**	√	√	√
WOC7002	Dissertation	**30**		√ **	√ **
Elective Courses (Only take two (2) courses)					
WOC7001	Software Risk Management	**3**	√		√
WOC7003	Software Reusability	**3**			
WOC7005	Software Testing Techniques and Management	**3**		√	
WOC7006	Formal Software Specifications	**3**			
WOC7007	Software Configuration Management	**3**			
WOC7008	Multi-Agent Oriented Software	**3**			
WOC7009	Secure Software Development	**3**			
WOC7010	Agile Software Development	**3**	√		√
WOC7011	Big Data Applications and Technologies	**3**			
WOC7012	Framework Based Web Development	**3**		√	
WOC7013	Automatic Speech Processing and Applications	**3**			

** *Students are only allowed to register for Dissertation after completing 6 credits of coursework. Registration of the Dissertation should also be made before or along with WOX7001- Research Methodology.*

Note: The courses that will be offered every semester are subject to change, depending on the availability of staff and the number of students registering.

LIST OF COURSES AND COURSE CONTENT

CORE COURSES

Code	Course	Credits
WOC7004	Architecting Software Systems	3
WOX7001*	Research Methodology	3
WOC7002	Dissertation	30

ELECTIVE COURSES

Code	Course	Credits
WOC7001	Software Risk Management	3
WOC7003	Software Reusability	3
WOC7005	Software Testing Techniques and Management	3
WOC7006	Formal Software Specifications	3
WOC7007	Software Configuration Management	3
WOC7008	Multi-Agent Oriented Software	3
WOC7009	Secure Software Development	3
WOC7010	Agile Software Development	3
WOC7011	Big Data Applications and Technologies	3
WOC7012	Framework Based Web Development	3
WOC7013	Automatic Speech Processing and Applications	3

(**Note** : Not all courses will be offered every semester; the actual courses offered will depend on the availability of staff and the number of students registering).

WOC7004 Architecting Software Systems

Learning Outcomes

At the end of this course, the students are able to:

1. Apply different types of architectural styles/patterns in developing software system.
2. Design software architecture.
3. Evaluate software architecture.

Synopsis of Course Content

This course covers advanced architecture design of software systems. It briefly reviews the different architectural structures and views, quality attributes, tactics to achieve quality attributes and common architectural styles/patterns (such as layered, broker, client-server, peer-to-peer, and so on). It covers Service-Oriented Architecture style in-depth. Existing architectures from different domains will be used as case studies.

This course also covers methods to design software architecture (for e.g. Attribute-Driven Design method) and evaluate software architecture (for e.g. ATAM analysis method). It also covers architecting software product lines, architecting in the Cloud, and supporting tools.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WOX 7001 Research Methodology

Learning Outcomes

At the end of the course, the student is able to:

1. Explain the concepts and roles of research in computer science.
2. Differentiate the approaches and steps involved in conducting research in computer science.
3. Describe the principal methods of research used in computer science and related areas.
4. Use appropriate statistics to characterize and analyze data.
5. Provide a proposal for a research project, and make an oral presentation of the research proposal.

Synopsis of Course Content

Topics included are: nature of research in computer science; major considerations and tasks in scientific research; selecting a research project; project planning, tools and techniques for planning; review of literature; empirical research methods in computer science; writing a research proposal; managing the research project; data analysis and presentation of results/writing the research report

Evaluation and Weightage

Continuous Assessment	:	100%

WOC7002 Dissertation

Learning Outcomes
At the end of the dissertation component, the students are able to :
1. Report the literature review related to the proposed research project in the approved area.
2. Determine a research methodology for the proposed research.
3. Implement a detailed research project based on the proposed research.
4. Provide a dissertation related to the research project.

Synopsis of Course Content
The dissertation component is concerned with the guidance rendered by the supervisor to the student on the proper way of conducting a software engineering research project, which could be in the form of face-to-face discussion, presentation, demonstration and communication. The component also covers the understanding and formulation of the research methodology to perform the research project.

Evaluation and Weightage

Continuous Assessment	:	100%

Methodologies for Feedback on Performance
Dissertation will be examined by examiners

WOC7001 Software Risk Management

Learning Outcomes
At the end of this course, the students are able to:
1. Analyse the various types of software risks.
2. Use appropriate approaches to manage the software risks.
3. Perform a project to manage, monitor and control the various types of software risks.

Synopsis of Course Content
This course explores the various types of risks and how they can impact software project success, explains the different approaches to manage the various types of software risks comprising project scope risk, schedule risk, resource risk and costs risk. This course also discusses the different techniques to help organisations to analyse their risk exposure, create an overall risk profile, establish a risk tolerance based on that profile, and apply to their project portfolio.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WOC7003 Software Reusability

Learning Outcomes
At the end of this course, the students are able to:
1. Differentiate the different approaches and techniques in software reuse oriented development.
2. Apply various software reuse techniques in systems engineering application and component, taking into consideration ethical and professional aspects.
3. Model system component based on the chosen reusable software techniques.

Synopsis of Course Content
This course introduces both object-oriented (OO) and non-OO software reuse but focuses on OO software reuse. It provides the fundamental software reuse concepts, principles, and techniques as well as reusable structure and framework including class libraries, design patterns, application frameworks, and object wrappers. The reuse life-cycle and software engineering techniques for reuse such as domain engineering and reuse-oriented software architecture are covered. Component systems and components engineering are emphasised in particular, besides application system engineering and customization techniques including component retrieval, component selection, and component integration. The role of reuse in Business Process Reengineering (BPR) approach is also explained.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WOC 7005 Software Testing Techniques and Management

Learning Outcomes
At the end of this course, the students are able to:
1. Determine activities to be performed in each phase of the software testing process.
2. Apply appropriate software testing techniques in a specific context.
3. Manage software testing in a systematic and organised manner.

Synopsis of Course Content
This course covers the software testing concepts, principles, techniques, and management issues. Students will become acquainted with the software testing process, including various activities carried out in each phase of the process. Students will learn to test software in structured and organized ways by identifying and applying appropriate techniques based on a specific organisational and project context. Students will also learn how to manage test effectively and efficiently, by taking into consideration values and constraints of testing as well as time, costs, expertise and other resources involved in carrying out test.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WOC 7006 Formal Software Specifications

Learning Outcomes
At the end of this course, students should be able to:
1. Explain major methods of formal specifications
2. Distinguish the advantages and disadvantages of formality
3. Evaluate formal specification to verify the correctness of the specification.
4. Write formal specifications based on given case studies

Synopsis of Course Content
This course introduces the methods of formal specification in software engineering. This course mainly focuses on how to effectively read and write formal specifications using the Alloy and Z notation. This comprises of forming mathematical sentences to describe the structural and behavioural properties of software, using axiomatic set theory and first order logic. Other formal language includes some introduction on notation such as the B, CSP and VDM.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WOC7007 Software Configuration Management

Learning Outcomes
At the end of this course, students are able to:
1. Describe software configuration management issues, process, tools and techniques, and activities
2. Analyse configuration management practices that support the entire development lifecycle
3. Arrange strategies and plan for software configuration management

Synopsis of Course Content
This course provides an overview of configuration management procedures, issues, processes and activities. It introduces source code management, build engineering and environment configuration. It also includes change control and release management, IT control and compliance, industry standards and frameworks pertaining to software configuration management.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WOC7008 Multi-Agent Oriented Software

Learning Outcomes

At the end of this course, the students are able to

1. Illustrate the software agent principles, technology and multi-agent oriented applications as new frontier in Software Engineering.
2. Explain the design, architecture and multi-agent oriented communication protocol.
3. Compare several multi-agent oriented methodologies for the implementation of agent-oriented applications.
4. Propose multi-agent -oriented methodology that is appropriate for the implementation of the identified applications.

Synopsis of Course Content

This course provides the fundamental concepts and principles of multi-agents and technologies. It includes the understanding on the types of agents, multi-agent communication, agent communication languages, multi-agent-oriented methodologies and multi-agent implementation languages. Application areas for the multi-agents are discussed and explored as well.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WOC7009 Secure Software Development

Learning Outcomes

At the end of this course, the students are able to

1. To explain the security risk of a system
2. To apply quality assurance strategies that support early vulnerability detection to improve software development process.
3. To analyse security design issues at multiple level of abstraction. 4. To design a software solution for secure access and data protection.

Synopsis of Course Content

This course covers the fundamentals for building secure software by applying security principles to the software development lifecycle. Core topics include security in requirements engineering, secure designs, risks analysis, threat modelling, defensive coding, security testing and assessment.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WOC7010 Agile Software Development

Learning Outcomes
At the end of this course, students are able to:
1. Apply variety of agile practices in software development environment.
2. Differentiate between traditional and agile methods in software development environment.
3. Analyze the challenges in change management associated with adopting an agile method.

Synopsis of Course Content
This course examines agile methods, including Extreme Programming (XP), Scrum, Lean, Kanban, Crystal, Dynamic Systems Development Method, Test-Driven Development and Feature-Driven Development to understand how rapid realization of software occurs most effectively. The ability of agile development teams to rapidly develop high quality, customer-valued software is examined and contrasted with teams following more traditional methodologies that emphasize planning and documentation. Students will learn agile development principles and techniques covering the entire software development process from problem conception through development, testing and deployment. Several issues of adopting agile methods are also discussed.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WOC7011 Big Data Applications and Technologies

Learning Outcomes
At the end of this course, the students are able to:
1. Evaluate the relation of Big Data and the Hadoop framework in the context of scalable distributed systems
2. Apply MapReduce module.
3. Test Big Data in Agile environment

Synopsis of Course Content
This course is designed to provide students with knowledge on Big Data and frameworks for storing and processing big data. The course covers the basic principles of Big Data and Hadoop frameworks which include the distributed system design, Google cluster architecture, and data processing on large clusters. Students will also learn the variety of solutions available using the MapReduce paradigm. At the end of this course, students should be able to debug, manage jobs, improve performance, custom data, and manage workflows for MapReduce.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WOC7012 Framework Based Web Development

Learning Outcomes
At the end of the course, the students are able to:
1. Apply the basic principles of MVC (Model, View, Controller) to structure web applications.
2. Design a web application using RESTful design principles.
3. Use a web development framework and its supported programming language for building a web application.

Synopsis of Course Content
This course covers design and development of web applications based on an MVC development framework that provides comprehensive programming and configuration model for web applications. Students will learn the programming language supported and features provided by the framework to develop web applications. This course also covers the basic principles of MVC (Model, View, Controller) to structure the web application, RESTful design principles to build RESTful web services, connect the web application to a database and perform unit testing using the framework.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WOC7013 Automatic Speech Processing and Applications

Learning Outcomes
At the end of this course, the students are able to:
1. Illustrate the fundamental concepts, principles and applications in automatic speech processing.
2. Evaluate the pattern-recognition techniques in automatic speech processing for improved human computer interaction.
3. Select the possible application area for automatic speech processing.
4. Propose speech technology application incorporating speech recognition or speech synthesis.

Synopsis of Course Content
This course offers students the practical and theoretical knowledge on the processing of human speech by computers. It covers fundamental concepts, principles, applications and pattern-recognition techniques in automatic speech processing. The course covers the two applications of speech processing, namely the automatic speech recognition and the speech synthesis, as well as the practical development and evaluation of one of these two applications by using existing toolkits. The algorithms, techniques and limitations of the state-of-the-art speech recognition and synthesis systems will also be presented.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

MASTER OF DATA SCIENCE

MASTER OF DATA SCIENCE
PROGRAMME REQUIREMENTS

1. Programme Type

The type of programme offered for the Master of Data Science is a programme consisting 10 coursework which prepares students for the final capstone project which allows students to apply the knowledge they learned in the taught courses into real world applications.

2. Admission

(a) Qualifications for Admission

(i) Bachelor's degree with Honours from Science stream with minimum CGPA 3.00 or equivalent;

or

(ii) Bachelor's degree with Honours from non-Science stream with minimum CGPA 3.00 AND work experience in related field of at least three (3) years;

or

(iii) Other qualifications that are approved by Senate from time to time

AND

(b) English Language Proficiency

International candidates are required to:

(i) have at least IELTS 6.0 (academic) or TOEFL 550 if their first degree is from a university where English is not the medium of instruction;

or

(ii) pass an English proficiency test approved by the University.

3. Duration of Study

The programme of study : two (2) semesters + one (1) special semester, to eight (8) semesters.

4. Programme Structure

(1) The Master of Data Science Programme through coursework shall have a total of forty-two (42) credits.

(2) Through Coursework

(i) The programme shall consist of two parts:

(a) Part I comprises:

(i) **seven (7)** core discpline courses, comprise of three or four credits courses; and

(ii) **two (2)** elective courses, each four credits

(b) Candidates may be imposed to enroll in other courses and obtain satisfactory results deemed necessary by the Faculty.

(c) Part II consist of a ten (10) credits project and shall involve investigation and analysis of a real world case study, leading to the submission of a report.

(3) Details of courses offered shall be of those approved by the Senate from time to time on the recommendation of the Faculty and shall be made known to the candidates at the start of each session.

(4) The list of Senate approved courses for the Master of Data Science Programme shall be as indicated in List 1.

PROGRAMME GOALS AND OUTCOMES
MASTER OF DATA SCIENCE

AIM OF THE PROGRAM

To produce graduates who are knowledgeable and skilled in key concepts in the areas of data science. To equip students with technical expertise and soft skills by integrating learning with practical experience in the curriculum.

Objective

The Program objectives are:

1. Knowledgeable in the field of data science, and able to extract meaningful insights to help organizations cope with challenges and issues arising from big data.
2. Establish careers as data science practitioner skilled in developing effective applications for industry or other stakeholders.
3. Lead and contribute to data science team in public or private organization with a full sense of responsibility and good ethics

PROGRAMME LEARNING OUTCOMES

No.	Programme Learning Outcomes	POs	Taxonomic Category
1.	Master the important concepts and theories in the field of data science, that can be utilized in relevant domains such as business and social sciences.	PO1	K
2.	Apply the knowledge in the data science in designing and developing data models, systems, and applications.	PO2	P
3.	Apply knowledge in data science for the good of society and country.	PO3	A
4.	Practice the philosophy, principles, high ethical values in professional practices related to data science.	PO4	A
5.	Communicate clearly and confidently, to successfully implement group project or system development efficiently and effectively.	PO5	A
6.	Solve problems in various disciplines through research, and knowledge of data science and scientific computing.	PO6	K
7	Demonstrate skills in information management and continuous learning.	PO7	P

Total hours of student learning time for the entire program is 42 credits.

(List of 7 domains of learning outcomes in accordance with the MQF program. Please refer to the attachment. Additional learning outcomes can be given if necessary)

Reference notes:
The Domain of the MQF in Programme Learning Outcomes program (PO)

PO	Domain
PO1	Knowledge
PO2	Practical Skills
PO3	Social Skills and Responsibility
PO4	Values, Attitudes and Professionalism
PO5	Communication, Leadership and Team Skills
PO6	Problem Solving and Scientific Skills
PO7	Information Management and Life Long Learning Skills
PO8	Managerial and Entrepreneurial Skills

Reference notes:
Taxonomic Category

K Cognitive
A Affective
P Psychomotor

COURSE PLAN FOR MASTER OF DATA SCIENCE
ACADEMIC SESSION 2020/2021

MASTER OF DATA SCIENCE		Credits	Semester I 2020/2021	Semester II 2020/2021	Semester III 2020/2021	Semester I 2021/2022
Core Courses						
WOX7001	Research Methodology	**3**	√	√		√
WQD7001	Principles of Data Science	**3**	√	√		√
WQD7003	Data Analytics	**3**	√	√		√
WQD7004	Programming for Data Science	**4**	√	√		√
WQD7005	Data Mining	**4**	√	√		√
WQD7006	Machine Learning for Data Science	**4**	√	√		√
WQD7007	Big Data Management	**3**	√	√		√
WQD7002	Data Science Research Project	**10**		√	√	√
Elective Courses [Students are required to choose any 2 courses from the list below]						
WQD7008	Parallel and Distributed Computing	**4**	√			√
WQD7009	Big Data Applications & Analytics	**4**	√			√
WQD7010	Network and Security	**4**		√		
WQD7011	Numerical Optimization	**4**		√		

Note: The courses that will be offered every semester are subject to change, depending on the availability of staff and the number of students registering.

LIST OF COURSES AND COURSE CONTENT

CORE COURSES

Code	Course	Credits
WOX7001	Research Methodology	**3**
WQD 7001	Principles of Data Science	**3**
WQD 7003	Data Analytics	**3**
WQD 7004	Programming for Data Science	**4**
WQD 7005	Data Mining	**4**
WQD 7006	Machine Learning for Data Science	**4**
WQD 7007	Big Data Management	**3**
WQD 7002	Science Data Research Project	**10**

ELECTIVE COURSES

(NOTE: *Students required to choose any 2 course from the list below***)**

Code	Course	Credits
WQD 7008	Parallel and Distributed Computing	**4**
WQD 7009	Big Data Applications & Analytics	**4**
WQD 7010	Network and Security	**4**
WQD 7011	Numerical Optimization	**4**

Note :
*** Students are only allowed to register for WQD7002 Data Science Research Project after completing at least three (3) core discipline courses.*

Not all courses will be offered every semester; the actual courses offered will depend on the availability of staff and the number of students registering.

WOX7001 Research Methodology

Learning Outcomes
At the end of the course, students are able to:
1. Explain the concepts and roles of research in computer science.
2. Differentiate the approaches and steps involved in conducting research in computer science.
3. Describe the principal methods of research used in computer science and related areas.
4. Use appropriate statistics to characterize and analyze data.
5. Provide a proposal for a research project, and make an oral presentation of the research proposal.

Synopsis of Course Content
Topics included are: nature of research in computer science; major considerations and tasks in scientific research; selecting a research project; project planning, tools and techniques for planning; review of literature; empirical research methods in computer science; writing a research proposal; managing the research project; data analysis and presentation of results/writing the research report.

Evaluation and Weightage

Continuous Assessment	:	100%

WQD7001 Principles of Data Science

Learning Outcomes
At the end of this course, students are able to:
1. Summarize the foundations of the data science, its life cycle processes, methods and techniques.
2. Determine the principles of tidy data and data sharing.
3. Apply the most important data science methods, using open-source tools.

Synopsis of Course Content
The course is designed to help the student making sense of the field of data science. It covers the what, when, who, where, why and how (5W 1H) of data science in the era of big data. Also encompass the fundamental principles of data science that underlie the algorithms, processes, methods, and data-analytic thinking. The role of data scientist, the knowledge and skills required is also presented. Diverse technologies, programming languages as well as tools in data science are discussed.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WQD 7003 Data Analytics

Learning Outcomes
At the end of this course, students are able to
1. Explain the basic concepts of data analytics
2. Differentiate the various statistical techniques
3. Apply the appropriate statistical techniques

Synopsis of Course Content
This course aims to develop students' ability to describe, explore and analyze data using suitable statistical packages or scripting language (e.g. SPSS, AMOS, PLS, and/or R)

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WQD7004 Programming for Data Science

Learning Outcomes
At the end of this course, the students are able to:
1. Define the steps of problem solving in programming for disparate datasets.
2. Demonstrate a familiarity with the algorithms and data structures related to data science.
3. Develop programs to solve the problems in data science.

Synopsis of Course Content
This course covers the problem solving and programming that relevant to the data science. The course provide students with the necessary programming skills to statistically process and explore disparate datasets.These include structures for data organization, sorting and searching, basic graph models and algorithms, streaming algorithms, linear and convex programming.

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

WQD 7005 Data Mining

Learning Outcomes
At the end of the course, the students are able to:
1. Define the own term Data Mining and Data Warehouse, as well as the differences between OLTP and OLAP.
2. Draw a schema diagram for the data warehouse using Snowflake schema.
3. Create a decision tree (DT) model using the C4.5 algorithm.
4. Find frequent itemsets using FP-growth.
5. Evaluate the differences between Time-series clustering and density-based clustering in big data environment.

Synopsis of Course Content
This course covers topic such as Data Warehouse, Pre-mining, Classification, Association Rules and Clustering Algorithms. It explains how to find patterns in a database and emphasizes on hands-on experience of data mining tools.

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

WQD 7006 Machine Learning for Data Science

Learning Outcomes
At the end of this course, students are able to:
1. Explain the concepts and techniques for machine learning.
2. Identify appropriate machine learning techniques for various datasets.
3. Evaluate practical solutions to common problems in machine learning.

Synopsis of Course Content
This course introduces fundamental concepts and techniques for machine learning. It covers topics such as linear and logistics regression, decision trees, support vector machines, and reinforcement learning.

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

WQD7007 Big Data Management

Learning Outcomes
At the end of this course, students are able to
1. Explain the processes in data pipeline
2. Discuss database concepts and technologies for big data storage and retrieval
3. Apply appropriate models, tools, and technologies to implement storage, search and retrieval systems for large-scale structured and unstructured information systems.
4. Analyse data provenance and data trustworthiness, and its role in sharing and reuse of data.

Synopsis of Course Content
This course prepares students to deal with large-scale collections of data as objects to be stored, searched over, selected, and transformed for use and reuse. It examines the underlying principles and technologies used to capture data, clean it, contextualize it, store it, and access it for a repurposed use. Data provenance is also examined to determine the trustworthiness of data.

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WQD 7008 Parallel and Distributed Computing

Learning Outcomes
At the end of this course, the students are able to:
1. Recognize the underlying principles of parallel and distributed computing.
2. Determine the fundamental paradigms of parallel and distributed computing.
3. Identify the issues and problems, together with the solutions in implementing parallel and distributed systems.
4. Implement parallel and distributed systems.

Synopsis of Course Content
This course focuses on the design and implementation of parallel and distributed processing systems. This course covers the fundamental concepts of distributed computing and introduces contemporary issues in big-data processing. This course emphasises on both the underlying principles and hands-on experience of data analytic tools.

