UNIVERSITI MALAYA
Faculty of Engineering

POSTGRADUATE PROGRAMME
HANDBOOK 2021/2022

Faculty of Engineering

engine.um.edu.my

UNVERSITI MALAYA
FACULTY OF ENGINEERING

POSTGRADUATE PROGRAMME HANDBOOK

ACADEMIC SESSION
2021/2022

Deputy Dean (Postgraduate Studies)
BLOCK L, ENGINEERING TOWER,
FACULTY OF ENGINEERING
03-7967 4477
pejtdit_fkej@um.edu.my

LEGISLATIONS AND PRESCRIBED RULES

Master's Programmes

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

Ph.D Programme

Ph.D candidates are governed by the Universiti 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 Universiti 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.

TABLE OF CONTENTS

VISION, MISSION, AND OBJECTIVES OF THE FACULTY

VISION

TO BE AN INTERNATIONALLY RENOWNED FACULTY OF ENGINEERING IN RESEARCH, INNOVATION, PUBLICATION AND TEACHING

MISSION

TO ADVANCE ENGINEERING KNOWLEDGE AND LEARNING THROUGH QUALITY EDUCATION AND RESEARCH IN THE PURSUIT OF THE FULFILLING ASPIRATIONS OF THE UNIVERSITY AND NATION.

ACADEMIC PROGRAMME

- Ensure academic programmes are relevant, current, innovative and internationally recognized to meet national and global needs.

- Continuously develop academic programmes that inspire and tap students' potential

- Ensure academic programmes are accredited by local and international engineering professional bodies.

- Continuously develop programmes that are relevant to industrial requirements.

THE HISTORY OF FACULTY OF ENGINEERING

01 1950

The Board of Studies was set up by the University of Malaya, located in Bukit Timah, Singapore to recommend the **establishment of an Engineering Department**

02 1954

The Engineering Department was setup and **C.A.M. Gray** was appointed as the **First Professor** of Engineering

03 1956

The first bachelor engineering course in **Civil Engineering** was offered

04 1958

The department was **upgraded to a Faculty of Engineering** when UM relocated its campus to Lembah Pantai, Kuala Lumpur

The second bachelor degree in **Mechanical Engineering** was offered

05 1959

The third bachelor degree in **Electrical Engineering** was offered

06 1970

The forth bachelor degree in **Chemical Engineering** was offered

07 1974

All the four engineering divisions were **upgraded to Departments**

1993 08

The **Department of Engineering Design & Manufacture**, which was once known as the CAD/CAM unit was established

1996 09

In the Session 1996/97, six other courses namely in **Telecommunication** Engineering, **Environmental** Engineering, **Materials** Engineering, **Computer Aided Design & Manufacturing** Engineering, and **Biomedical** Engineering were offered

2001 10

The **Department of Biomedical Engineering** was established

2009 11

The **Bachelor of Biomedical Engineering (Prosthetics and Orthotics)** was offered

2013 12

The Department of Engineering Design & Manufacturing **merged** into the Department of Mechanical Engineering

THE MANAGEMENT
FACULTY OF ENGINEERING

Prof. Ir. Dr. Kaharudin Dimyati
Dean

Profesor Ir. Dr. Hazlie Mokhlis
Deputy Dean
(Undergraduate)

Prof. Ir. Dr. Ngoh Gek Cheng
Deputy Dean
(Postgraduate)

Assoc. Prof. Ir. Dr. Lai Sai Hin
Deputy Dean
(Research)

Ir. Dr. Ahmad Khairi Bin Abdul Wahab
Deputy Dean
(Development)

Ir. Dr. Nasrul Anuar Bin Abd Razak
Head of Dept.
Biomedical Engineering

Dr. Mahar Diana Binti Hamid
Head of Dept.
Chemical Engineering

Prof. Ir. Dr. Faridah Othman
Head of Department
Civil Engineering

Prof. Ir. Dr. Sulaiman Wadi Harun
Head of Department
Electrical Engineering

Assoc. Prof. Dr. Farazila Yusof
Head of Department
Mechanical Engineering

Mdm. Noor Lailatul Marini Kamal Amir
Principal Assistant Registrar

MESSAGE FROM THE DEAN

We bid you all a warm welcome to the Faculty of Engineering and congratulate you on your successful admission to our prestigious postgraduate programmes.

You will do your postgraduate studies in a university that is dedicated to being a global university with an impact on the world, where we aim to be a leading resource for postgraduate studies. You will find that it is the right environment to work on your future success.

The system of education offered in the Faculty of Engineering is carefully structured to enable you to study both the basics of your selected field of engineering as well as mastering more specialist areas of expertise. We provide instruction in core engineering principles that are essential in any era, and complement this with insights in the latest developments.

This handbook serves as a reference for academic information about the Faculty and its postgraduate programmes. I strongly advise you to take some time to go through this handbook to understand the course syllabus and the requirements for graduation. Should you need assistance or further clarification, our officers are ready to help you.

On behalf of the Faculty of Engineering, I wish you every success. I hope that you will take with you the UM experience and that you will remember us fondly in years to come! I'm confident that this decision to embark on a postgraduate study will help you realize your personal, professional and educational dreams.

Professor Ir. Dr. Kaharudin Dimyati
Dean,
Faculty of Engineering

DEAN'S OFFICE

Professor Ir. Dr. Kaharudin bin Dimyati
kaharudin@um.edu.my
Tel. No. : 03-79675200

Dean

Noor Lailatul Marini Binti Kamal Amir
marini_kamal@um.edu.my
Tel. No.: 03-79675356

Principal Assistant Registrar N48

Nurul Fathina Romli
fathina1109@um.edu.my
Tel. No. : 03-79675200

Secretary N29

Senior Administrative Asst. N22

Rahimah Binti Abdul Rahim
imah@um.edu.my
Tel. No.: 03-7967786

Administrative Assistant N19

Rosnaidah Binti Zainal Abidin
rose79@um.edu.my
Tel. No. : 03-79672798

Administrative Assistant N19

Noor Ayuni Binti Mohd Zulaidi
namz@um.edu.my
Tel. No : 03-79677638

General Office Assistant N14

Mohd Asdi Bin Amiruddin
asdi@um.edu.my
Tel. No : 03-79677638

Operational Assistant N11

Muhammad Illzam Bin Ishak
m_illzam@um.edu.my
Tel. No : 03-79675315

Operational Assistant N11

Amirul Aizad