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

WQD 7009 Big Data Applications and Analytics

Learning Outcomes
At the end of this course, students are able to:
1. Explain the concepts of Big Data Applications and Analytics
2. Use suitable methods and techniques to analyse big data
3. Evaluate big data problems and suggest solutions to a real world problem

Synopsis of Course Content
The course will cover Big data applications and analytics, Data Collection, Sampling and Pre-processing, Predictive Analysis, Descriptive analysis, Survival analysis, Social networks analysis, and Case study of Big data Applications.

Evaluation and Weightage

Continuous Assessment	:	70%
Final Examination	:	30%

WQD 7010 Network and Security

Learning Outcomes
At the end of the course, students are able to:

1. Investigate the concept of network and the criteria of having a secure network and the latest network security issues.
2. Experiment a secured network.
3. Evaluate a secured network and its mechanism.

Synopsis of Course Content
The course consists of the advanced network, the concepts of securing a network, applying security perimeters, implement secure access to network devices and infrastructures, implement firewall and IPS.

Evaluation and Weightage

Continuous Assessment	:	50%
Final Examination	:	50%

WQD 7011 Numerical Optimization

Learning Outcomes
At the end of the course, students are able to:
1. Explain the key principles and values pertinent to numerical optimization and linear algebra
2. Apply and implement numerical solution methods
3. Interpret the numerical solutions with respect to their accuracy and suitability

Synopsis of Course Content
The course will provide an opportunity for in-depth study of numerical methods and linear algebra. Topics relevant to the course are as follows: Numerical analysis, Polynomial Interpolation, Numerical Integration, Resolution of non-linear systems, Resolution of large linear systems, Eigenvalues approximation, Numerical solution of ODEs and Numerical solution of PDEs

Evaluation and Weightage

Continuous Assessment	:	60%
Final Examination	:	40%

WQD7002 Science Data Research Project

Learning Outcomes
At the end of the course, the student are able to:
1. Apply data science techniques to solve data science problems in real world environment
2. Professionally present the project plan and results
3. Write a project report

Synopsis of Course Content
The capstone project allows students to use public data or create data product by applying their knowledge in foundations, theory and methods of data science to address problems in industry and government. During the project, students engage in the entire process of solving a real-world data science project, from collecting and processing data , to designing the best method to solve identified problem, to applying suitable analytic methods, and finally, to implementing a solution.

Evaluation and Weightage

Continuous Assessment	:	100%

MASTER OF LIBRARY AND INFORMATION SCIENCE

MASTER OF LIBRARY AND INFORMATION SCIENCE
PROGRAMME REQUIREMENT

1. Programme Type

Master of Library and Information Science is a full coursework programme with a total 45 credits. This includes 24 credits for core courses, 9 credits for electives courses and 12 credits for research project.

2. Admission

(a) Qualifications for Admission

(i) Bachelor's degree with Honours with minimum CGPA of 3.00 or equivalent;

or

(ii) Bachelor's degree with work experience of at least three (3) years in a library or an information centre;

or

(iii) Accreditation of Prior Experiential Learning (APEL) and:
(a) work experience of at least ten (10) years in a library or an information centre;
(b) Pass the interview

or

(iv) Other qualifications approved by the University Senate from time to time.

(b) English Language Proficiency

International candidates are required to:

(i) have at least IELTS 5.5 (academic) or TOEFL (CBT) 550 if their first degree is from a university where English is not the medium of instruction;

or

(ii) pass an English proficiency test approved by the University.

3. Duration of Study

The programme of study : two (2) semesters + one (1) special semester to eight (8) semesters.

4. Programme Structure

(1) The Master of Library and Information Science Programme through coursework only shall have a total of fourty five (45) credits.

(2) Through Coursework

(i) The programme shall consists of two parts:

(a) Part I comprises:

(i) **eight (8)** core courses, with three credits of each; and

(ii) **three (3)** elective course of three credits.

(b) Candidates may be imposed to enroll in other courses and obtain satisfactory results deemed necessary by the Faculty.

(c) Part II shall consist of twelve (12) credits and shall involve a research project leading to the submission of a report.

(3) Details of courses offered shall be of those approved by the Senate from time to time on the recommendation of the Faculty and shall be made known to the candidates at the start of each session.

(4) The list of Senate approved courses for the Master of Library and Information Science Programme shall be as indicated in List 1. Candidates shall be informed of the prescribed combination of courses for this programme prior to registration at the start of their study programme.

PROGRAMME GOALS AND OUTCOMES
MASTER OF LIBRARY AND INFORMATION SCIENCE

AIM OF THE PROGRAM

To produce graduates who have advanced knowledge, skills and values of information professions in Library and Information Science.

PROGRAM OBJECTIVES

1. Establish a career as information professional and abide with legal ethics and code of professional practice.
2. Communicate effectively and demonstrates leadership quality to solve issues related to information and society.
3. Engage in professional development and social activities in information management and lifelong learning.

PROGRAMME LEARNING OUTCOMES

No.	Programme Learning Outcome (PO)	MQF PO's	MQF PO's Attributes
1.	Synthesise theories, principles and advanced knowledge in the field of Library and Information Science.	PO1	Knowledge
2.	Apply advanced skill in managing, preserving, and disseminating information effectively in the current environment.	PO2	Practical Skills
3.	Apply advanced knowledge and skills in demonstrating social responsibility to support information society needs.	PO3	Social Skills and Responsibilities
4.	Practice the principles, policies and high ethical values in the provision of information in diverse professional practice.	PO4	Ethics, Professionalism and Humanities
5.	Communicate effectively and able to work in a team and exhibit leadership skills.	PO5	Communication, Leadership and Team Skills
6.	Apply effective problem solving and decision-making in management, services and research.	PO6	Scientific methods, critical thinking and problem solving skills
7	Engage in professional development and social activities in information management and lifelong learning.	PO7	Lifelong Learning and Information Management

Total hours of student learning time for the entire program is 45 credits.

(List of 7 domains of learning outcomes in accordance with the MQF program. Please refer to the attachment. Additional learning outcomes can be given if necessary)

Reference notes:
The Domain of the MQF in Programme Learning Outcomes program (PO)

PO	Domain
PO1	Knowledge
PO2	Practical Skills
PO3	Social Skills and Responsibility
PO4	Values, Attitudes and Professionalism
PO5	Communication, Leadership and Team Skills
PO6	Problem Solving and Scientific Skills
PO7	Information Management and Life Long Learning Skills
PO8	Managerial and Entrepreneurial Skills

Reference notes:
Taxonomic Category

K Cognitive
A Affective
P Psychomotor

COURSE PLAN FOR MASTER OF LIBRARY AND INFORMATION SCIENCE
ACADEMIC SESSION 2020/2021

MASTER OF LIBRARY AND INFORMATION SCIENCE		Credits	Semester I 2020/2021	Semester II 2020/2021	Semester III 2020/2021	Semester I 2020/2021
Core Courses						
WQB7001	Research Methods in Library and Information Science	**3**	√	√		√
WQB7003	Organization of Information	**3**	√			√
WQB7004	Reference and Information Literacy Services	**3**	√			√
WQB7005	Technologies for Information Management	**3**	√	√		√
WQB7006	Digital Libraries	**3**		√		
WQB7007	Libraries, Information and Society	**3**	√	√		√
WQB7008	Development of Information Collection	**3**		√		
WQB7009	Management of Library and Information Services	**3**		√		
WQB7002	Library & Information Science Research Project	**12**		√	√	
Elective Courses [Students are required to choose any 3 courses from the list below]						
WQB7010	Indexing, Abstracting and Thesauri Construction	**3**		√		
WQB7011	Web Publishing	**3**	√			√
WQB7012	User Needs and Behaviour	**3**		√		
WQB7013	Measurement and Evaluation of Library and Information Services	**3**	√			√
WQB7014	Special Topics in Library & Information Science	**3**		√		
WQB7015	Digital Humanities	**3**	√			√
WQB7016	Bibliometrics and Scientific Publishing	**3**		√		
WQB7017	Statistics for Library & Information Science Research	**3**	√			√

Note: The courses that will be offered every semester are subject to change, depending on the availability of staff and the number of students registering.

LIST OF COURSES AND COURSE CONTENT

CORE COURSES

Code	Course	Credits
WQB7001	Research Methods in Library and Information Science	**3**
WQB7003	Organization of Information	**3**
WQB7004	Reference and Information Literacy Services	**3**
WQB7005	Technologies for Information Management	**3**
WQB7006	Digital Libraries	**3**
WQB7007	Libraries, Information and Society	**3**
WQB7008	Development of Information Collection	**3**
WQB7009	Management of Library and Information Services	**3**
WQB7002	Library & Information Science Research Project	**12**

ELECTIVE COURSES

(NOTE: *Students required to choose any 3 course from the list below***)**

Code	Course	Credits
WQB7010	Indexing, Abstracting and Thesauri Construction	**3**
WQB7011	Web Publishing	**3**
WQB7012	User Needs and Behaviour	**3**
WQB7013	Measurement and Evaluation of Library & Information Services	**3**
WQB7014	Special Topics in Library & Information Science	**3**
WQB7015	Digital Humanities	**3**
WQB7016	Bibliometrics and Scientific Publishing	**3**
WQB7017	Statistics for Library & Information Science Research	**3**

Note :
** *Students are only allowed to register for* Research *Project after completing 9 credits of coursework.*
* *Students should have completed WQB7001* Research Methods in Library and Information Science *before registering for the research project OR registration of the Research Project should also be made along with WQB7001* Research Methods in Library and Information Science

Not all courses will be offered every semester; the actual courses offered will depend on the availability of staff and the number of students registering.

WQB7001 Research Methodology

Learning Outcomes
At the end of the course, the student are able to:
1. Formulate problem statements, research questions and research hypotheses
2. Appropriately select research designs and methodologies for library and information science research.
3. Appropriately apply research concepts and principles in the use of quantitative and qualitative research designs in the conduct of library and information science research.
4. Apply ethical issues in the conduct of library and information science research.

Synopsis of Course Content
The course covers the following topics: formulation of research problems and research questions for quantitative and qualitative research; developing quantitative and qualitative literature reviews; survey designs, ethnographic designs, quantitative and qualitative case study designs; appraising quantitative and qualitative research reports; developing quantitative and qualitative research proposals.

Evaluation and Weightage
Continuous Assessment : 100%

WQB7002 Library & Information Science Project

Learning Outcomes
At the end of the course, students are able to:
1. Design a information service project for a selected community
2. Conduct a information service project for a selected community
3. Assess the information service project outcomes in a selected community
4. Report the information service project outcomes for a selected community

Synopsis of Course Content
The project provides students the opportunity to perform a deliberate, solution-oriented investigation of an issue in a library and/or information service setting and design a project (solution) to address the issue. The project covers: identification of an information service issue for a specific community; designing an information service project for the selected community; conducting an information service project; assessing the information service project outcomes; and reporting the information service project outcomes for the selected community.

Evaluation and Weightage
The project will be assessed by an internal examiner and the candidate's appointed supervisor. The candidate's supervisor will also provide a report on the candidate's performance during the research project.

WQB7003 Organization of Information

Learning Outcomes
At the end of the course, the student are able to:

1. Transcribe catalogue entries for monographs, conference proceedings, uniform titles, analytical works, serials and non-book resources using the ISBDG standards. Anglo-American Cataloguing rules as well tag transcriptions using the metadata based on MARC.
2. Validate the quality of main entry for personal and corporate authors.
3. Construct the subjects for entries using subject schedules such as LCSH.
4. Compose class numbers for entries using classification scheme such as DDC and LCCS.

Synopsis of Course Content
The course covers the following topics: Bibliographic control, bibliographic tools and transcribing printed information sources according to ISBDG. Transcribing monographs using Anglo-American cataloguing rules. Tagging transcriptions in accordance to MARC. Provide and control the main entry headings for personal and corporate authors. Transcribe conference proceedings. Transcribe analytical works and uniform titles. Transcribe serials and non-book materials. Determine access and quality control of subjects for transcribed entries. Determine the classification number for transcribed entries. Resource Description and Access (RDA) as a new unified cataloguing standard with the online RDA Toolkit subscription as the most effective way to interact with the new standard.

Evaluation and Weightage

Continuous Assessment	:	70%
Final Examination	:	30%

WQB7004 Reference and Information Literacy Services

Learning Outcomes
At the end of the course, the student are able to:

1. Analyse the concept of user needs and information service in the context of an information environment.
2. Articulate information needs through a reference enquiry using effective interview techniques.
3. Evaluate information sources effectively in solving problems and making decisions.
4. Use various types of information sources in handling an information enquiry.
5. Demonstrate ethical practices in handling reference and information literacy services

Synopsis of Course Content
The course covers the following topics: Introduction to information sources and services; the role of reference and information literacy service in the information environment; an analysis of user information needs and requirements; formulating research strategies, developing search skills, and evaluating information sources. It also provides students with the skills for **c**onducting a reference interview and knowledge about ethics and legal liabilities of information provision. Key research on information seeking behaviour and context for information seeking will be discussed and related to information sources and information service provision.

Evaluation and Weightage

Continuous Assessment	:	70%
Final Examination	:	30%

WQB7005 Technologies for Information Management

Learning Outcomes
At the end of the course, the student are able to:
1. Analyse relational and text retrieval database systems in information management
2. Formulate appropriate selection criteria for automating particular library operations
3. Evaluate various features of up-to-date integrated library system (e.g. ILMS, web 2.0, cloud computing and mobile technology)
4. Develop competencies in some widely-used software applications in managing information

Synopsis of Course Content
The course covers the following topics: Information management; information processes and the technologies used in managing information processes, software applications commonly used in libraries and software evaluation, tools and techniques for planning, implementing and managing technological change for libraries and information services, relational databases for information management, text retrieval systems for information management, library standards: MARC, NISO Z39.50, automating library functions through integrated library system, introduction to digital library, applications of web 2.0 technologies, cloud computing and mobile technologies in libraries

Evaluation and Weightage
Continuous Assessment : 100%

WQB7006 Digital Libraries

Learning Outcomes
At the end of the course, the student are able to:
1. Analyse the evolution, nature and different contexts of digital libraries
2. Construct a comprehensive understanding of variety concepts, practices, and technologies, in digital library practice, development and research
3. Develop prototype of a small-scale digital library based on proper planning and gathered requirements
4. Analyse research trends and issues related to digital libraries

Synopsis of Course Content
The course covers the following topics: Digital library concepts, digital libraries and the global information society, development of digital collections and digital libraries, digital library initiatives and research projects, technical infrastructure of the digital library, knowledge organization in digital libraries, document formats and collection development, information access and users of digital libraries, social, economic and policy issues in developing digital libraries, professional issues in managing digital libraries.

Evaluation and Weightage
Continuous Assessment : 70%
Final Examination : 30%

WQB7007 Libraries, Information and Society

Learning Outcomes
At the end of the course, students are able to:
1. Describe the nature of the information society and how libraries and information organizations fit into it
2. Develop a critical awareness of the role and value of the various types of libraries and information organizations
3. Summarize the key principles and values which underlie the library and information profession
4. Find solutions to the key issues which affect the development of library and information services

Synopsis of Course Content
A library, Information & Society is an introductory course emphasizing the philosophy, history, and social aspects of libraries and librarianship in today's society. This course explores major issues in the library and information science professions as they involve their communities of users and stakeholders. It analyzes specific situations that reflect the professional agenda of these fields, including the various information processes and services, intellectual freedom, community service, professional ethics, social responsibilities, intellectual property, literacy, historical and international models, the socio-cultural role of libraries and information agencies and professionalism in general, focusing in particular on the interrelationships among these issues.

Evaluation and Weightage

Continuous Assessment	:	70%
Final Examination	:	30%

WQB7008 Development of Information Collection

Learning Outcomes
At the end of the course, the student are able to:
1. Define the characteristics of library collection development and selection policies
2. Identify community characteristics, needs and wants in library collections development.
3. Evaluate the quality and strenght of a specific collection
4. Identify the main components of a preservation and conservation policy.

Synopsis of Course Content
The course covers the following topics: Introduction to the course: What is collection development? The mission of libraries in general and of particular libraries, Library users, Assessing user and community needs; Collection development policies: Who should select library materials? ; Resource selection tools; Reviews and reviewing; Publishers and Publishing; Selecting electronic resources; Selecting serials; selecting government documents, microforms; Acquisition process, gifts and exchange; Vendor services, outsourcing; Financial management and budgeting; Evaluating collections, citation studies; Weeding, Storage, preservation and conservation; Cooperative collection development; Intellectual freedom, access to information, copyright, licensing.

Evaluation and Weightage

Continuous Assessment	:	70%
Final Examination	:	30%

WQB7009 Management of Library and Information Services

Learning Outcomes
At the end of the course, the student is able to:

1. Adapt the current theories and models in management science and their relevance to the library and information environment
2. Prepare a strategic management plan for the library and information centre
3. Prepare a staff training and development plan for the library and information centre
4. Prepare a financial plan for the library and information centre

Synopsis of Course Content
The course covers the following topics: An introduction to management theories and models, library planning, organizational structure in libraries, staffing, motivation, organizational culture, leadership, marketing and budgetary techniques

Evaluation and Weightage

Continuous Assessment	:	70%
Final Examination	:	30%

WQB7010 Indexing, Abstracting And Thesauri Construction

Learning Outcomes
At the end of this course, students are able to:
1. Articulate the principles and concepts underlying subject indexing, abstracting and thesauri construction for information retrieval.
2. Construct indexes for information resources such as journals articles, conference proceedings, newspaper clippings and digital images in a variety of format.
3. Compose indicative and informative abstracts for journals articles, conference proceedings, newspaper clippings and digital images.
4. Construct a thesaurus on a chosen subject

Synopsis of Course Content
The course covers the following topics: Core concepts in indexing, abstracting, information organization, and explores theories and methods for applying these skills, It provides the student with the necessary knowledge and skills to create and evaluate indexes and abstracts. It also integrates the study of indexing and abstracting into the larger field of library and information science such as information retrieval, databases, semantic relationship and metadata. Students will be exposed to techniques of thesaurus construction.

Evaluation and Weightage

Continuous Assessment	:	100%

WQB7011 Web Publishing

Learning Outcomes
At the end of the course, the student is able to:
1. Analyse variety concepts, practices, and technologies used in web publishing
2. Develop a practical working knowledge of the updated web publishing strategies, such as web portal, content management systems and blogs
3. Develop a prototype of a small scale web publishing project based on proper planning and gathered requirements

Synopsis of Course Content
The course covers the following topics: Big picture of web publishing, web publishing in libraries, planning of a web publishing project, web development tools (open source and commercial), architecture of the web publishing, web clients and client-side technologies: e.g. HTML, XHTML, CSS, Javascript, web servers and server-side technologies: e.g. Apache, PHP, database driven systems, recent web publishing systems and software (e.g. blogs) web publishing issues: e.g. privacy, usability, accessibility, standards

Evaluation and Weightage
Continuous Assessment : 100%

WQB7012 User Needs and Behaviour

Learning Outcomes
At the end of the course, the student is able to:
1. Describe concepts, theories and models of information behaviour
2. Profile information seeking and behavior of individuals and groups using suitable methodologies
3. Use theories of information behaviour and user profile to inform the design of information services
4. Discuss patterns of information behaviour in the context of different community of users

Synopsis of Course Content
Encompasses the following topics: Understand information concepts and user behaviour, information needs, seeking and related concepts; models and theories in studies on information behaviour dan users (Wilson, Johnson, Leckie, Kulthau, Bates, etc); methods in user behaviour studies; and information seeking in an electronic environment (Belkin, Marchionini, etc.

Evaluation and Weightage
Continuous Assessment : 100%

WQB7013 Measurement and Evaluation of Library & Information Services

Learning Outcomes

At the end of the course, the student are able to:

1. Identify the key components of evaluation research when evaluating library and information services
2. Formulate appropriate research questions with respect to quantitative and qualitative evaluation of library and information services.
3. Design appropriate evaluation studies for library and information services
4. Apply existing performance measures and indicators for evaluating library and information services

Synopsis of Course Content

The course covers the following topics: Evaluation of traditional and electronic resources; evaluation of technical and reference services; evaluation of information literacy and bibliographic services; performance measurement in libraries; evaluation of online and information retrieval systems

Evaluation and Weightage

Continuous Assessment : 100%

WQB7014 Special Topics in Library & Information Science

Learning Outcomes

At the end of the course, the student are able to:

1. Apply the current practices of the special topic learnt in information and library science field.
2. Develop a critical awareness of the key principles and values pertinent to the special topic which underlie the library and information profession
3. Find solution on the key issues in the special topic learnt which affect the development of library and information services
4. Synthesize their learning in the special topic learnt, to reflect on their professional education to form goals for future development.

Synopsis of Course Content

The course provides an opportunity for in-depth study of LIS-related topics pertinent to library services and information technology in public, school, academic or special libraries. It may consist of lectures, seminars, readings, assignments, presentation and project determined by the lecturer. Suggested LIS-related special topics are archive / records management, information commons, resources and services for specific patron groups; children's and young adults' literature; law librarianship; special librarianship; accreditation and roles of libraries; learning organizations; knowledge management; system analysis and design for information professional; information retrieval; social media; open access repositories; and data mining.

Evaluation and Weightage

Continuous Assessment : 70%

Final Examination : 30%

WQB7015 Digital Humanities

Learning Outcomes
At the end of the course, the student are able to:
1. Analyse different theories and applications of digital humanities
2. Construct a comprehensive understanding of up-to-date and variety concepts, practices, and technologies, in digital humanities practice, development and research
3. Develop a digital humanities project plan based on planning, development and evaluation phases
4. Analyse research trends and issues related to digital humanities

Synopsis of Course Content
The course covers the following topics: Concepts, theories, and applications in digital humanities; culture of digital humanities and the global information society; up-to-date application and technology used in the development of digital humanities project and research; research initiatives and impact of digital humanities in various disciplines; project development plan for digital humanities including planning, development and evaluation phases; social issues; economic and policy issues in digital humanities projects.

Evaluation and Weightage

Continuous Assessment	:	70%
Final Examination	:	30%

WQB7016 Bibliometrics and Scientific Publishing

Learning Outcomes
At the end of the course, the student are able to:
1. Identify the changing nature of scholarly communications, in the production and dissemination of scientific information
2. Explain fundamental bibliometric methods for evaluation and description of science
3. Apply relevant bibliometrics tools for productive use of results in the evaluation and ranking systems of science
4. Identify the major legal issues surrounding the profession of librarianship and the management of library systems in terms of scholarly communication– including intellectual freedom, ethics and the role of professional organizations.

Synopsis of Course Content
The course covers the following topics: A survey of scholarly communication past and present with a particular emphasis on the changes in scholarly communication in the past ten years. Students will examine the interaction between society, technology and scholarly communication, the theory and practice of the communication of knowledge in academic and research environments, and how trends developments of publishing and communication are affecting changes in scholarly communications. The course is concerned with the development, improvement, and interpretation of bibliometric indicators, in particular citation-based indicators for assessing research performance. Students will investigate and compare different data sources available for bibliometric analysis, such as Web of Science, Scopus, Google Scholar, and PubMed, and identify the major legal issues in terms of scholarly communication– including intellectual freedom, ethics and the role of professional organizations.

Evaluation and Weightage

Continuous Assessment	:	100%

WQB7017 Statistics for Library & Information Science Research

Learning Outcomes

At the end of the course, the student are able to:

1. Identify levels of measurement for the independent and dependent variables.
2. Construct research questions/research hypotheses
3. Analyze quantitative data using univariate, bivariate, parametric and non-parametric statistical tests
4. Develop a statistical report based on the testing of hypotheses

Synopsis of Course Content

The course covers the following topics: Levels of measurement; descriptive statistics; parametric inferential tests and non-parametric inferential tests; writing up results of hypotheses testing; learning how to input data as well as to analyze data using SPSS For Windows.

Evaluation and Weightage

Continuous Assessment **:** 100%

MASTER OF COMPUTER SCIENCE
(MASTER BY RESEARCH)

MASTER OF COMPUTER SCIENCE (BY RESEARCH)
PROGRAMME REQUIREMENTS

1. Programme Type

The type of programme offered for the Master of Computer Science by research is the programme shall consists of one hundred percent (100%) research leading to the submission of a dissertation.

2. Admission Requirements

(1) Qualifications for Admission

(i) Bachelor's degree with Honours or a comparable degree in the field of Computer Science or Information Technology or in a field related to the study;

or

(ii) Bachelor's degree with Honours or a comparable degree in a programme consisting of Computer Science or Information Technology related courses or its equivalent;

or

(iii) Bachelor's degree in Computer Science or Information Technology and:

(a) have working experience of at least three years in a profession related to the field;

or

(b) proof of publications related to the field;

or

(c) Diploma in Computer Science of University Malaya or a post-degree diploma in the field of Computer Science or Information Technology of another accredited institution;

or

(d) Other qualifications approved by the Senate from time to time.

(2) English Language Proficiency

(i) International candidates are required to:

(a) have at least IELTS 6.0 or TOEFL 550 if their first degree is from a university where English is not the medium of instruction;

or

(b) pass an English proficiency test approved by the University.

3. Duration of Study

The programme of study : two (2) to eight (8) semesters.

4. Programme Structure

(i) This programme shall consist of one hundred percent (100%) research work leading to the submission of a dissertation which format shall be stipulated as in Part VII, University of Malaya Regulations (Master's Degree) 2019.

(ii) Attend and pass a Research Methodology Course – WOX7001 (three (3) credits) not later than the second semester of candidature.

(ii) Candidates may be imposed to enroll in other courses and obtain satisfactory results deemed necessary by the Faculty.

5. Determination of Research Area

The determination of research area shall be done upon candidate's admission into the programme.

LEARNING OUTCOMES FOR MASTER BY RESEARCH

To be awarded a master degree by research, a candidate shall:

1. Demonstrate a systematic understanding of knowledge by identifying research problems or insights in a particular field
2. Apply appropriate research methodologies and techniques
3. Relate leadership qualities through communicating and working effectively with peers and stakeholders
4. Conduct research with minimal supervision and adhere to legal, ethical and professional codes of practice
5. Publish in peer reviewed academic journals in his/her field of study
6. Appraise research findings using scientific and critical thinking skills
7. Manage information for lifelong learning

CANDIDATURE REQUIREMENTS

Master of Computer Science (Master by Research)

No	Requirement
1.	Fulfill the minimum candidature duration of 2 semesters.
2.	Fulfill the University language requirement (Bahasa Malaysia and English) not later than the second (2nd) semester of candidature
3.	Fulfill the residential requirement of 6 months Candidates are considered have fulfilled the residential requirement if they have completed requirements **4, 5 and 6** and including the following: (a) Face-to-face consultation with supervisor(s) as imposed by the faculty; and/or (b) Participation in any faculty activities as required by the faculty
4.	Attend at least 3 credits of **Research Methodology Course not later than the second (2nd) semester** of candidature.
5.	Present your research proposal at **Proposal Defence** not later than the second (2nd) semester of candidature
6.	Present your research progress at **Candidature Defence** not later than the third (3rd) semester of candidature
The candidates must fulfill the following publication requirement before the Examination Committee (Board) meeting:	
Publication Requirements • Master's Degree Candidate pursuing a programme in the field of Science must show proof of acceptance of publication for at least one (1) papers in ISI (WoS) Journals prior to a Committee of Examiners meeting. • Master's Degree Candidate pursuing a programme in the field of Social Science must show proof of acceptance of publication for at least one (1) paper in the category A or B refereed journal recognized by Faculty/Academy/Institute/Centre prior to a Committee of Examiners meeting.	

Master

Graduate on Time (GOT) Schedule for Masters by Research Candidates

Semester	Activities	Output/Milestone	Comments
1	• Attend Research Methodology Course • Attend Bahasa Melayu course* • Attend English language course** • Familiarization with and use of EndNote, Turnitin, editing software, data analysis and research tools • Attend GOT seminar • Conduct Literature Review • Proposal Defence	• Completed Research Methodology course • Fulfilment of language requirements • Presented research proposal	
2	• Expand research proposal to drafts of chapter 1, 2 & 3 • Conduct pilot study/ planning & setting up of experiment/ start data collection • Begin data analysis • Attend at least 2 courses in Upskill Program • Prepare and present Candidature Defence • Prepare for Publication 1	• Completed outline of dissertation • Submission of Publication 1 • Completed Candidature Defence	
3	• Finalise chapters 1, 2 & 3 • Finalise data analysis • Begin chapter 4 & 5 • Attend at least 1 courses in Upskill Program • Submit 3 Months Notice	• Completed chapters 1, 2 & 3 • Draft of chapters 4 & 5	
4	• Attend Thesis Bootcamp	• Submission of dissertation • Outcome of Committee of Examiners	

Semester	Activities	Output/Milestone	Comments
	• Finalize and submit dissertation • Committee of Examiners meeting	meeting	

Notes:
Monitoring Panel

1. Chairman & 1 member who is an expert in the field and a supervisor. A fourth member is allowed to be appointed if necessary.
2. The same panel should follow through the proposal presentation and Candidature Defense.
3. It is strongly recommended that one member is appointed as internal examiner.
4. The main responsibilities of the panel should include the following:-
   a) Advise the student to improve the research proposal.
   b) Monitor the progress of the student
   c) Improve the research plan.

* Applicable to all international candidates.
** Applicable to international candidates who are writing their dissertation in languages other than English.

COURSE CONTENT OF RESEARCH METHODOLOGY

WOX7001 Research Methodology

Learning Outcomes

At the end of the course, students are able to:

1. Explain the concepts and roles of research in computer science.
2. Differentiate the approaches and steps involved in conducting research in computer science.
3. Describe the principal methods of research used in computer science and related areas.
4. Use appropriate statistics to characterize and analyze data.
5. Provide a proposal for a research project, and make an oral presentation of the research proposal.

Synopsis of Course Content

Topics included are: nature of research in computer science; major considerations and tasks in scientific research; selecting a research project; project planning, tools and techniques for planning; review of literature; empirical research methods in computer science; writing a research proposal; managing the research project; data analysis and presentation of results/writing the research report.

Evaluation and Weightage

Continuous Assessment **:** 100%

Dissertation

MASTER OF INFORMATION SCIENCE
(MASTER BY RESEARCH)

MASTER OF INFORMATION SCIENCE (BY RESEARCH)
PROGRAMME REQUIREMENTS

1. Programme Type

The types of programmes offered for the Master of Information Science by research is the: programme shall consists of one hundred percent (100%) research leading to the submission of a dissertation.

2. Admission Requirements

(1) Qualifications for Admission

(i) Bachelor's degree with Honours or a comparable degree from another University or a comparable degree in the field of Library Studies or Information Studies or work experience of at least three years in a library or information centre;

or

(ii) Post degree diploma in the field of Library Studies or Information Studies or a comparable qualification;

or

(iii) Other qualifications approved by the Senate from time to time.

(2) English Language Proficiency

(i) International candidates are required to:

(a) have at least IELTS 5.5 or TOEFL 550 if their first degree is from a university where English is not the medium of instruction;

or

(b) pass an English proficiency test approved by the University.

3. Duration of Study

The programme of study : two (2) to eight (8) semesters.

4. Programme Structure

(1) This programme shall consist of one hundred percent (100%) research work leading to the submission of a dissertation which format shall be stipulated as in Part VI, University of Malaya Regulations (Master's Degree) 2019.

(ii) Attend and pass a Research Methodology Course – WOB7001 (three (3) credits) not later than the second semester of candidature.

(iii) Candidates may be imposed to enroll in other courses and obtain satisfactory results deemed necessary by the Faculty.

LEARNING OUTCOMES FOR MASTER BY RESEARCH

To be awarded a master degree by research, a candidate shall:

1. Demonstrate a systematic understanding of knowledge by identifying research problems or insights in a particular field
2. Apply appropriate research methodologies and techniques
3. Relate leadership qualities through communicating and working effectively with peers and stakeholders
4. Conduct research with minimal supervision and adhere to legal, ethical and professional codes of practice
5. Publish in peer reviewed academic journals in his/her field of study
6. Appraise research findings using scientific and critical thinking skills
7. Manage information for lifelong learning

CANDIDATURE REQUIREMENTS

Master of Information Science (Master by Research)

No	Requirement
1.	Fulfill the minimum candidature duration of 2 semesters.
2.	Fulfill the University language requirement (Bahasa Malaysia and English) not later than the second (2^{nd}) semester of candidature
3.	Fulfill the residential requirement of 6 months Candidates are considered have fulfilled the residential requirement if they have completed requirements **4, 5 and 6** and including the following: (a) Face-to-face consultation with supervisor(s) as imposed by the faculty; and/or (b) Participation in any faculty activities as required by the faculty
4.	Attend at least 3 credits of **Research Methodology Course not later than the second (2nd) semester** of candidature.
5.	Present your research proposal at **Proposal Defence** not later than the second (2nd) semester of candidature
6.	Present your research progress at **Candidature Defence** not later than the third (3rd) semester of candidature
The candidates must fulfill the following publication requirement before the Examination Committee (Board) meeting:	
Publication Requirements • Master's Degree Candidate pursuing a programme in the field of Science must show proof of acceptance of publication for at least one (1) papers in ISI (WoS) Journals prior to a Committee of Examiners meeting. • Master's Degree Candidate pursuing a programme in the field of Social Science must show proof of acceptance of publication for at least one (1) paper in the category A or B refereed journal recognized by Faculty/Academy/Institute/Centre prior to a Committee of Examiners meeting.	

Master

Graduate on Time (GOT) Schedule for Masters by Research Candidates

Semester	Activities	Output/Milestone	Comments
1	• Attend Research Methodology Course • Attend Bahasa Melayu course* • Attend English language course** • Familiarization with and use of EndNote, Turnitin, editing software, data analysis and research tools • Attend GOT seminar • Conduct Literature Review • Proposal Defence	• Completed Research Methodology course • Fulfilment of language requirements • Presented research proposal	
2	• Expand research proposal to drafts of chapter 1, 2 & 3 • Conduct pilot study/ planning & setting up of experiment/ start data collection • Begin data analysis • Attend at least 2 courses in Upskill Program • Prepare and present Candidature Defence • Prepare for Publication 1	• Completed outline of dissertation • Submission of Publication 1 • Completed Candidature Defence	
3	• Finalise chapters 1, 2 & 3 • Finalise data analysis • Begin chapter 4 & 5 • Attend at least 1 courses in Upskill Program • Submit 3 Months Notice	• Completed chapters 1, 2 & 3 • Draft of chapters 4 & 5	
4	• Attend Thesis Bootcamp	• Submission of dissertation • Outcome of Committee of Examiners	

Semester	Activities	Output/Milestone	Comments
	• Finalize and submit dissertation • Committee of Examiners meeting	meeting	

Notes:
Monitoring Panel

1. Chairman & 1 member who is an expert in the field and a supervisor. A fourth member is allowed to be appointed if necessary.
2. The same panel should follow through the proposal presentation and Candidature Defense.
3. It is strongly recommended that one member is appointed as internal examiner.
4. The main responsibilities of the panel should include the following:-
   a) Advise the student to improve the research proposal.
   b) Monitor the progress of the student
   c) Improve the research plan.

* Applicable to all international candidates.
** Applicable to international candidates who are writing their dissertation in languages other than English.

COURSE CONTENT OF RESEARCH METHODOLOGY

WOB7001 Research Methods in Library and Information Science

Learning Outcomes

At the end of the course, the student is able to:

1. Formulate problem statements, research questions and research hypotheses
2. Appropriately select research designs and methodologies for library and information science research.
3. Appropriately apply research concepts and principles in the use of quantitative and qualitative research designs in the conduct of library and information science research.
4. Apply ethical issues in the conduct of library and information science research.

Synopsis of Course Content

Topics included are: formulation of research problems and research questions for quantitative and qualitative research; developing quantitative and qualitative literature reviews; survey designs, ethnographic designs, quantitative and qualitative case study designs; appraising quantitative and qualitative research reports; developing quantitative and qualitative research proposals.

Evaluation and Weightage

Continuous Assessment **:** 100%

Dissertation

DOCTOR OF PHILOSOPHY

PROGRAMME EDUCATION OBJECTIVES FOR DOCTOR OF PHILOSOPHY

PEO 1:
Foster innovation of new ideas, methods and techniques in relevant research fields

PEO 2:
Lead research and establish a career as a skilled researcher and/or practitioner

PEO 3:
Disseminate research output and provide expert advice through various mechanism in an ethical and professional manner

LEARNING OUTCOMES FOR DOCTOR OF PHILOSOPHY DEGREE

1. Synthesise and contribute knowledge in the respective research field.

2. Adapt appropriate practical skills and research methodologies leading to innovative research.

3. Provide expert advice to relevant stakeholders based on respective research output.

4. Conduct research independently and adhere to legal, ethical and/or professional codes of practice.

5. Display leadership qualities through effective communication and collaboration with peers and stakeholders.

6. Address issues in the field of research critically using appropriate problem solving and/or scientific skills.

7. Integrate information for lifelong learning.

CANDIDATURE REQUIREMENTS

Doctor of Philosophy Degree:

No	Requirement
1.	Fulfill the minimum candidature duration of 4 semesters.
2.	Fulfill the University language requirement (Bahasa Malaysia and English) not later than the second (2nd) semester of candidature
3.	Fulfil the residential requirement of 6 months Candidates are considered have fulfilled the residential requirement if they have completed requirements **4, 5, 6 and 7** and including the following: (a) Face-to-face consultation with supervisor(s) as imposed by the faculty; and/or (b) Participation in any faculty activities as required by the faculty
4.	Attend at least 3 credits of **Research Methodology Course** not later than the second (2nd) semester of candidature
5.	Present your research proposal at **Proposal Defence** not later than the second (2nd) semester of candidature
6.	Present your research progress at **Candidature Defence** not later than the fifth (5th) semester of candidature
7.	Present your research progress at **Thesis Seminar** before the submission of thesis for examination
The candidates must fulfill the following publication requirement before the Viva-Voce and the Examination Committee (Board) meeting:	
8.	**Publication Requirements** • Candidate pursuing a programme in the field of **Science** must show proof of acceptance of publication for at least two (2) papers in ISI (WoS) Journals prior to viva-voce and the Committee of Examiners meeting. • Timing – Publications must be within the candidature ot the candidate • Topics of Publications – Publications must be related and conform to the candidatate's research in his/her thesis • Affiliation – Publications must carry the affiliation ot the department and/or faculty where the candidate is registered

Proposed Graduate on Time Schedule
Major Administrative and Regulatory Milestones for PhD Candidates (Conventional PhD)
(Sciences)

Semester	Activities	Output/Milestone	Comments
1	• Attend Research Methodology Course • Attend Bahasa Melayu course* • Attend English language course** • Familiarization with and use of EndNote, Turnitin, editing software, data analysis and research tools • Conduct Literature Review • Proposal Defence	• Completed Research Methodology course • Fulfilment of language requirements • Presented research proposal	
2	• Complete Literature Review • Conduct pilot study/ planning & setting up of experiment/ start data collection • Attend at least 3 courses in Upskill Program (including GOT seminar) • Prepare for Candidature Defence	• Literature Review • Thesis Plan/Outline of Thesis • Submission of Publication 1 (review paper / experimental design)	• Candidates are strongly advised to use reference management software Eg: Mendeley, Bibtex, EndNote
3	• Investigation and development of the proposed solutions. • Data analysis • Candidature Defence report writing • Attend at least 2 courses in Upskill Program • Candidature Defence	• Completed Candidature Defence	• Candidature Defence report should include data collection, findings, thesis outline
4	• Experimentation and/or data analysis • Thesis write-up (Chapter 1, 2 & 3) • Preparation of manuscripts for submission of	• Submission of Publication 2 • Completed drafts of three chapters	

Semester	Activities	Output/Milestone	Comments
	publication • Attend at least 2 courses in Upskill Program		
5	• Thesis write-up (complete remaining chapters) • Presentation of Thesis Seminar • Submit 3 Months Notice for thesis submission • Attend Thesis Bootcamp	• Completed thesis draft • Presented Thesis Seminar	
6	• Finalize and submit thesis • Prepare for viva voce	• Submission of thesis • Viva voce	

Notes:
Monitoring Panel

1. Chairman & 1 member who is an expert in the field and a supervisor. A fourth member is allowed to be appointed if necessary.
2. The same panel should follow through the proposal presentation (seminar 1, Candidature Defence and thesis seminar (seminar 2).
3. It is strongly recommended that one member is appointed as internal examiner.
4. The main responsibilities of the panel should include the following:-
   a) Advise the student to improve the research proposal.
   b) Monitor the progress of the student
   c) Improve the thesis plan.

*Applicable to all international candidates.
** Applicable to international candidates who are writing their theses in languages other than English.

Proposed Graduate on Time Schedule
Major Administrative and Regulatory Milestones for PhD Candidates (PhD – Fast Track)
(Sciences)

Semester	Activities	Output/ Milestone	Comments
1	• Attend Research Methodology Course • Attend Bahasa Melayu course* • Attend English language course** • Familiarization with and use of EndNote, Turnitin, editing software, data analysis and research tools • Conduct Literature Review • Proposal Defence	• Completed Research Methodology course • Fulfillment of language requirements • Presented research proposal	
2	• Complete Literature Review • Conduct pilot study/ planning & setting up of experiment/ start data collection • Attend at least 3 courses in Upskill Program (including GOT seminar) • PhD Confirmation Defence • Prepare for Candidature Defence	• Literature Review • Thesis Plan/Outline of Thesis • Submission of Publication 1 (review paper / experimental design) • Results of PhD Confirmation Defence (if unsatisfactory, continue as a Master student – refer to Master by Research GOT Schedule in Semester 3)	• Candidates are strongly advised to use reference management software Eg: Mendeley, Bibtex, EndNote
3	• Investigation and development of the proposed solutions. • Data analysis • Candidature Defence report writing and Candidature Defence • Attend at least 2 courses in Upskill Program	• Completed Candidature Defence report • Completed Candidature Defence	• Candidature Defence report should include data collection, findings, thesis outline

Semester	Activities	Output/ Milestone	Comments
4	• Experimentation and/or data analysis • Thesis write-up (Chapter 1, 2 & 3) • Preparation of manuscripts for submission of publication • Attend at least 2 courses in Upskill Program	• Submission of Publication 2 • Completed drafts of three chapters	
5	• Thesis write-up (complete remaining chapters) • Presentation of Thesis Seminar • Submit 3 Months Notice for thesis submission • Attend Thesis Bootcamp	• Completed thesis draft • Presented Thesis Seminar	
6	• Finalize and submit thesis • Prepare for viva voce	• Submission of thesis • Viva voce	

Notes:
Monitoring Panel

1. Chairman & 1 member who is an expert in the field and a supervisor. A fourth member is allowed to be appointed if necessary.
2. The same panel should follow through the proposal presentation (seminar 1, Candidature Defence and thesis seminar (seminar 2).
3. It is strongly recommended that one member is appointed as internal examiner.
4. The main responsibilities of the panel should include the following:-
   a) Advise the student to improve the research proposal.
   b) Monitor the progress of the student
   c) Improve the thesis plan.

*Applicable to all international candidates.
** Applicable to international candidates who are writing their theses in languages other than English.

LEGISLATIONS AND PRESCRIBED RULES

(1) Master's Programmes

Master's candidates are governed by the University of Malaya (Master's Degree) Rules and Regulations, 2019.

(2) Ph.D Programme

Ph.D candidates are governed by the University of Malaya (Degree of Doctor of Philosophy) Rules and Regulations, 2019. In addition to the above all postgraduate candidates are also governed by the Universities and University Colleges Act, 1971 Constitution of the University of Malaya, all other statutes, rules and regulations currently applicable in the University including the University of Malaya (Discipline of Candidates) Rules 1999.

The full texts of the above rules and regulations are available at https://umsitsguide.um.edu.my.As a registered candidate of the University of Malaya, the candidates have the responsibility to be aware of and to abide by the rules and regulations of the University, the policies and requirements of their respective faculties and the advice contained in this handbook.

MARKING SCHEME AND GRADE POINT AVERAGE

The assessment for the examination of the coursework component is based on the following marking scheme:

MARKS	GRADE	GRADE POINT	MEANING
90-100	A+	4.00	HIGH DISTINCTION
80-89 75-79	A A-	4.00 3.70	DISTINCTION
70-74	B+	3.30	PASS
65-69	B	3.00	
60-64	B-	2.70	FAIL
55-59	C+	2.30	
50-54	C	2.00	
45-49	C-	1.70	
40-44	D+	1.50	
35-39	D	1.00	
0-34	F	0.00	

RESEARCH GUIDANCE

RESEARCH GUIDANCE

PROGRESS REPORT

All postgraduate research candidates are to submit a progress report online at the end of each semester as stipulated. The supervisor shall evaluate the progress report and submit the progress report to the Deputy Dean of Higher Degree/Head of Department. A candidate whose progress is satisfactory will be recommended for continuous of his/her candidature.

The Faculty shall terminate the candidature of a candidate whose progress is not satisfactory for **TWO** consecutive semesters. A candidate who fails to submit his progress report within the stipulated period shall be barred from registering for the following semester.

SUPERVISION POLICY OF POSTGRADUATE CANDIDATES AT THE UNIVERSITY OF MALAYA

1. Purpose

This policy was created with the following objectives:

(1) To explain the criteria for the appointment of the supervisor and the role and responsibilities of the supervisor to the candidate in the research mode and the coursework and research modes.

(2) To assist the Responsibility Centre (RC) in making plans for the infrastructure, the workload of the academic staff and intake of candidates.

(3) To ensure the quality of supervision is assured and that the research produced by the candidate is consistent with the mission and vision of the University.

(4) As a guide for academic staff and candidates in the University of Malaya in executing the responsibilities as a supervisor and research candidate.

2. Appointment of Supervisor

The appointment of a supervisor must meet the following criteria:

(1) It is encouraged to appoint at least two (2) supervisors for each candidate. If only one supervisor is appointed, the supervisor must have the experience of supervising until graduation at least two (2) candidates.

(2) The appointed supervisor must have a minimum qualification equivalent to the degree or at par with the program registered by the candidate.

(3) If the supervisor does not have the qualification stated, experience in the research field or related industry can be considered as the criteria for appointment as a Supervisor.

(4) The appointment of a Supervisor shall take into account the research skills and experiences which are consistent with the research field of the candidate.

(5) Supervisors suggested by prospective candidates, are given priority to supervise, except in cases where the RC feels that other supervisors are more qualified to supervise.

(6) Academic staff on sabbatical leave may be allowed to supervise until the end of the leave, provided the leave does not affect the candidate's supervision. However, based on some specific reasons, the Supervisor may apply to not supervise the candidate while on leave and the decision is based on the discretion of the relevant RC.

(7) For academic staff who will be coming to the end of their services, the RC should ensure that a replacement supervisor is appointed at least six (6) months prior to the end of the service date of the initial supervisor so that both of them can co-supervise without affecting the progress of the candidate's research.

(8) For academic staff have left the service in University of Malaya but is still doing academic work elsewhere, they may be appointed as co-supervisor and the number of candidates supervised shall be limited to five (5) persons, where the candidates must be in their final stage of their studies.

(9) Appointment of an external party (either academic or non-academic) as co-supervisors can be considered if the external party is able provide research facilities and the expertise which will in turn assist the candidates in their research.

(10) Academic staff should attend training programs in supervision or enhancement courses prescribed by the University of Malaya.

(11) If the RC would like to appoint a supervisor who is not in compliance with all the criteria of appointment specified in the policy, the RC shall submit a letter of application together with a strong justification to the Dean of Graduate Studies Institute of Graduate Studies for consideration and approval.

(12) Appointment of supervisors shall be managed by the RC in compliance with all the criteria specified in this policy. Appointment made shall take into account the space, resources and expertise to support and assist candidates, with their research.

(13) If the appointment of a new supervisor is required for some reason, the appointment shall be made according to merit and this case is considered as a special case. This case cannot be referred to and be an example or a precedent for a case to come.

(14) In the event of problems of supervision between supervisor and candidate, the RC should address this problem. If the problem cannot be resolved, the matter may be submitted to the Dean, Institute of Graduate Studies for further action.

3. Ratio between Supervisor and Candidate

(1) The maximum ratio for candidates to obtain quality supervision are as follows: -

Research Fellow 1:3
Lecturer 1:5
Senior Lecturer 1:7
Associate Professor 1:10
Jusa C Professor 1:15
Jusa B Professor 1:20
Jusa A Professor 1:25

(2) RC may approve a higher maximum number of candidates provided that supervisor has shown excellent supervision performance.

(3) RC can also set a different maximum number of students from above to meet the requirements of relevant professional bodies.

(4) In calculating the supervisory workload, three (3) candidates of the mixed-mode is equal to two (2) candidates of the research mode.

4. Change of Supervisor

Change of supervisor can be implemented as follows:

(1) If there is strong justification and excuse, the candidate may apply to change the supervisor, not more than once during the period of candidature.

(2) If there is a supervisor who did not perform the supervisory duties satisfactorily, the Dean of the RC may appoint any other qualified academic staff to replace the said supervisor.

5. Family Links

(1) Supervisors appointed shall not have a close family link to the candidate.

(2) Both the appointed supervisors also must not have any family relationship with each other.

6. Role and Responsibilities of the Supervisor

The appointed supervisor shall exercise his/her role and responsibilities as set out in Appendix A.

7. Role and Responsibilities of the Candidate

The candidate shall also be responsible for the candidature and research throughout their status as a student in the University of Malaya as set out in Appendix B.

APPENDIX A

ROLE AND RESPONSIBILITIES OF THE SUPERVISOR

1. Before starting, the supervisor to the candidate will need to know the latest university rules and regulations relating to higher degree programs.

2. Supervisors should have adequate knowledge, enhanced theoretical and conceptual framework, and is up to date in the field of research of the candidate.

3. Supervisors should be knowledgeable about the work schedule provided for the completion of a research project so that it complies with the provisions of certain degrees. This is to ensure the smooth running of the candidate's research project.

4. Supervisors are responsible for providing relevant and adequate guidance and academic support to students during the supervision period to enable the candidate to carry out excellent research and writing. This responsibility includes guiding the careful planning of the research, the background and library research, the need to attend courses to complete the research, including scientific methods. Awareness about the impact of fraud and plagiarism should be informed to the candidate.

5. Supervisors should interact with the candidate at least two (2) times per month in the first semester and once (1) a month for the next semester. For the first meeting, the supervisor and the candidate must talk face to face, while, the next meeting may be conducted via other methods such as on-line.

6. Supervisors are responsible to ensure that candidates could communicate with relevant experts should the research area requires so. In certain cases, an additional supervisor or consultant may be appointed.

7. Each supervisor should be appointed to the candidates should know their responsibilities respectively and explained to the candidates on the aspects that will be monitored. In the event that two (2) supervisors were appointed for each candidate, the effective working relationship between all parties needs to be maintained together.

8. Supervisors need to help candidates in the preparation with regards to the presentation at conferences, seminars, meetings and workshops.

9. Supervisors are encouraged to record every meeting and discussion with the candidate about the study and research of the candidate by providing and updating the file on record of achievement and progress of research projects for each candidate.

10. Supervisors should evaluate the progress of the candidates by getting a written report and monitor the performance in a relative manner according to the quality set for a certain degree. Candidates should be informed if the quality of her work did not reach the required standard. If progress of the candidates is not satisfactory, the supervisor must take action to help the candidates improve their performance. Progress report for each semester for each candidate must be submitted by the supervisor to the Academic / Faculty / Institute / Centre as scheduled.

11. Supervisors should help candidates in academic writing, presentations in conferences and submitted for publication. For all the academic papers submitted for publication, written jointly by the supervisor and candidate, both have to agree to publish them together.

12. Supervisors need to help manage and secure any funds (example: Vote PPP, UMRG etc.) for research projects.

13. Supervisors must ensure work safety rules are followed during the research and are carried out in accordance with health and safety ethics policy specified by the University.

14. Supervisors should provide constructive and critical comments on the candidate's drafts of the thesis within a reasonable time and advise the candidate regarding the format of the thesis as specified by the University.

15. Supervisors should suggest and advise the Post Graduate Office of the RC in the process of nomination and evaluation of expertise of internal and external examiner. The supervisors also need to ensure that there are no delays in the process.

The Role of Supervisor in the Board of Examiners

1. The role of supervisor in the Board of Examiners is as the advisor. The supervisor is not involved in any discussions relating to the results of work submitted by the candidate. The supervisor does not function as an examiner.

2. The supervisor's attendance in the Board of Examiners shall be by invitation only.

3. Supervisors are expected to provide supervision reports in the required format within a specified time to the Post Graduate Office for the Board of Examiners meeting.

4. The supervisor should also help the candidates on the corrections to be done based on the comments raised by the Board of Examiners and continue to oversee the candidate in cases where the thesis is referred back for further study.

APPENDIX B

ROLE AND RESPONSIBILITIES OF THE CANDIDATE

1. Candidates should understand and fulfil all of the conditions contained in the letter of offer, rules and regulations applicable to the program.

   Examples are as follows:

   (A) Book of the University of Malaya (Master's Degree) Regulations 2010 and the University of Malaya (Master's Degree) 2010;

   (B) Book of the University of Malaya (Degree of Doctor of Philosophy) 2007 and Regulations of the University of Malaya (Degree of doctor of Philosophy 2007);

   (C) Program handbook, and

   (D) Postgraduate Handbook.

2. Candidates should interact with the supervisor at least two (2) times per month in the first semester and once (1) a month the next semester. For the first meeting, the candidate and supervisor should talk face to face, while, the next meeting can be conducted via other methods such as online.

3. Candidates shall record meetings and discussions on their research each time they meet with the supervisor.

4. Candidates should have a good working relationship with the supervisor.

5. Candidates must plan the project schedule and comply with the maximum period of study.

6. Candidates should discuss and agree with the supervisor on consultation times.

7. Candidates must submit progress as specified without falsifying the research outcome and is free of plagiarism.

8. Candidates must notify their supervisor of any problems that may interfere with the research.

9. Candidates shall engage in academic activities organized by the department or the RC.

10. Candidates must plan and ensure sufficient time to do the research and write the thesis.

11. Candidates should ensure that their candidature is always active by renewing their registration each semester.

12. A candidate shall give three months' notice to the supervisor or inform the supervisor the date for submission of the thesis for examination purposes, so there is no delay in the appointment of examiners.

13. Candidates are solely responsible for the content, the presentation of thesis and viva-voce presentation.

14. Candidates are responsible for ensuring that corrections are made in a given period after the Board of Examiner's meeting / viva-voce and the Senate.

UNIVERSITY OF MALAYA

GUIDELINES

FOR THE PREPARATION OF RESEARCH REPORTS DISSERTATIONS AND THESES

2015

TABLE OF CONTENTS

PREFACE

In the process of completing a postgraduate programme in the University of Malaya and being awarded the degree, a candidate may be required to submit either a research report, a dissertation or a thesis, depending on the requirements of the specific programme.

In view of this requirement, the Institute of Graduate Studies (IGS), University of Malaya has taken the initiative to provide general guidelines for the submission of research reports, dissertations and theses. These guidelines will assist candidates to meet the minimal format requirements set by the University to complete the final form of a research report, dissertation or thesis. However, the format may differ in each individual faculty, academy, institute or centre with its own additional requirements.

1. FORMAT OF WRITING

A research report, dissertation or thesis can be written in ONE of the following formats:

- Conventional format
- Article style format
- Thesis in the format of published papers (This option is only available for Doctor of Philosophy candidates)

These formats serve as a generic guideline for the postgraduate students in writing a research report/dissertation/thesis. Minor variation of the format as recommended by the supervisors is allowed.

1.1 CONVENTIONAL FORMAT

The conventional format follows the traditional monograph structure. The structure of research report, dissertation or thesis that follows the conventional format should include the following:

Preface
▪ Title Page ▪ Original Literary Work Declaration Form ▪ Abstract ▪ *Abstrak* ▪ Acknowledgements / Dedication ▪ Table of Contents ▪ List of Figures ▪ List of Tables ▪ List of Symbols and Abbreviations ▪ List of Appendices
Main Body
▪ Chapter 1: Introduction ▪ Chapter 2: Literature Review ▪ Chapter 3: Materials and Methods / Methodology ▪ Chapter 4: Results ▪ Chapter 5: Discussion ▪ Chapter 6: Conclusion ▪ References (A consolidated list of references for all chapters)
Supplementary
▪ List of Publications and Papers Presented ▪ Appendix

1.2 ARTICLE STYLE FORMAT

Apart from the conventional style of writing, a research report, dissertation or thesis can also be presented in the chapters that are in the format of journal article. The number of chapters to be included is at the discretion of the author, depending on the suitability of the chapters in answering the research questions.

The article style format should not be confused with the format for thesis by published papers. Similar to the conventional format, a research report/dissertation/thesis in the article style format should be written extensively to elucidate the different aspects of the research work in great detail.

The main body of a research report/dissertation/thesis in the article style format should contain the following chapters:

- **General Introduction**
  The General Introduction gives an overview of the research by outlining the objectives, novelty as well as the research questions addressed. This chapter should also explain the correlation among the articles/chapters.

- **Literature Review**
  The Literature Review provides extensive background information on past studies and current knowledge pertaining to the research topic.

- **Article 1, Article 2, Article 3 or more**
  Each article should address a specific research objective or a related topic of the study. Each article forms a separate chapter and must be written in a cohesive manner with a logical and coordinated progression from one article/chapter to the other. The article/chapter should consist of its own sections on Introduction, brief Literature Review, Methodology, Results, Discussion and Conclusion.

- **Conclusion and Recommendation**
  The Conclusion chapter summarizes the findings in all articles and suggests the future direction for research.

The format specifications of the research report/dissertation/thesis must conform to the general research report/dissertation/thesis requirements as outlined in the following chapters.

The general structure that follows the article style format should include the following:

Preface
▪ Title Page ▪ Original Literary Work Declaration Form ▪ Abstract ▪ *Abstrak* ▪ Acknowledgements / Dedication ▪ Table of Contents ▪ List of Figures ▪ List of Tables ▪ List of Symbols and Abbreviations ▪ List of Appendices
Main Body
▪ Chapter 1: General Introduction ▪ Chapter 2: Literature Review ▪ Chapter 3: Article 1* 3.1 Introduction 3.2 Literature Review 3.3 Materials and Methods / Methodology 3.4 Results 3.5 Discussion 3.6 Conclusion ▪ Chapter 4: Article 2* 4.1 Introduction 4.2 Literature Review 4.3 Materials and Methods / Methodology 4.4 Results 4.5 Discussion 4.6 Conclusion ▪ Chapter 5: Article 3* 5.1 Introduction 5.2 Literature Review 5.3 Materials and Methods / Methodology 5.4 Results 5.5 Discussion 5.6 Conclusion ▪ Chapter 6: Conclusion

▪ References (A consolidated list of references for all chapters) ***Note:*** **Article is written with a specific title which normally refers to the research done*
Supplementary
▪ List of Publications and Papers Presented ▪ Appendix

1.3 THESIS IN THE FORMAT OF PUBLISHED PAPERS

UM also permits the presentation of thesis for the degree of Doctor of Philosophy in the format of published and/or submitted papers, where such papers have been published or accepted by high impact journals (e.g.: ISI journals) during the period of candidature.

Papers submitted as a PhD thesis must be based on a particular theme or focus and form a cohesive research write up.

The quality of a thesis by published papers should be in accordance with PhD-level research.

The guidelines for the format by published papers are as follows:

- The theses may comprise published papers and/or manuscripts accepted for publication by high impact journals (e.g. ISI journals). The papers should be published or accepted for publication during the period of candidature.

- The minimum number of papers and/or manuscript is normally three (3). However, in some disciplines a larger number of papers is required to meet the expectations of scope and quality in accordance with PhD-level research. For Doctor of Philosophy by Prior Publication mode, the minimum number of published works is at least five (5) and these works must be those published within a period not exceeding 10 years prior to the date of submission of thesis.

- Where the papers have more than one writer, the candidate must be the main writer of at least two (2) out of three (3) papers. For Doctor of Philosophy by Prior Publication mode, the candidate should be the primary author of four (4) of the published works submitted.

- Normally, the theses shall include the following in addition to the components required of a standard thesis:
  a) list of publications and/or manuscripts;
  b) acknowledgments of joint writers and evidence of permissions; and
  c) published papers and accepted manuscripts.

- Each published paper or accepted manuscript must begin with a clear statement of the contribution made by each writer of any jointly written paper.

- The thesis shall be prefaced by a synopsis which summarises the most important findings presented in each published paper or accepted manuscript. It should indicate how the included works are thematically linked or tied to a particular research framework and how, when considered together, they contribute significantly to knowledge in the discipline.

- The **Introduction** chapter should contain:
  a) description of research problem investigated;
  b) objectives of the study; and
  c) account of research progress linking the research papers.

  The account of research progress must link together the various papers submitted as part of the thesis so that the reader can understand the logic behind the progression of the research programme.

- The **Literature Review** chapter must contain, in accordance with discipline norms, a critical review of relevant literature, identify the knowledge gaps and the relationship of the literature to the programme of research.

- The **Conclusion** chapter establishes the cumulative effect of the papers, the significance of the findings and the knowledge claim in the thesis.

- Published papers/ accepted manuscripts must be presented coherently in the thesis according to the requirement of the University of Malaya (Degree of Doctor of Philosophy) Regulations 2007, including any accompanying declarations. Published papers/ accepted manuscripts must be included in the thesis in their **original publication format** and should not be retyped. Thesis by publication must be submitted according to the format outlined in this section of the Guidelines.

The examination process for theses in the format of published papers is similar to that for conventional theses.

Theses which have not achieved sufficient academic merit may be referred for further work within a period of between 6 to 12 months and be submitted for re-examination.

In such cases, the candidate may choose to submit the thesis for re-examination in the same format or in the conventional Doctoral thesis format.

The general structure for a thesis in the format of published papers is as per following:

Preface
▪ Title Page ▪ Original Literary Work Declaration Form ▪ Abstract ▪ *Abstrak* ▪ Acknowledgements / Dedication ▪ Table of Contents ▪ List of Figures ▪ List of Tables ▪ List of Symbols and Abbreviations ▪ List of Appendices
Main Body
▪ Chapter 1: Introduction ▪ Chapter 2: Literature Review ▪ Chapter 3: Published Paper 1 Published Paper 2 Published Paper 3 and so on ▪ Chapter 4: Conclusion ▪ References (List of references for chapters of Introduction, Literature Review and Conclusion)
Supplementary
▪ List of Publications and Papers Presented ▪ Appendix

2. SEQUENCE OF CONTENTS

The structure of the research report, dissertation or thesis is based on a standard format which contains the three main sections; **PREFACE**, **MAIN TEXT** and **SUPPLEMENTARY**.

2.1 PREFACE

This section consists in order of the following:

- TITLE PAGE
- ORIGINAL LITERARY WORK DECLARATION FORM
- ABSTRACT
- ACKNOWLEDGEMENTS / DEDICATION
- TABLE OF CONTENTS
- LIST OF FIGURES
- LIST OF TABLES
- LIST OF SYMBOLS AND ABBREVIATIONS
- LIST OF APPENDICES

2.1.1 TITLE PAGE

The title page is the first page after the front cover and should include:

a) The final research title which has been approved by the Faculty;
b) Name of candidate according to the registration records;
c) The statement as the following (according to mode of programme):

Master's Degree			**Doctoral Degree**	
Research Report (Coursework mode)	**Dissertation (Mixed mode)**	**Dissertation (Research mode)**	**Thesis (Mixed mode)**	**Thesis (Research mode)**
RESEARCH REPORT SUBMITTED TO THE (name of the Faculty) UNIVERSITY OF MALAYA, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF (Name of Programme)	DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF (Name of Programme)	DISSERTATION SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF (Name of Programme)	THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF (Name of Programme)	THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF (Name of Programme)

d) The year of submission.

This page is the first page of Roman numeral page number but it is not numbered. The text should be typed using font type **Times New Roman**, font **size 14 with 1.15 pt. line spacing**.

Please refer to Appendices G1 – G5 for examples of the title page.

2.1.2 ORIGINAL LITERARY WORK DECLARATION FORM

This form must be completed by the candidate and signed by a witness. The original signed form must be included in all copies of the research report/dissertation/thesis. The form can be downloaded from the IGS website in two (2) languages (English language and Bahasa Malaysia). If the research report/dissertation/thesis is written in English, hence the English version of the form is used and vice versa.

Please refer to the example of the form as given in Appendix H1 and H2.

2.1.3 ABSTRACT

An abstract is a short summary of the research report/dissertation/thesis. An abstract should briefly describe the objectives (problem statement), the significance of research, research methodology, as well as the findings and conclusion of the research.

An abstract must not exceed 500 words, double-spaced, and written in bahasa Malaysia and English language. Where the language of the thesis is other than bahasa Malaysia or English, an abstract in that language must also be included.

The sequence of abstracts is as follows:

- For research report/dissertation/thesis written in Bahasa Malaysia, the abstract in Bahasa Malaysia is followed by the English version.
- For research report/dissertation/thesis written in English, the abstract in English is followed by the Bahasa Malaysia version.
- For research report/dissertation/thesis written in Arabic, the abstract in Arabic is followed by its version in Bahasa Malaysia and English.

The Abstract page is assigned Roman numeral "iii" and the following pages should be numbered consecutively.

For examples, please refer to Appendices J1 and J2.

2.1.4 ACKNOWLEDGEMENTS / DEDICATIONS

Most research reports, dissertations or theses include a message to convey appreciation to those who have been involved and provided their assistance directly or indirectly in the preparation of the study.

This is optional and should not exceed a single page, which is numbered in Roman numeral accordingly.

2.1.5 TABLE OF CONTENTS

The Table of Contents lists the chapters, topics and sub-topics together with their page numbers.
Sub-topics and topics should be labelled according to the chapter, for e.g.:

CHAPTER 1
1.1 Topic 1
    1.1.1 Sub-topic 1

CHAPTER 2
2.1 Topic 1
    2.1.1 Sub-topic 1

This numbering system provides a clear picture of the relationship between chapters and topics and shows how they are connected.

2.1.6 LIST OF FIGURES

This list contains the titles of figures, together with their page numbers, which are found throughout the text.

For example, figures in Chapter 1 are numbered sequentially: Figure 1.1, Figure 1.2 and so on.

2.1.7 LIST OF TABLES

This list contains the titles of tables, together with their page numbers, which are listed in the text.

The numbering system is according to chapter, for e.g.: tables in Chapter 1 are numbered sequentially: Table 1.1, Table 1.2 and so on.

2.1.8 LIST OF SYMBOLS AND ABBREVIATIONS

The symbols, abbreviations, nomenclature and terminology that are used in the text must be listed down accordingly.

For further information on spelling and abbreviations, candidates are advised to refer to the latest edition of the Oxford Advanced Learner's Dictionary published by Oxford University Press.

2.1.9 LIST OF APPENDICES

This list is optional and contains the titles of appendices placed in the supplementary section

2.2 MAIN TEXT

Candidates and supervisors should ensure that the text follows the agreed conventions of the individual Faculty. The main text in the research report/dissertation/thesis must be organised following the guidelines as mentioned below:

- Text must be organised in titled chapters.
- The titles must reflect the content of the chapter.
- Every chapter must begin on a new page.
- Chapters can be divided into sub-chapters with corresponding sub-titles.
- Titles and sub-titles must be numbered.

There is no restriction on the total number of chapters in a research report/dissertation/thesis. The number of chapters differs according to the field of study conducted by the candidate whether it is science-based or social-science-based. However the content of the chapters may differ according to the candidate's research or conventions of individual Faculty.

Generally, a research report/dissertation/thesis will have the following basic structure:

- INTRODUCTION
- LITERATURE REVIEW
- MATERIALS AND METHODS / METHODOLOGY
- RESULTS
- DISCUSSION
- CONCLUSION
- REFERENCES

Items in the structure are divided into separate chapters and the descriptions of these chapters are as follows:

2.2.1 INTRODUCTION

This chapter contains the introduction to the issues in which the research is concerned with, the aims and objectives of the study, and the scope or outline of the research approach as well as the structure of the research report/dissertation/thesis.

2.2.2 LITERATURE REVIEW

A literature review is a description of the literature relevant to a particular field or topic of study. It consists of a critically written and comprehensive account of the published works on a topic by accredited scholars and researchers. A critical literature review is a critical assessment of the relevant literature. It is directly related to the research, providing information on theories, models, materials and techniques used in the research. The literature review should be comprehensive and include recent publications which are relevant to the research.

2.2.3 MATERIALS AND METHODS / METHODOLOGY

This chapter describes and explains the materials as well as the research methodology used in the study. The sub-topics for this chapter include the key research questions, the research design, and the research procedures adopted. It may also, where appropriate, indicate sampling methods, research instruments and statistical methods employed. The purpose of this is to inform the reader on the methods used to collect the data and generate the findings reported.

2.2.4 RESULTS

This chapter explains the results which are commonly presented in the form of text, figures and tables, complete with data analysis.

2.2.5 DISCUSSION

This chapter contains the interpretation of the results. The findings of the research should be compared and contrasted with those of previous studies presented in the literature review. The purpose of this chapter is to discuss the findings and the outcomes of the research in relation to the results that have been obtained.

2.2.6 CONCLUSION

In this chapter, the findings are summarized and their implications discussed. This section may include suggestions for future work.

2.2.7 REFERENCES

All works or studies referred to in the research report/dissertation/thesis in the form of quotations or citations must be included in the references.

The references should be written consistently in the American Psychological Association (APA) format or in another format approved by the Faculty. Each reference should be written in single spacing format and a double space should be left between references. The list of references must be arranged in alphabetical order and the entries should not be numbered. The list must also have a hanging indentation of 0.5 inch. For example:

Buchwalow, I. B., & Böcker, W. (2010). *Immunohistochemistry: basics and methods.* Berlin: Springer Verlag.

Caamaño-Tubío, R. I., Pérez, J., Ferreiro, S., & Aldegunde, M. (2007). Peripheral serotonin dynamics in the rainbow trout (*Oncorhynchus mykiss*). *Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology, 145*(2): 245-255.

Cakir, Y., & Strauch, S. M. (2005). Tricaine (MS-222) is a safe anesthetic compound compared to benzocaine and pentobaritol to induce anesthesia in leopard frogs (*Rana pipiens*). *Pharmacological Reports, 57*: 467-474.

Cameron, A. A., Plenderleith, M. B. & Snow, P. J. (1990). Organization of the spinal cord in four species of elasmobranch fishes: cytoarchitecture and distribution of serotonin and selected neuropeptides. *The Journal of Comparative Neurology, 297*: 201-218

Reference citations in text require the following information:

- last name of the author,
- the year of publication,
- the page number for the reference (direct quotes only).

For summaries or paraphrases, the last name of the author and the year of publication must be included for the in-text reference. For examples:

Kingston and Parker (2012) found the biggest challenges in classroom to be ….

The biggest challenges in classroom were …. (Kingston & Parker, 2012).

For direct quotations (which refers to when the exact words of another author are copied), the last name of the author, the year of publication as well as the page number for the reference must be included for the in-text reference. The quotation has to be enclosed in quotation marks. For examples:

It was said that "What is taught and how it is to be taught entail teachers' moral judgements and commitments" (Frank & Quiroz, 1997, p. 208).

According to Frank and Quiroz (1997), "What is taught and how it is to be taught entail teachers' moral judgements and commitments" (p. 208).

If the quoted citation contains more than 40 words, it should be placed within a paragraph of its own with a 0.5 inch indentation. For example:

> The general theory of relativity, on its own, cannot explain these features or answer these questions because of its prediction that the universe started off with infinite density at the big bang singularity. At the singularity, general relativity and all other physical laws break down: one couldn't predict what will come out of the singularity. (Hawking, 1988, p. 309)

Please refer to the University of Malaya Library APA Formatting and Style Guide (6th Edition). The guide can be downloaded at UM Library website:

http://www.umlib.um.edu.my/publications/apa-guide.pdf

The University recommends the use of EndNote software or any other reference management software for organizing and managing citations, bibliographies and references.

2.3 SUPPLEMENTARY

Specific items which were not included in the main body of the text, should be put in this Supplementary Section. Typically, this section includes the following:

2.3.1 LIST OF PUBLICATIONS AND PAPERS PRESENTED

Published works as well as papers presented at conferences, seminars, symposiums etc pertaining to the research topic of the research report/ dissertation/thesis are suggested be included in this section. The first page of the article may also be appended as reference.

2.3.2 APPENDIX

Appendices consist of research instruments, additional illustration of data sources, raw data and quoted citations which are too long to be placed in the text. The appendix section supports the written text of the research report/dissertation/thesis by including materials that can provide additional information. These materials include tables, charts, computer programmes and questionnaires, for example:

- Research data, tables, examples of questionnaires, maps, photos and other materials that are too long to be included in the text or are not directly required to comprehend the text can be included as appendices. Tables and graphics that are more than two pages long can be put in the Appendix section.
- Appendices are labelled as APPENDIX A, APPENDIX B, etc.

3. FORMAT SPECIFICATIONS

3.1 PAPER QUALITY, PRINTING AND DUPLICATING

The research report/dissertation/thesis should be printed, single-sided, on high quality white A4 paper (201 × 297 mm; 80 grams). Computer pin-feed printout paper is not permitted.
The research report/dissertation/thesis, in softcover or hardbound copies, must be typed and duplicated by offset printing or good quality photocopying. All copies must be clean and neat in order to ensure easy reading.

3.1.1 TYPING AND PRINTING QUALITY

The research report/dissertation/thesis must be typed using font type **Times New Roman, font size 12** (except for tables and figures) and justified, using Microsoft Word version 6.0 or later, or similar word-processing software. Research report/dissertation/thesis in Arabic should be typed using

Words in a language that is different from the language of the research report/dissertation/thesis must be typed in *italics*. Font type Traditional Arabic in font size 16.

Text should be typed on one side of a paper only.

Chapter titles should be typed with capital letters and centred between the left and right margins. Each chapter must begin on a new page. Chapters and subchapters should be titled. Titles should be typed in bold without underline.

For mathematical texts, the use of Equation Editor or LaTeX is advisable. Script fonts are not permitted.

A high quality laser or ink-jet printer should be used for the printing.

3.1.2 LINE SPACING

The body of the text should be typed with **double spacing**. Single-spacing is only permitted in tables, long quotations, footnotes, citation and in the references.

The first sentence of a new paragraph should not start at the bottom of a page if the space available can only fit one line.

3.1.3 MARGINS

The text should have the following margins:

Top	: 2.0 cm or 0.79 inch
Right	: 2.0 cm or 0.79 inch
Left	: 4.0 cm or 1.57 inch
Bottom	: 2.0 cm or 0.79 inch

Additional guidelines need to be followed:

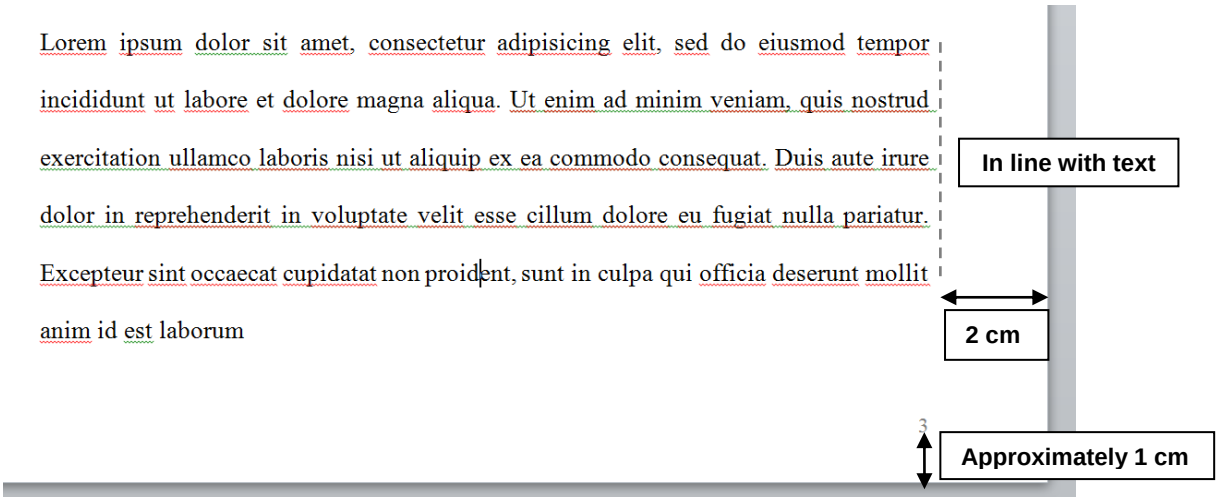
- Do not type more than one sentence after the bottom margin. If it is necessary to do so, it should only be for a footnote or the completion of the last sentence of the chapter, topic or sub-topic or information in a figure.
- All tables and figures must be placed within the specified margins.
- The last paragraph of the page should contain at least two sentences. If it does not, the paragraph should begin on the next page.

3.1.4 PAGE NUMBERING

All page numbers should be printed 1.0 cm from the bottom edge of the page and placed at the right-hand side without any punctuation.

The page numbering system must conform to the following rules:

- The page numbers should be placed at the right hand side without any punctuation.
- Font type Times New Roman and font size 10 recommended for numbers.
- Roman numerals (i, ii, iii etc) should be used in the Preface section. The first page of the thesis, the title page, is an unnumbered page 'i'. Numbering begins on the second page with 'ii'.
- Arabic numerals (1, 2, 3) are used on the pages of the text (starting with the Introduction page) and Supplementary section.



3.1.5 NUMBERING OF CHAPTERS AND SUB-CHAPTERS

Chapters and sub-chapters must be numbered using Arabic numerals (1, 2, 3 etc). Chapters are numbered CHAPTER 1, CHAPTER 2, CHAPTER 3, and so on. Sub-chapters are nested, but its numbering is not indented, up to a maximum of 4 levels as in the example shown below:

CHAPTER 2: FIRST LEVEL (CHAPTER TITLE)

2.1 Level 2 (sub-title);

2.1.1 Level 3 (sub-sub-title);

2.1.1.1 Level 4 (sub-sub-sub-title)

The use of letters in parenthesis in the main body for e.g., (a), (b), (c) is appropriate as a means of differentiating sub-topics of the same topic. However, it is not required to be listed in the Table of Content.

If a chapter title or chapter sub-title at any level exceeds a single line, the spacing between the lines must be the same as that of the text (double-spacing). Subsequent sub-chapters beyond the fourth nesting level must be numbered using alphabets; (a), (b), (c).. etc

3.1.6 FOOTNOTES

There are differences in the use of footnotes in various disciplines. For example, footnotes are commonly used in Social Sciences but rarely in Science and Technology. However candidates are advised to limit the use of footnotes unless they are proved necessary to the document. Footnotes are used to elaborate or provide additional information regarding matters discussed in that page.

Footnotes are recorded using Arabic numeric and numbered consecutively. Raised superscript numerals in the text refer to explanatory notes and documented sources appearing either at the bottom of the page as footnotes or at the end of the thesis as endnotes in a notes section. The advantage of using notes is that explanatory type of information can be presented along with source citations on the same page or place.

Footnotes should use a smaller font than the text (font size 8).

When using footnote, a number formatted in superscript is inserted following the punctuation mark in the text. Footnotes should be placed at the bottom of the page on which they appear. For example,

Scientists examined, over several years, the fossilized remains of the wooly-wooly yak.[1]

_____

[1] While the method of examination for the wooly-wooly yak provides important insights to this research, this document does not focus on this particular species.

Please refer to the faculty for the recommended convention for writing of footnotes.

3.1.7 TABLES

Tables are printed within the body of the text at the centre of the frame and labelled according to the chapter in which they appear. Thus, for example, tables in Chapter 3 are numbered sequentially: Table 3.1, Table 3.2 and so on.

The caption should be placed **above** the table itself. If the table contains a citation, the source of the reference should be included in the table caption.

Table 3.1: Short Title (Gibson, 2005)

Heading	**Heading**
Text	Text

If the table occupies more than one page, the continued table on the following page should indicate that it is a continuation, for example: 'Table 3.7, continued'. The header row should also be repeated.

3.1.8 FIGURES

Figures, like tables are printed within the body of the text at the centre of the frame and labelled according to the chapter in which they appear. Thus, for example, figures in Chapter 3 are numbered sequentially: Figure 3.1, Figure 3.2.

Figures, unlike text or tables, contain graphs, illustrations or photographs and their labels are placed at the **bottom** of the figure rather than at the top (using the same format used for tables).

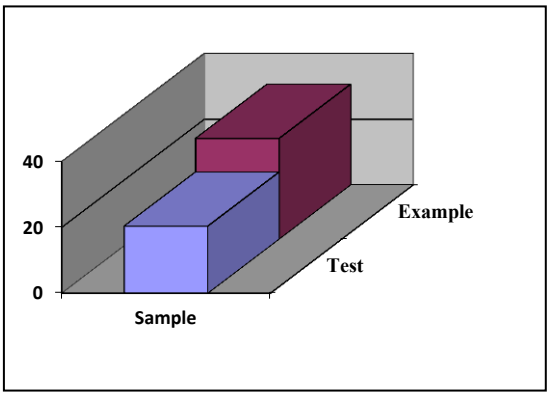


Figure 3.1: Title

If the figure occupies more than one page, the continued figure on the following page should indicate that it is a continuation: for example: 'Figure 3.7, continued'.

If the figure contains a citation, the source of the reference should be placed after the label.

3.1.9 BINDING

Each copy of the research report/dissertation/thesis submitted shall be bound in one (1) volume.

For the purpose of examination, research report/dissertation/thesis submitted should be **soft cover** bound in rexine with the following colour:

- Research report: Navy blue
- Dissertation: Dark red or maroon
- Thesis: Dark red or maroon

For final submission prior to graduation, research report/dissertation/thesis submitted should be **hard cover** bound in rexine with the following colour:

- Research report: Navy blue
- Dissertation: Dark red or maroon
- Thesis: Dark red or maroon

Front Cover Colour of Dissertation/Thesis (Dark red or maroon)
Front Cover Colour of Research Report (Navy blue)

The thesis cover must be of A4 size (210mm x 297mm).

The title of research report/dissertation/thesis, name of author, name of the university and year of submission must be printed on the front cover. The letters for the Front Cover should be printed in gold of font size 16, font type Arial Narrow, bold and in uppercase letters.
The examples are shown in Appendices D1, D2, D3 and D4.

The spine of the manuscripts should show the title of research report/dissertation/thesis, name of author, year of submission and name of degree. The year of submission must be in accordance to the year when the research report/dissertation/thesis is submitted.
The examples are shown in Appendices E1 and E2.

3.1.10 WORD LENGTH

The maximum word length for a submission for examination:

a) Research Report : 30,000 words

b) Dissertation (Mixed Mode) : 40,000 words

c) Dissertation (Research Mode) : 60,000 words

d) Thesis (Mixed Mode) : 80,000 words

e) Thesis (Research Mode) : 100,000 words

The maximum length of words excludes footnotes, references, appendices, tables, figures and prefaces.

A candidate who wishes to exceed the number of words specified must apply to the Senate through the respective Faculty at least three months before the submission of the research report/dissertation/thesis for examination and provide reasons for the inability to adhere to the prescribed length.

3.1.11 OTHER INFORMATION

A candidate may not resubmit previous research work which he or she has submitted to this or any other University for the award of a degree. The candidate may, however, incorporate any part of such work, provided that there is a clear indication in the research report/dissertation/thesis of its sources.

The candidate may also include any other printed or published work by an individual or a working group to validate his or her findings. Where the contribution is from a working group, the candidate is required to provide a statement indicating which part of the work was carried out by the candidate. The statement should be signed by the rest of the group indicating their consent (this may be included in the Appendix).

Approved research reports/dissertations/theses or parts of their content are allowed for publication if they are accompanied by a statement that the work was conducted towards the fulfilment of a particular degree.

All research mode candidates are required to publish papers in ISI Web of Science (WoS) or category A or B refereed journal based on the work during the course of study, and due reference must be made to the University in all such papers.

4. SUBMISSION

A candidate is required to submit the "Notice of Submission of Research Report/Dissertation/Thesis" online via student portal **at least three months** before the actual date of submission. Go to *http://myum.um.edu.my*, click the "*Research*" icon and then click "*Thesis*".

Submission of research report/dissertation/thesis has to be done within the candidature period.

For the purpose of examination, at least **five (5) printed softbound copies** (or such numbers as may be determined by the Faculty) of the research report/dissertation/thesis and **one (1) electronic copy** (PDF format) should be submitted together with the "Submission of Research Report/Dissertation/Thesis for Examination/Re-examination" form (Appendix B) after title approval of research report/dissertation/ thesis by the faculty/academy/institute/centre.

For final submission prior to graduation, at least **two (2) printed hardbound copies** (or such numbers as may be determined by the Faculty) of the final research report/dissertation/thesis **one (1) electronic copy** (PDF format) should be submitted after the final corrections or amendments (if any) have been made, together with the "Final Submission for Research Report/Dissertation/Thesis" form (Appendix C), Repository form and Correction Report form (if applicable).

All the required forms can be downloaded from the IGS website (http://ips.um.edu.my).

Masters candidates submit their research reports and dissertations to their respective faculty whereas Doctoral candidates submit their theses to the Thesis Unit of IGS.

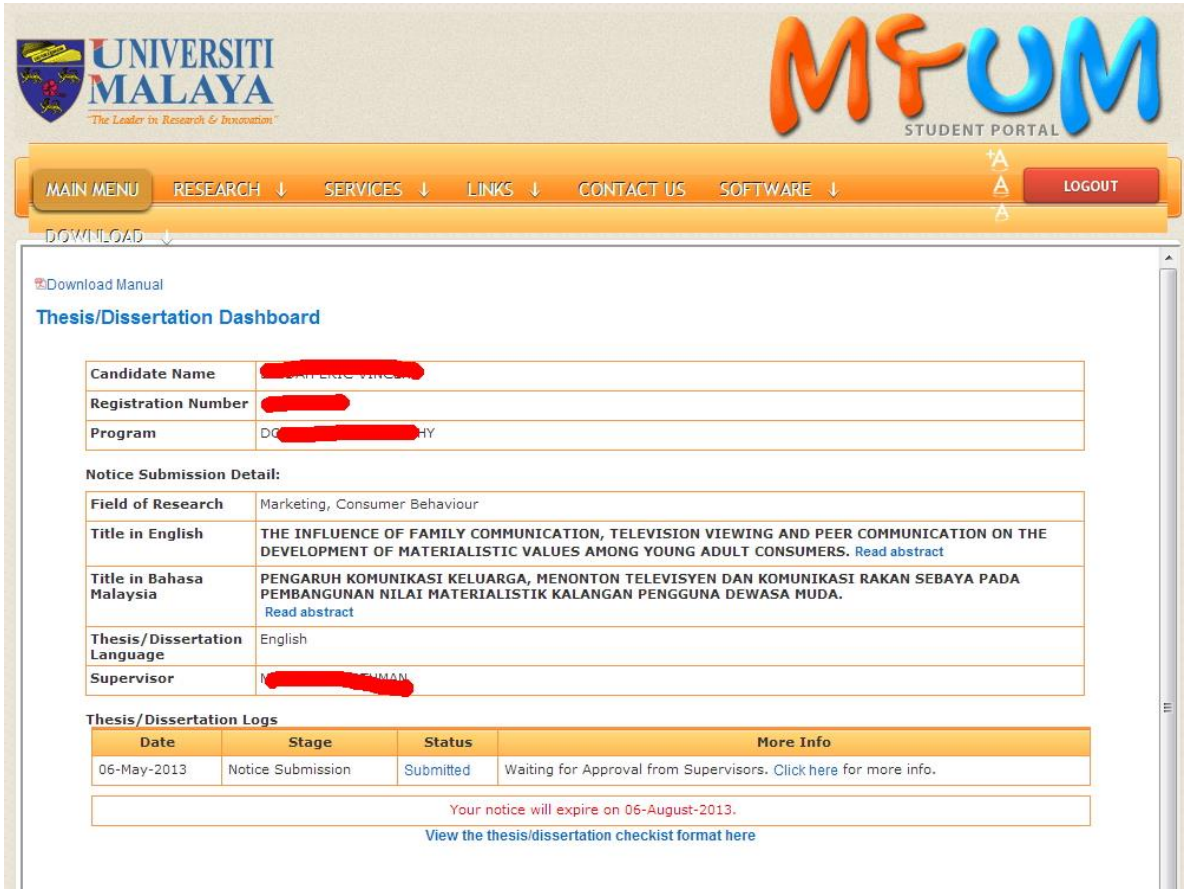
5. PLAGIARISM

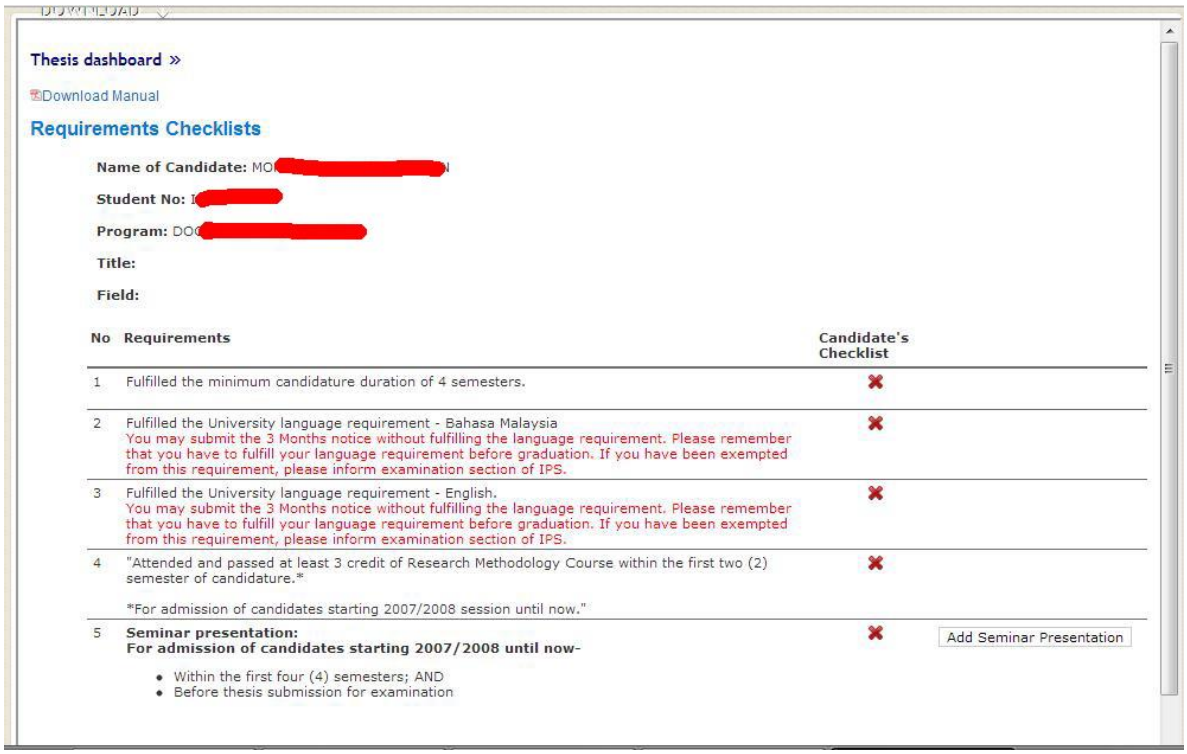
Postgraduate candidate of the University of Malaya are expected to produce original academic work. Plagiarism is defined as the use of original work, ideas or actual texts created by others, without acknowledging the original source. Hence, failure to acknowledge the work of others in their work means the candidate is guilty of plagiarism and may be subjected to disciplinary action under the University of Malaya (Discipline of Students) Rules 1999.

Postgraduate candidates are strongly advised to read the "How to Avoid Plagiarism: A Handbook for Postgraduate Students", which outlines the rules and regulations pertaining to acts of plagiarism.

The University also highly recommends the usage of Turnitin, an online web-based plagiarism detection application to avoid plagiarism and ensure academic integrity. In most cases, the similarity index percentage should not be more than 10% to 25%. Please refer to your respective faculty/academy/institute/centre regarding the acceptable similarity index percentage.

APPENDIX A - THREE MONTHS NOTICE SUBMISSION





APPENDIX B - SUBMISSION OF THESIS/DISSERTATION FOR EXAMINATION/RE-EXAMINATION FORM

UNIVERSITY OF MALAYA

PENYERAHAN TESIS/DISERTASI UNTUK PEMERIKSAAN/PEMERIKSAAN SEMULA*

SUBMISSION OF THESIS/DISSERTATION FOR EXAMINATION/RE-EXAMINATION*

**** Sila potong mana yang tidak berkenaan / * Please strike out whichever is not applicable***

FORMAT TESIS (Calon Ijazah Kedoktoran Sahaja - sila tanda √)
THESIS FORMAT (Doctoral Degree Candidates only - Please tick √)

	Thesis/Dissertation in Standard/Conventional Format
	Thesis by Published Papers *(This option is only available for Doctoral candidates)*

BAHAGIAN A – BUTIR-BUTIR CALON (UNTUK DIISI OLEH CALON)
SECTION A – CANDIDATE'S DETAILS (TO BE COMPLETED BY THE CANDIDATE)

Nama Calon
Name of Candidate : _____

Program *Programme* : _____

No. Matrik
Matric No. : _____

Fakulti
Faculty : _____

Alamat
Surat-Menyurat
Mailing Address : _____

_____

No. Telefon Bimbit
Mobile Phone No. : _____ | No. Telefon Pejabat
Office Phone No. : _____

E-mel
E-mail : _____

Tajuk Tesis / Disertasi (dalam huruf besar) :
**Sila pastikan tajuk tesis/disertasi telah diluluskan oleh Fakulti dan lampirkan salinan surat/emel berkaitan.*

Title of Thesis/Dissertation (Block letters) :
**Kindly ensure that the title of thesis/dissertation has been approved by the Faculty and provide a copy of the letter/email pertaining to the approval.*

_____

_____

_____

UM-PT01-PK02-BR027-S00

APPENDIX C - FINAL SUBMISSION OF THESIS/DISSERTATION FORM

UNIVERSITY OF MALAYA
PENYERAHAN AKHIR TESIS/DISERTASI
FINAL SUBMISSION FOR THESIS/DISSERTATION

Peringatan kepada calon:
Calon dikehendaki mengikut format penyediaan tesis/disertasi yang telah ditetapkan oleh Universiti sebelum membuat penghantaran kepada Fakulti/IPS.

Reminder to candidate:
Candidate is required to follow the format of thesis/dissertation preparation imposed by the University before submission of thesis to the Faculty/IGS.

BAHAGIAN A – BUTIR-BUTIR CALON (UNTUK DIISI OLEH CALON)
SECTION A – CANDIDATE'S DETAILS (TO BE COMPLETED BY THE CANDIDATE)

Nama Calon : _____
Name of Candidate

Program : _____
Programme

No. Matrik : _____
Matric No.

Fakulti : _____
Faculty

Alamat Surat-Menyurat : _____
Mailing Address

_____

_____

No. Telefon Bimbit : _____ No. Telefon Pejabat : _____
Mobile Phone No. *Office Phone No.*

E-mel : _____
E-mail :

Tajuk Tesis / Disertasi (dalam huruf besar) :
Title of Thesis/Dissertation (Block letters) :

_____

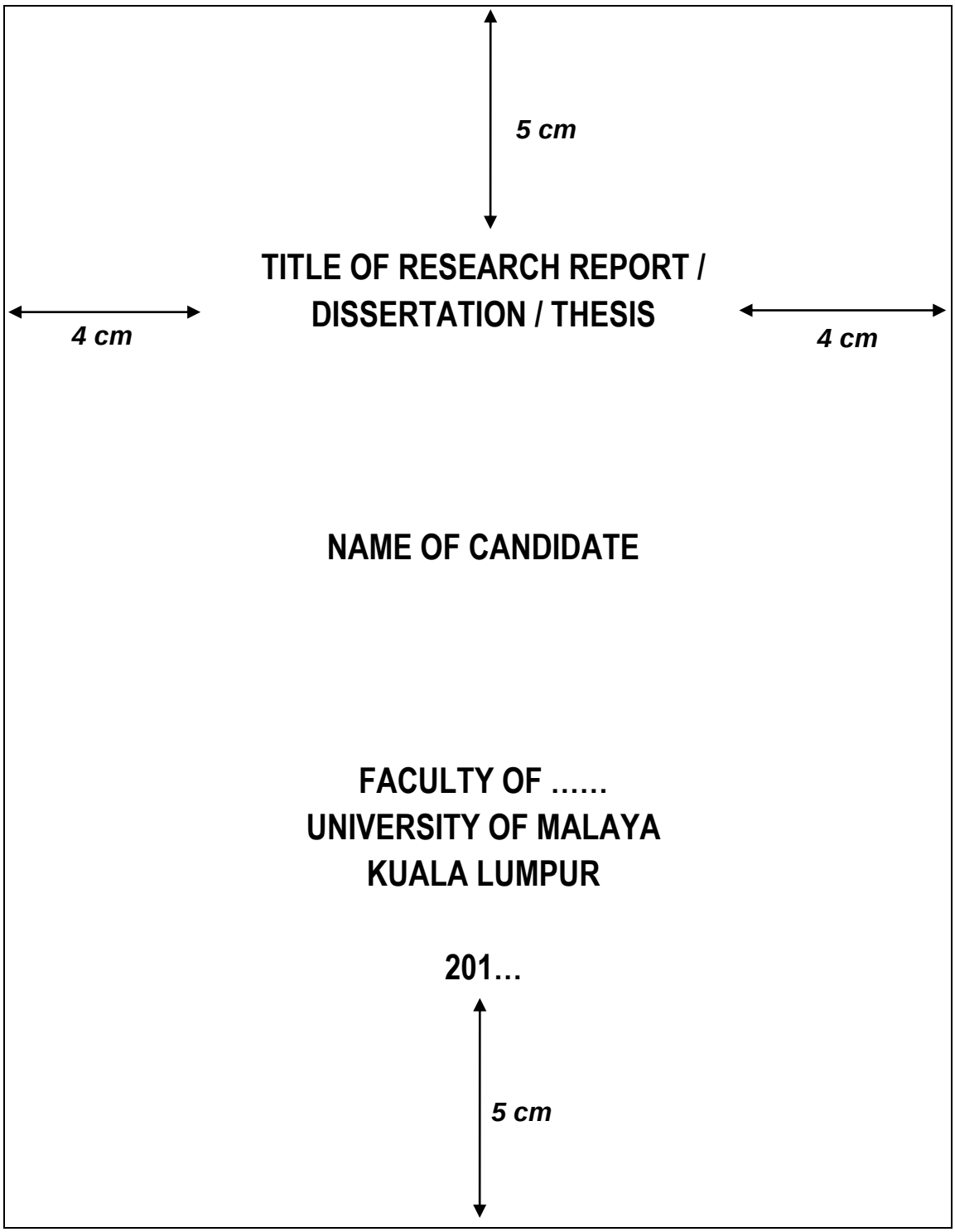
_____

_____

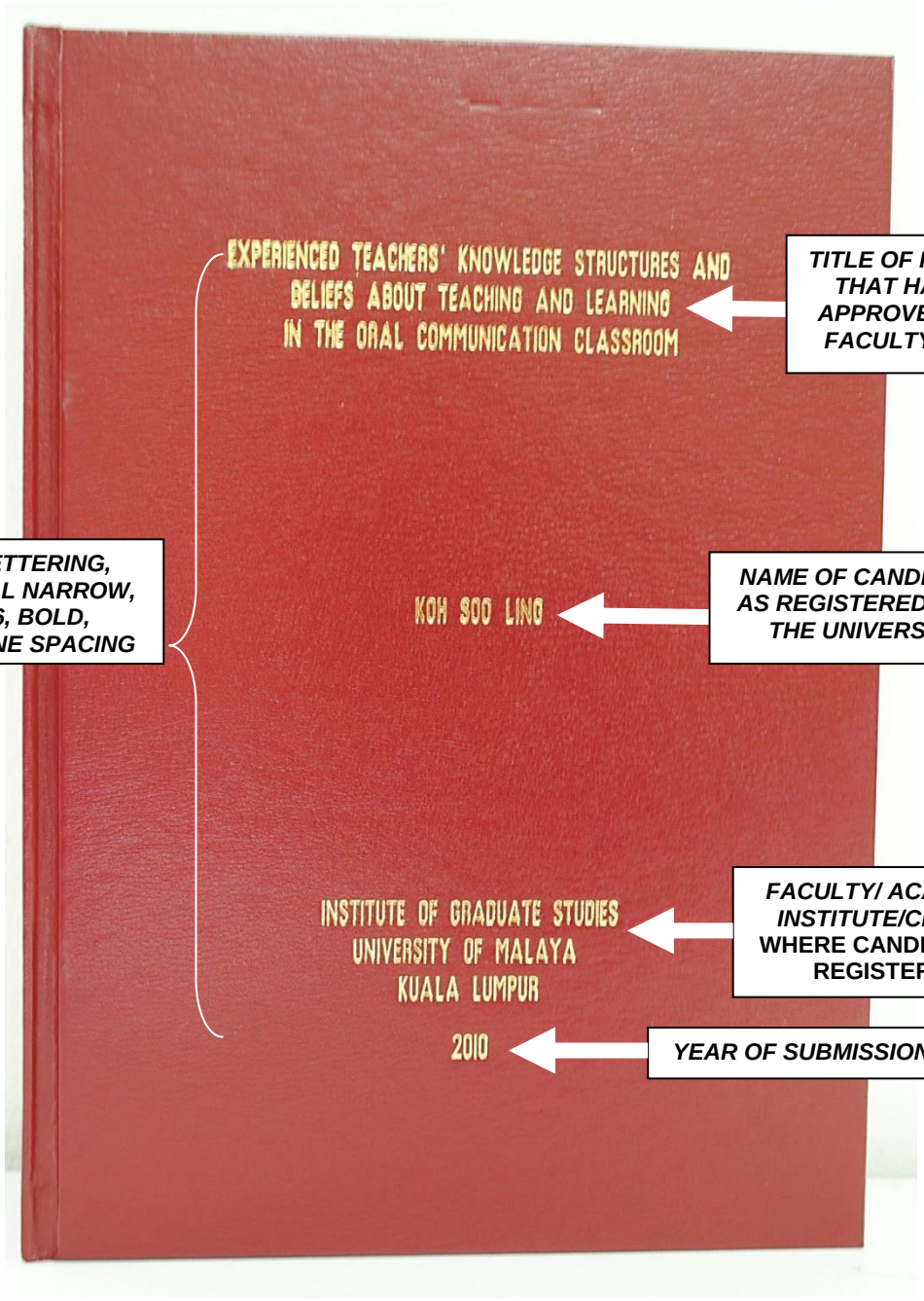
APPENDIX D1 – FRONT COVER

Example of the Front Cover of Research Report/Dissertation/Thesis:

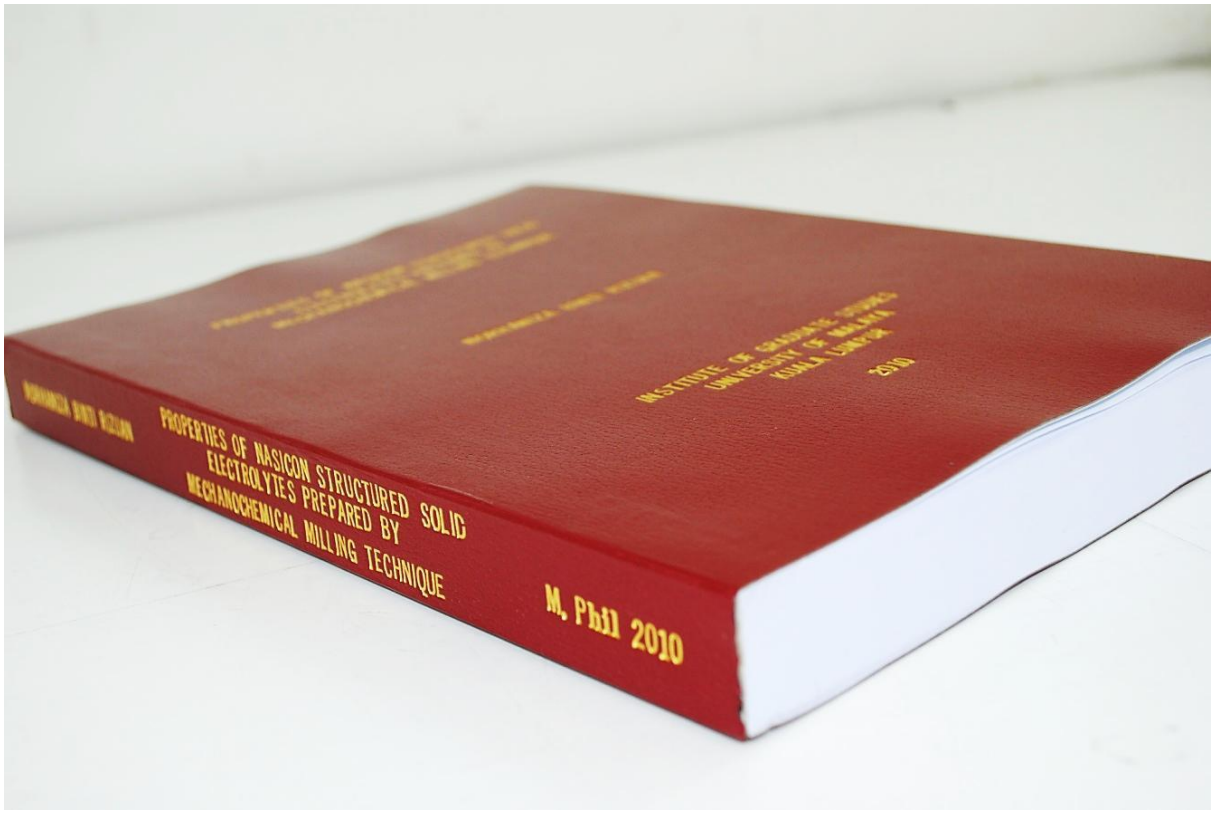
Front Cover Colour of Dissertation/Thesis (Dark red or maroon)
Front Cover Colour of Research Report (Navy blue)



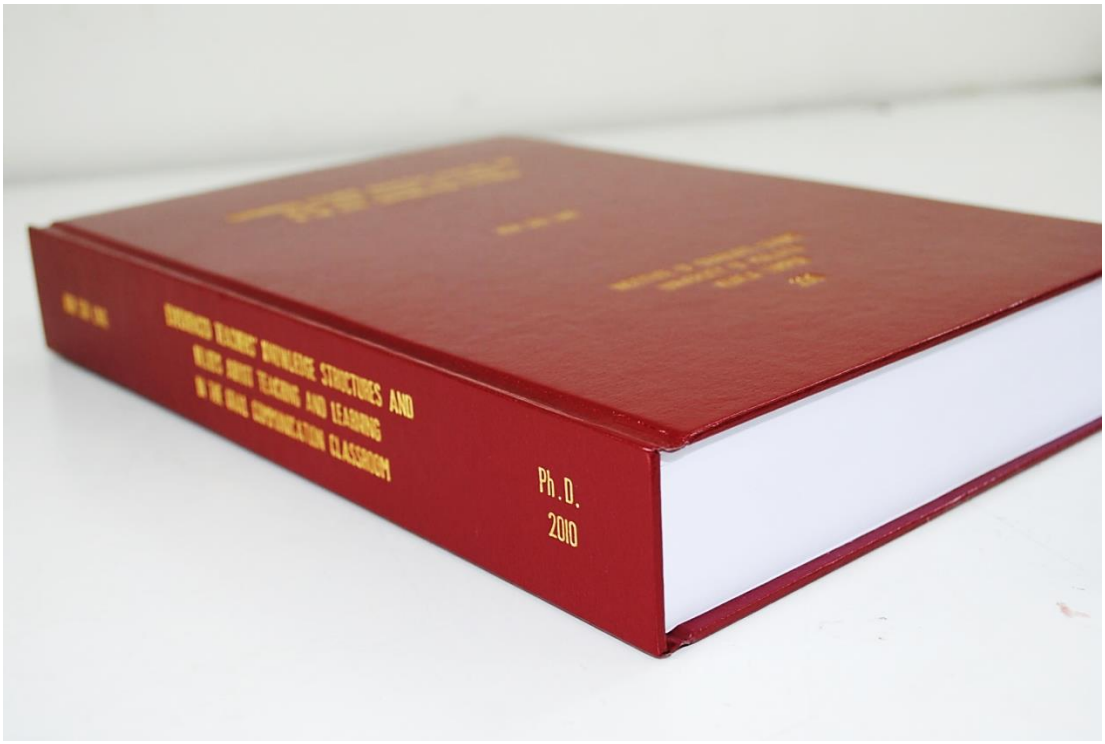
APPENDIX D2 – FRONT COVER FORMAT



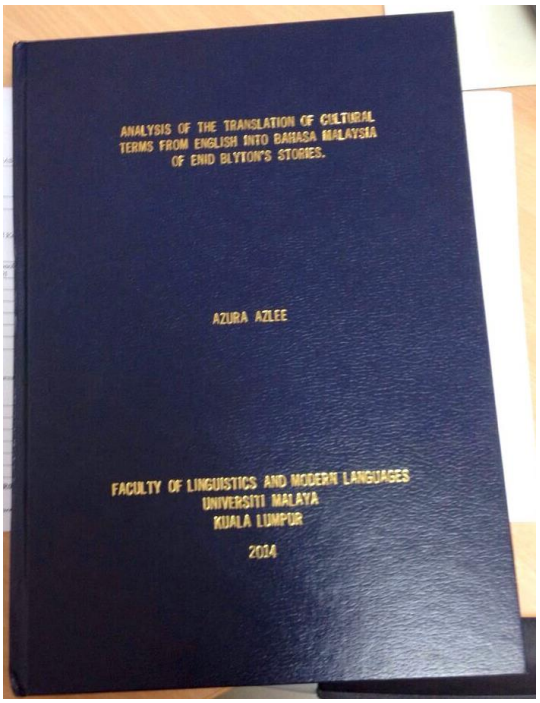
APPENDIX D3 - SAMPLE OF SOFTBOUND COPY (SUBMISSION FOR EXAMINATION)



APPENDIX D4 - SAMPLE OF HARDBOUND COPY (FINAL SUBMISSION)



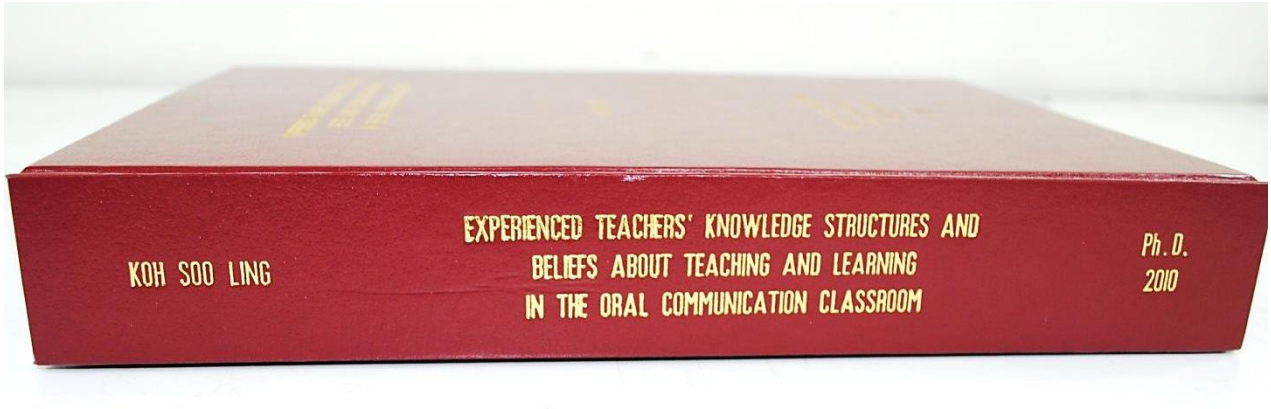
Example of hardbound thesis or dissertation (in dark red or maroon)



Example of hardbound research report (in navy blue)

APPENDIX E1 – SPINE FORMAT

APPENDIX E2 - SPINE FORMAT EXAMPLE



APPENDIX F - ELECTRONIC SOFT COPY FORMAT

The submitted electronic copy of the research report/dissertation/thesis in the form of CD (in PDF format) is required to be labeled with the following details:

- Name
- Matric no.
- Title of research report/dissertation/thesis
- Faculty/Academy/Institute/Centre
- Year of submission

For example:

Name	**GHAZALI LEE**
Matric No.	**SHB115021**
Title of research report/ dissertation/thesis	**ASSESSMENT OF SKEWNESS OF GRAPHS**
Faculty/Academy/Institute/Centre	**FACULTY OF SCIENCE**
Year of submission	**2012**

Printed label format (inside the CD sleeve/case)

APPENDIX G1 – TITLE PAGE (RESEARCH REPORT)

Example of the Title Page of a Research Report:

TITLE OF RESEARCH REPORT

NAME OF CANDIDATE

SUBMITTED TO THE
GRADUATE SCHOOL OF BUSINESS
FACULTY OF BUSINESS AND ACCOUNTANCY
UNIVERSITY OF MALAYA, IN PARTIAL
FULFILMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF BUSINESS
ADMINISTRATION

201x

APPENDIX G2 – TITLE PAGE (DISSERTATION BY RESEARCH)

Example of the Title Page of a Dissertation (Research Mode):

TITLE OF DISSERTATION

NAME OF CANDIDATE

DISSERTATION SUBMITTED IN FULFILMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF PHILOSOPHY

NAME OF FACULTY / ACADEMY/
INSTITUTE / CENTRE
UNIVERSITY OF MALAYA
KUALA LUMPUR

201x

APPENDIX G3 – TITLE PAGE
(DISSERTATION BY MIXED MODE)

Example of the Title Page of a Dissertation (Mixed Mode):

TITLE OF DISSERTATION

NAME OF CANDIDATE

DISSERTATION SUBMITTED IN PARTIAL
FULFILMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF LINGUISTICS

NAME OF FACULTY / ACADEMY/
INSTITUTE / CENTRE
UNIVERSITY OF MALAYA
KUALA LUMPUR

201x

APPENDIX G4 – TITLE PAGE (THESIS BY RESEARCH)

Example of the Title Page of a Thesis (Research Mode):

TITLE OF THESIS

NAME OF CANDIDATE

THESIS SUBMITTED IN FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF DOCTOR
OF PHILOSOPHY/MEDICINE

NAME OF FACULTY / ACADEMY /
INSTITUTE / CENTRE
UNIVERSITY OF MALAYA
KUALA LUMPUR

201x

APPENDIX G5 – TITLE PAGE (THESIS BY MIXED MODE)

Example of the Title Page of a Thesis (Mixed Mode):

TITLE OF THESIS

NAME OF CANDIDATE

THESIS SUBMITTED IN PARTIAL FULFILMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY/ PUBLIC HEALTH

NAME OF FACULTY / ACADEMY /
INSTITUTE / CENTRE
UNIVERSITY OF MALAYA
KUALA LUMPUR

201x

APPENDIX H1 - ORIGINAL LITERARY WORK DECLARATION FORM (ENGLISH)

UNIVERSITI MALAYA

ORIGINAL LITERARY WORK DECLARATION

Name of Candidate: (I.C/Passport No:)

Registration/Matric No:

Name of Degree:

Title of Project Paper/Research Report/Dissertation/Thesis ("this Work"):

Field of Study:

I do solemnly and sincerely declare that:

(1) I am the sole author/writer of this Work;
(2) This Work is original;
(3) Any use of any work in which copyright exists was done by way of fair dealing and for permitted purposes and any excerpt or extract from, or reference to or reproduction of any copyright work has been disclosed expressly and sufficiently and the title of the Work and its authorship have been acknowledged in this Work;
(4) I do not have any actual knowledge nor do I ought reasonably to know that the making of this work constitutes an infringement of any copyright work;
(5) I hereby assign all and every rights in the copyright to this Work to the University of Malaya ("UM"), who henceforth shall be owner of the copyright in this Work and that any reproduction or use in any form or by any means whatsoever is prohibited without the written consent of UM having been first had and obtained;
(6) I am fully aware that if in the course of making this Work I have infringed any copyright whether intentionally or otherwise, I may be subject to legal action or any other action as may be determined by UM.

Candidate's Signature Date

Subscribed and solemnly declared before,

Witness's Signature Date

Name:
Designation:

APPENDIX H2 - ORIGINAL LITERARY WORK DECLARATION FORM (BAHASA MALAYSIA)

UNIVERSITI MALAYA

PERAKUAN KEASLIAN PENULISAN

Nama: (No. K.P/Pasport:)

No. Pendaftaran/Matrik:

Nama Ijazah:

Tajuk Kertas Projek/Laporan Penyelidikan/Disertasi/Tesis ("Hasil Kerja ini"):

Bidang Penyelidikan:

Saya dengan sesungguhnya dan sebenarnya mengaku bahawa:

(1) Saya adalah satu-satunya pengarang/penulis Hasil Kerja ini;
(2) Hasil Kerja ini adalah asli;
(3) Apa-apa penggunaan mana-mana hasil kerja yang mengandungi hakcipta telah dilakukan secara urusan yang wajar dan bagi maksud yang dibenarkan dan apa-apa petikan, ekstrak, rujukan atau pengeluaran semula daripada atau kepada mana-mana hasil kerja yang mengandungi hakcipta telah dinyatakan dengan sejelasnya dan secukupnya dan satu pengiktirafan tajuk hasil kerja tersebut dan pengarang/penulisnya telah dilakukan di dalam Hasil Kerja ini;
(4) Saya tidak mempunyai apa-apa pengetahuan sebenar atau patut semunasabahnya tahu bahawa penghasilan Hasil Kerja ini melanggar suatu hakcipta hasil kerja yang lain;
(5) Saya dengan ini menyerahkan kesemua dan tiap-tiap hak yang terkandung di dalam hakcipta Hasil Kerja ini kepada Universiti Malaya ("UM") yang seterusnya mula dari sekarang adalah tuan punya kepada hakcipta di dalam Hasil Kerja ini dan apa-apa pengeluaran semula atau penggunaan dalam apa jua bentuk atau dengan apa juga cara sekalipun adalah dilarang tanpa terlebih dahulu mendapat kebenaran bertulis dari UM;
(6) Saya sedar sepenuhnya sekiranya dalam masa penghasilan Hasil Kerja ini saya telah melanggar suatu hakcipta hasil kerja yang lain sama ada dengan niat atau sebaliknya, saya boleh dikenakan tindakan undang-undang atau apa-apa tindakan lain sebagaimana yang diputuskan oleh UM.

Tandatangan Calon Tarikh

Diperbuat dan sesungguhnya diakui di hadapan,

Tandatangan Saksi Tarikh

Nama:
Jawatan:

APPENDIX J1 - SAMPLE OF ABSTRACT (SOCIAL SCIENCES)

Sample of abstract was taken from a PhD thesis (Faculty of Economics and Administration)

ABSTRACT

The purpose of this research was to seek a better understanding of the role of learning and experience in moderating the influence of heuristics and biases in financial decision behaviour. The study was conducted using a mixed methods research approach where the quantitative analysis of self-reports from a survey questionnaire was supported by qualitative analysis of observed behaviour from case studies. The findings pointed to an inverse relationship when the choices involved risk or loss of money, and where the link could be the emotional state of the individual. The findings also highlighted the income variable as a significant predictor of irrational decision-making behaviour. The study presented three contributions to behavioural decision research. One, the scope of the biases tested in relation to the experience variable was expanded to include the breakeven, house money, status quo and anchoring effects. Two, similarities and differences in decision behaviour between investment professionals and retail investors were examined under the same context. Three, the findings provided additional insights on the effect of loss aversion on riskless and risky choice tasks. It is hoped that the findings from this research will be of use to risk practitioners who seek to develop a judgement risk framework to complement the existing financial risk frameworks.

APPENDIX J2 - SAMPLE OF ABSTRACT (SCIENCE)

Sample of abstract was taken from a Master's dissertation (Faculty of Science)

ABSTRACT

Fish fins are appendages which represent the limbs in higher vertebrates. The understanding on the innervations of the fish fin is still at its infancy as studies on the relevant field are relatively scarce. Hence, this study aimed to fill the knowledge gap, i.e. to investigate the organisation of spinal motor neurons in relation to the distribution of the median fins. For comparison purposes, four species of juvenile fishes utilised in this study were divided into two groups, namely (i) fish with long and continuous dorsal fin (*Channa micropeltes*, toman and *Clarias* sp., keli), and (ii) fish with short and non-continuous dorsal fin (*Mystus nemurus*, baung and *Pangasius* sp., patin). Spinal cord tissue obtained from three different representative segments along the rostro-caudal axis were processed histologically and stained using three neurohistological staining techniques including H&E, Nissl as well as Lillie's Variant of the Weil-Weigert prior to light microscopy level observation. The organisation of motor neurons was correlated with the distribution of fins. The differences of the motor neuronal organisation between the two species could be credited to further muscle differentiation in the caudal fin muscle layers of *Pangasius* sp., which exhibited more complicated organisation than that of the *Clarias* sp. In conclusion, the findings of this study were in agreement with the existing literature that medial motor neurons innervate body trunk while more laterally located motor neurons innervate distal structure, in this case the fins.

THESIS/DISSERTATION SUBMISSION & EXAMINATION IN UM

STEP-BY-STEP GUIDE

Submission of Thesis/ Dissertation for Examination

Examination of Thesis/ Dissertation

Final Submission of Thesis/ Dissertation for Graduation

A. SUBMISSION OF THESIS/ DISSERTATION FOR EXAMINATION

STEP 1:

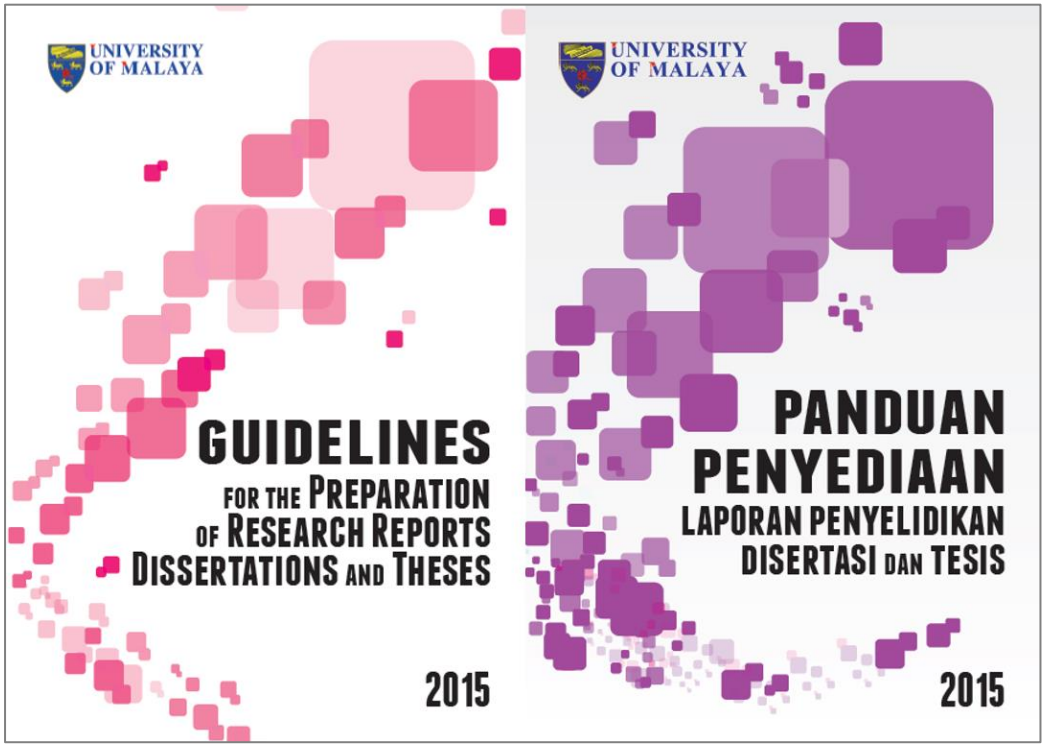
Make sure all **candidature requirements** imposed by the University **as well as your respective faculty** have been fulfilled prior to submission of thesis/ dissertation.

- ✓ **Language Requirement**
- ✓ **Research Methodology**
- ✓ **Proposal Presentation** (seminar in the first 2 semester for Master or first 4 semesters for PhD)
- ✓ **Candidature Defence**
- ✓ **Thesis Seminar*** (seminar before thesis submission) - *Applicable to PhD candidates by Research*
- ✓ **Publication Requirement** (must provide proof of acceptance before Committee of Examiners' meeting and/or viva voice)

A. SUBMISSION OF THESIS/ DISSERTATION FOR EXAMINATION

STEP 2:

Finalize your thesis/ dissertation according to *Guidelines for the Preparation of Research Reports, Dissertations and Theses*.



Available on *http://ips.um.edu.my*

A. SUBMISSION OF THESIS/ DISSERTATION FOR EXAMINATION

STEP 3:

Submit your **3 Months Notice** at least 3 months before the actual date of thesis/dissertation submission to allow timely nomination of examiners and approval of thesis/dissertation title.

RESEARCH MODE

Log in to MyUM Student Portal *(http://myum.um.edu.my/)* and go to *Research > Thesis > Thesis/Dissertation Dashboard*

MIXED MODE

Complete the 3 Months Notice Submission form and submit to your respective faculty.

A. SUBMISSION OF THESIS/ DISSERTATION FOR EXAMINATION

STEP 4:

Notify your **supervisor(s)** to

- ✓ verify and endorse your notice submission,
- ✓ approve the title of thesis/dissertation,
- ✓ nominate the Internal and External Examiners.

STEP 5:

Check with the respective **faculty** whether the title of thesis/dissertation has been approved. This may take up to 2-3 months.

A. SUBMISSION OF THESIS/ DISSERTATION FOR EXAMINATION

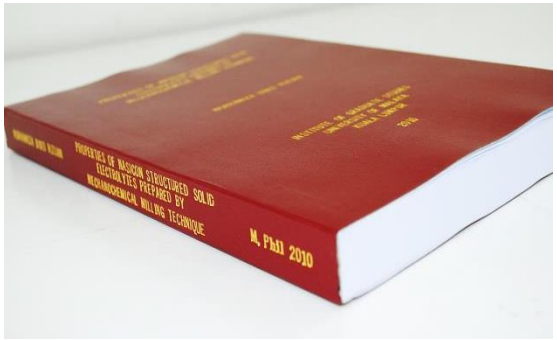
STEP 6:

Complete ***Submission of Thesis/ Dissertation for Examination form***.

STEP 7:

After receiving notification from the faculty regarding the approval of thesis/dissertation title, submit **five (5) softbound theses/ dissertations** and its **soft copy (pdf.)** together with the completed form to:

- ✓ Postgraduate office of respective faculty for Master's candidates
- ✓ Thesis Unit, IGS for Doctoral candidates



A. SUBMISSION OF THESIS/ DISSERTATION FOR EXAMINATION

Upon submitting your thesis/dissertation for examination, **you will NOT be required to register for the next semester** unless the Committee of Examiners recommends a re-examination following the Committee of Examiners' Meeting and/or viva voce.

B. EXAMINATION OF THESIS/DISSERTATION

WHAT HAPPENS AFTER YOU SUBMIT YOUR THESIS (IPS)/DISSERTATION (Faculty)?

1. Thesis/dissertation is processed within 7 working days after submission
   - ✓ Invitation email to examiners to confirm their **acceptance, availability & the correspondence address**
   - ✓ Shipping of thesis/dissertation to examiners (2 – 7 days depending on location)
2. Examiner's reports are expected to arrive 2 months after examiners receive the thesis/dissertation
   - ✓ Reminder notifications to examiners before deadline and follow-up emails (phone calls) if examiners fail to meet deadline
   - ✓ Examination period extension for examiners (if required)
   - ✓ Submission of thesis/dissertation to Reserve Examiner for examination if the delay exceeds 4 months.

B. EXAMINATION OF THESIS/DISSERTATION

STEP 1:

Contact the respective offices to check on the progress of the examination process after 3 months from the date of thesis/dissertation submission.

The examination process usually takes around **three (3) to four (4) months**. However in exceptional circumstances, the process may take longer.

B. EXAMINATION OF THESIS/DISSERTATION

Examiners will **evaluate** the following aspects of your thesis/dissertation:

Format of thesis/ dissertation	Conventional Format	Format of Published Papers*
Robustness of thesis/dissertation	• Suitability of title • Research objectives • Literature review • Research methodology • Analysis of research • Significance of finding(s) • References • Possibility of publication	• Quality of published papers • Coherence of the overall research write-up • Suitability of title • Research questions and objectives • Literature review • Significance of finding(s) • References
Overall style & organization	• Presentation • Mechanical aspect (grammar, spelling, punctuation, numbering)	• Presentation • Mechanical aspect (grammar, spelling, punctuation, numbering)

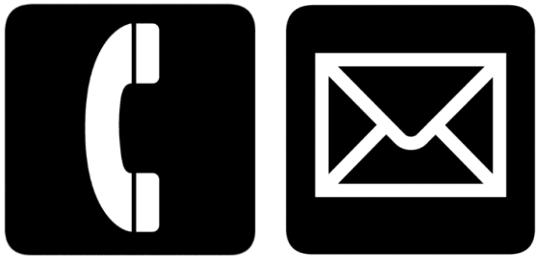
***The option of writing thesis in the format of published papers is only available for Doctoral candidates.**

B. EXAMINATION OF THESIS/DISSERTATION

STEP 2:

On receipt of all reports from the examiners, the respective faculty will arrange for the **Committee of Examiners' Meeting** and/or **viva voce**.

The faculty will notify the candidate normally 2 weeks before the scheduled date.



B. EXAMINATION OF THESIS/DISSERTATION

Possible Outcomes of Thesis Examination

DOCTORAL DEGREE

1) Awarded the degree and **Distinction** for thesis, subject to the stipulated rules and conditions.
2) Attained sufficient academic merit for the award of the degree **without amendments/ corrections** to the thesis.
3) Attained sufficient academic merit for the award of the degree subject to **minor corrections** to be made to the thesis within a period of **3 months** as required by the examiners and subject to confirmation of the corrections by the **Supervisor.**
4) Attained sufficient academic merit for the award of the degree subject to **major corrections** to be made to the thesis within a period of **6 months** as required by the examiners and subject to confirmation of the corrections by the **Internal Examiner.**

B. EXAMINATION OF THESIS/DISSERTATION

Possible Outcomes of Thesis Examination

DOCTORAL DEGREE (Cont.)

5) Required to undertake further work and submit the thesis for **Reexamination** within a period of **6 to 12 months** from the date of Senate.

6) **Failed** to attain sufficient academic merit in the thesis examination for the Doctoral degree and it is recommended to Senate that a **Master's degree** be awarded subject to the candidate fulfilling the requirement for the award of the Master's degree.

7) **Failed** to attain academic merit and it is recommended to Senate that the candidate has failed in the thesis examination and is not allowed to submit the thesis for re-examination.

B. EXAMINATION OF THESIS/DISSERTATION

Possible Outcomes of Dissertation Examination

MASTER'S DEGREE (RESEARCH MODE)

1) Awarded the Master's degree with **Distinction** – subject to the stipulated rules and conditions.
2) Attained sufficient academic merit for the award of the degree **without amendments/ corrections** to the dissertation.
3) Attained sufficient academic merit for the award of the degree subject to **minor corrections** to be made to the dissertation within a period of **3 months** as required by the examiners and subject to confirmation of the corrections by the Supervisor.

B. EXAMINATION OF THESIS/DISSERTATION

Possible Outcomes of Dissertation Examination

MASTER'S DEGREE (RESEARCH MODE) (Cont.)

5) Attained sufficient academic merit for the award of the degree subject to **major corrections** to be made to the dissertation within a period of **6 months** as required by the examiners and subject to confirmation of the corrections by the Internal Examiner.

6) Required to undertake further work and submit the dissertation for **Reexamination** within a period of **6 to 12 months** from the date of Senate.

7) **Failed** to attain academic merit and it is recommended to Senate that the candidate has failed in the dissertation examination and is not allowed to submit the thesis for re-examination.

B. EXAMINATION OF THESIS/DISSERTATION

Possible Outcomes of Dissertation Examination

MASTER'S DEGREE (MIXED MODE)

1) Awarded the Master's degree with **Distinction** – subject to the stipulated rules and conditions.
2) Attained sufficient academic merit for the award of the degree **without amendments/ corrections** to the dissertation.
3) Attained sufficient academic merit for the award of the degree subject to **minor corrections** to be made to the dissertation within a period of **3 months** as required by the examiners and subject to confirmation of the corrections by the Supervisor and Internal Examiner.

B. EXAMINATION OF THESIS/DISSERTATION

Possible Outcomes of Dissertation Examination

MASTER'S DEGREE (MIXED MODE) (Cont.)

5) Required to undertake further work and submit the dissertation for **Reexamination** within a period of **3 to 6 months** from the date of Senate.

6) **Failed** to attain academic merit and it is recommended to Senate that the candidate has failed in the dissertation examination and is not allowed to submit the thesis for re-examination.

C. FINAL SUBMISSION OF THESIS/DISSERTATION

STEP 1:

Make necessary **corrections** (if any) to your thesis/dissertation according to the examiners' reports and comments suggested by the Committee of Examiners within the stipulated time and prepare the ***Thesis/Dissertation Correction Report***.

Per 3(2) Lampiran A

UNIVERSITY OF MALAYA

DISSERTATION / THESIS CORRECTION REPORT

NAME :
MATRIC NO. :
SEMESTER :
PROGRAMME : Masters / Doctoral
TITLE OF DISSERTATION / THESIS:

SESSION :

Correction as Required by Examiners			Correction/Comments by Candidate	Comments/ Confirmation by Supervisor	Comments/ Confirmation by Internal Examiner
Section/ Chapter	Page	Comment			
		External Examiner 1			
		External Examiner 2			
		Internal Examiner			

Verified by:

(1) Supervisor's signature	(2) Supervisor's signature	(3) Internal examiner 's signature
Name: Date:	Name: Date:	Name: Date:

C. FINAL SUBMISSION OF THESIS/DISSERTATION

STEP 2:

Complete the following:

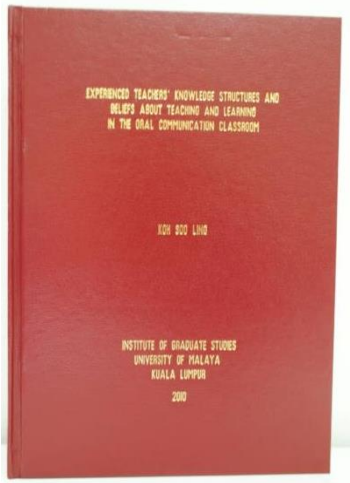
- ✓ *Final Submission of Thesis/ Dissertation for Examination form*
- ✓ *Repository Policy (Thesis/Dissertation Embargo) Form*

C. FINAL SUBMISSION OF THESIS/DISSERTATION

STEP 3:

Submit **two (2) hardbound copies** (or such numbers as may be determined by the Faculty) of the final thesis/dissertation and its **soft copy (pdf.)** together with the ***Thesis/Dissertation correction report*** and the completed forms to:

- ✓ Postgraduate office of respective faculty for Master's candidates
- ✓ Thesis Unit, IGS for Doctoral candidates



C. FINAL SUBMISSION OF THESIS/DISSERTATION

STEP 4:

Wait for your **Senate letter** confirming your graduation and the award of your degree.

TIMELINE

1

3 Months Notice

- Approval of Title
- Nomination of Examiners

Duration ≈ 3 months

2

Submission of Thesis/Dissertation to Postgraduate offices

3

Processing of Thesis/Dissertation to Examiners

4

Examination of Thesis/Dissertation

Duration ≈ 3 to 4 months

5

Committee of Examiners meeting and/or viva-voce

Duration ≈ ½ to 1 month after receipt of complete reports

OVERALL ESTIMATED DURATION

(step 1 to 5)

≈6½ to 8 months

PUBLICATION REQUIREMENTS FOR POSTGRADUATE CANDIDATES BY RESEARCH (SENATE APPROVAL ON 28.5.2015)

DOCTORAL CANDIDATES	MASTERS CANDIDATES
Doctoral candidates pursuing programmes in the field of **Sciences** must show proof of acceptance for publication of at least two (2) articles in journals indexed by Thomson Reuters Web of Science (WoS) (according to the criteria set in the publication guidelines), prior to graduation	Master's candidates pursuing programmes in the field of **Sciences** must show proof of acceptance for publication of at least one (1) article in journals indexed by Thomson Reuters Web of Science (WoS) (according to the criteria set in the publication guidelines), prior to graduation.

AVOIDING PLAGIARISM

As an enrolled student and member of the University of Malaya candidates are expected to produce original academic work. Failure to acknowledge the work of others in their work means the candidate is guilty of plagiarism. A candidate who is found to have plagiarized his assignments or any written work that is part of the assessment in a course or programme may be subjected to disciplinary action under the University of Malaya .

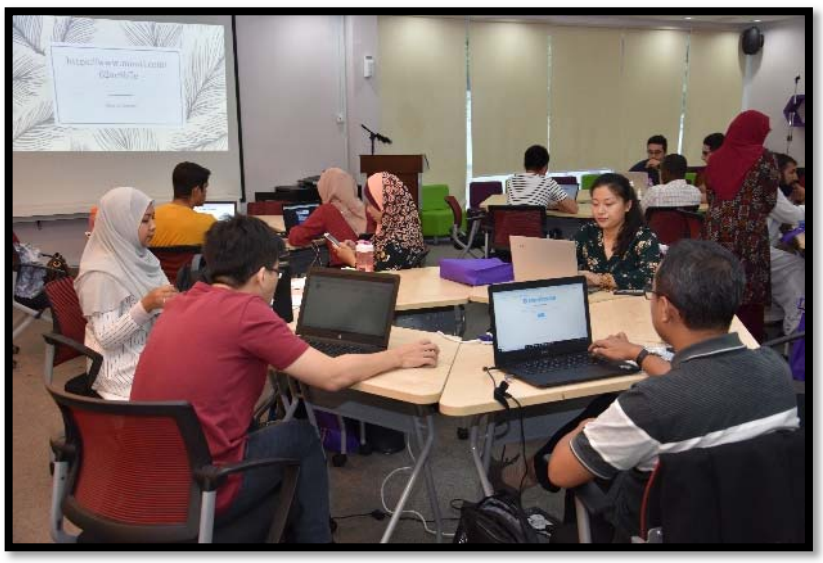
Candidates are advised to check their work for originality by using the Turnitin software. Details on Turnitin software can be accessed at https://www.turnitin.com

INTELLECTUAL PROPERTY

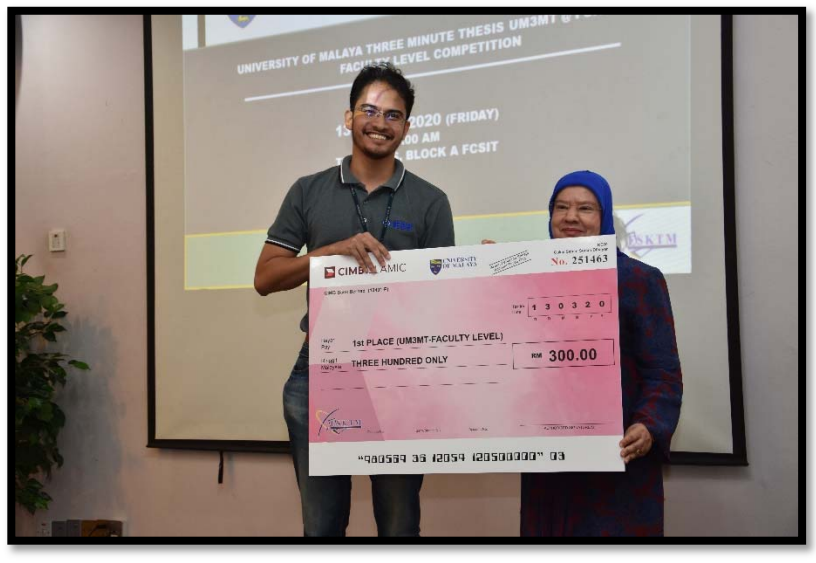
The UM ―Intellectual Property Policy‖ covers intellectual property (IP) ownership. As an enrolled student of UM, candidates are required to report to the University all IP with commercial potential. This does not mean that candidates lose their IP rights as their invention still belongs to them unless they have previously assigned it to another party. However, UM may make a claim for joint ownership if, for example, candidates are employed by the University to do research. In such a case, the candidates' contract may assign ownership to the University of Malaya.

POSTGRADUATE ACTIVITIES

Masters Research Project Boot Camp 2019



PhD Thesis & Masters Dissertation Boot Camp 2019



UM3MT Competition 2020

TEACHING AND LEARNING FACILITIES
FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

(A) TEACHING LABS

The Faculty of Computer Science and Information Technology provide 10 laboratories for teaching and learning purposes. The laboratories are as follows:

BLOCK A

Micro Lab 1 (MM1)
This lab has 47 units of computer that are connected to Windows Active Directory servers and the Internet. The operating system for these PCs is Windows 10. This lab is opened to all FSKTM undergraduate students.

Micro Lab 2 (MM2)
This lab has 37 units of computer that are connected to Windows Active Directory servers and the Internet. The operating system for these PCs is Windows 10. This lab is opened to all FSKTM undergraduate students.

Postgraduate Lab (ML)
This lab has 33 units of computer. All the computers are connected to Windows Active Directory servers and the Internet. The operating system for these PCs is Windows 10. This lab is opened to all FSKTM postgraduate students.

CCNA LAB (CCNA)
This lab has 41 units of computer. The operating system for these workstations is Windows 10. There are also 25 units of Cisco 1700 Series Router, 4 units Cisco 1760 Series Router and 12 units switch Cisco 2950 CATALYST Series. This lab is opened to all FSKTM students.

Robotic Teaching Lab
The Robotic Teaching Lab @ FCSIT is part of the Department of Artificial Intelligence effort to provide conducive intelligent learning environment to students taking the 'Intelligent Robotics' course. Equipped with six mobile robots, the lab allows space for hands-on and robotic experiments designed to help students understand the concept of robotic intelligence and acquire the needful skills for the course.

BLOCK B

Micro Lab 3 (MM3)
This lab has 61 units of computer that are connected to Windows Active Directory servers and the Internet. This lab is opened to undergraduate and postgraduate students.

Micro Lab 4 (MM4)
This lab has 61 units of computer that are connected to Windows Active Directory servers and the Internet. This lab is opened to undergraduate and postgraduate students.

iOS Application Development Lab
This lab has 15 units of Apple iMac 21.5" Intel Core i5 (2.96GHz) Processor, 1TB HDD and 8GB RAM and 5 units of Dell OptiPlex 3050. This computer are connected to Windows Active Directory servers and the Internet. The operating system is Mac OS and Windows. This lab is opened only for Multimedia students.

Micro Lab 6 (MM6)
This lab has 45 units of computer that are connected to Windows Active Directory servers and the Internet. This lab is opened to all FSKTM students but priority is given to multimedia courses. Operating system – Windows 10.

Stroustrup Lab 1
This lab has 42 units of computer that are connected to the Internet. This lab is opened to undergraduate students. Operating system – Windows 10.

(B) RESEARCH LABS

30 research labs to support postgraduate students research activities, managed by various departments in the faculty:

BLOCK A

Software Engineering Research Lab
All the machines in the lab are connected to the Internet. This lab is opened to students who are taking courses related to the field of software engineering.

Computer Technology Lab
This lab is opened to post-graduate student, priority given to students who are taking courses related to the field Computer Technology.

Information Science Research Lab
This lab is used to develop application software related to the field of Information Science.

BLOCK B

Artificial Intelligence Research Lab
Qualitative reasoning, qualitative modeling, Intelligent Tutoring System, Case-based System, Intelligent Interactive Multimedia System.

VLSI Research Lab
The study of the performance and the implementation of fast pipelined floating-point arithmetic circuits and arithmetic algorithm, as well as on designing VLSI. Focus is given to the aspect of VLSI circuits test.

Computer Systems and Network Research Lab
Focus on data security research through networking, ability of protocols and ATM studies.

Multimedia Research Lab
Research and development comprises:
- Corporate training
- Smart school education software
- Distributed multimedia systems
- Web-based multimedia systems
- Multimedia Storage & retrieval technology
- Multimedia input & output technology

Human Computer Interaction (HCI) Research Lab
This lab used is for conducting research on usability area, computer support cooperative work (CSCW) and task analysis. It involves task analysis hierarchy chart for user understandability test in implementing any task.

Information System Research Lab
This lab is used for conducting research on dissimilar information systems integration in heterogeneous environment including operating system, hardware, language and the use of the latest software industrial standard to integrate information systems.

Research and development on:
- Business Oriented Systems/ Electronic Government Systems
- Geographic Information Systems
- Inter-organizational Information Systems
- Web-based Information Systems
- Smart Card Application

Stroustrup 2 Lab
This lab has 12 units of computer that are connected to the Internet. This lab is opened to undergraduate students taking courses related to electronic circuit.

Silicon Valley
Silicon Valley Lab is involved in Research and Development projects with the international industry primarily based in Silicon Valley, California, USA. The Lab works on the latest real world research problems using state of the art equipment and software provided by the companies in the Valley. The lab trains FSKTM, UM students and staff to be able to contribute in high profile R&D projects and be part of the Silicon Valley Ecosystem.

Wisma R&D (10th and 15th floor):

- Empirical Software Engineering Lab
- Network Analytics Lab
- Mobile Ad Hoc Technology Lab
- Mobile Cloud Computing Lab
- Multimedia Lab
- Software Requirement, Architecture and Reuse Engineering Lab
- Cognitive Science Lab
- Advanced Robotic Lab
- I-Interact
- Software Engineering Process Lab
- Multimedia Signal Processing Lab

- Informetrics Lab
- Data Science
- Multimodal Interaction Lab
- Security Lab
- Knowledge Engineering Lab
- AIED/ ES/ NLP/ Intelligent System Lab
- Web Based Information System Lab
- Hypermedia

OTHER FACILITIES
FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

1. **Prayer Room (surau)**
   Air-conditioned prayer rooms (surau) (one for Men, and the other for Women) are provided in Block A for Muslims to pray. The surau for Men is located at the second floor and surau for women is located at the first floor in the building. Users are not allowed to sleep and eat in the surau. Users are also responsible for the cleanliness of the surau.

2. **Vending Machine (Drinks)**
   There are 2 units of vending machine for cold drinks located at Block A and Block B.

3. **Cafeteria**
   Cafeteria is located at the back of Block A.

4. **Postgraduate Lounge & Student Centre**
   Space provided for student to relaxing their mind, having informal discussion and make a small gathering. A few facilities such as television, sofas, computers, discussion rooms and pantry are ready to use.

5. **Parking Lot**
   The Faculty also provides parking lots for students to park their car or motorbike. Students can park their car or motorbike at the back of Block A. There are 150 parking lots for the motorbike and 45 for the car. Students are not allowed to park their car in front of both buildings because the parking lots are reserved for the faculty staff and visitors.

6. **Water Purifiers**
   Water purifiers are provided in both buildings and are placed at Student Lounge & Postgraduate Lounge.

7. **Internet Access at the building of FCSIT**
   There are WIFI Internet Access provided to students at every floor in each building. Students must obey the rules and regulations during the usage of these facilities.

8. **SPeCTRUM (Student Powered e-Collaboration Transforming UM)**
   This facility is for easy accessibility for student to upload their notes and information regarding their courses.

   All faculties (excluding Faculty of Medicine & Faculty of Dentistry) and PASUM can browse the SPECTRUM website at **http://spectrum.um.edu.my/**

   For Faculty of Medicine and Faculty of Dentistry, SPECTRUM website can be browsed at **http://spectrumx.um.edu.my/**

   All queries and suggestions can be directed to elearning@um.edu.my

9. **Software Loan**
   The Faculty provides some software that can be borrowed by FSKTM students and staff for ease of project implementation and so on.

LABORATORY REGULATIONS

1. Only registered users are allowed to use the facilities in the lab.

2. Effective from 1st April 2006, it is compulsory for users to wear the matric card in the lab at all times. Users who do not wear the matric cards are not allowed to enter the lab. Lab staff has the right to ask the user to leave upon refusing to wear or show his/her name tag.

3. Ensure use of good quality diskettes, CD or thumb drives and virus-free data. The faculty reserves the right to examine the diskettes, CDs or thumb drives before use.

4. Users are strictly prohibited from making copies of software without the knowledge of the staff on duty.

5. Users are prohibited from installing any software onto the hard disk without the knowledge of the staff on duty (eg; KAZAA, BitTorent, P2P software). The faculty reserves the right to remove such installations without any prior notice.

6. Any hardware problems must be reported to the staff on duty. The faculty will not be responsible for any accidents or damage because of negligence and misuse of the equipment by users.

7. Users are prohibited from playing games, chat or browse the web for pornography materials.

8. Users are prohibited from bringing in friends or students from other faculties/universities into the lab.

9. Users are prohibited from making noise and disturbing others. Any discussions should be conducted outside the lab.

10. Smoking, bringing-in bags and foodstuffs is strictly prohibited in the lab.

11. Users are responsible for the safekeeping of the hardware and cleanliness of other equipment in the lab including tables and chairs.

12. Users must be properly attired inside the lab. Slippers, shorts and indecently dressed users are strictly prohibited.

13. Users are prohibited to change administrator password as security reason and maintenance work.

Disciplinary action will be taken by the Faculty against those who breached the rules and regulations mentioned above.

ENQUIRIES ON TECHNICAL PROBLEMS

Users who face problems using equipment and software may contact the technical staff on duty at the various laboratories as indicated below:

LAB	STAFF ON DUTY	TEL. NO.	EMAIL
Micro Lab 1 (MM1)	Huswadi Hussain	03-79676317	huswadi@um.edu.my
Micro Lab 2 (MM2)	Jamal Amran	03-79676364	jamalamr@um.edu.my
Postgraduate Lab (ML)	Nor Shuhadah Yahiya	03-79676364	adik@um.edu.my
CCNA Lab (MC)	Huswadi Hussain	03-79676317	huswadi@um.edu.my
Micro Lab 3 (MM3)	Aini Munira Ahmad	03-79676394	aini_munira@um.edu.my
Micro Lab 4 (MM4)	Jamal Amran	03-79676364	jamalamr@um.edu.my
iOS Application Development Lab	Nor Shuhadah Yahiya	03-79676364	adik@um.edu.my
Micro Lab 6 (MM6)	Aini Munira Ahmad	03-79676394	aini_munira@um.edu.my
Stroustrup Lab 1 (MS1)	Mohd Jalaluddin Ahmad	03-79676407	jalal@um.edu.my
Robotic Teaching Lab	Mohd Jalaluddin Ahmad	03-79676407	jalal@um.edu.my

Operation Hours:

DAY	TIME
Monday - Thursday	8.00 a.m. – 5.30 p.m. (extended upon request according to class timetable)
Friday	8.00 a.m. – 12.15 p.m. 2.45 p.m. – 5.30 p.m. (extended upon request according to class timetable)

*** Computer Laboratories will be closed during maintenance work, and public holidays.*

Disclaimer

Whilst every effort has been made to ensure accuracy of the information contained in this handbook, changes may occur. Students are advised to check the faculty web site http://www.fsktm.um.edu.my for any changes and current information.

The Faculty cannot be held responsible for any errors or omissions in this handbook, and accepts no liability whatsoever for any loss damage howsoever arising.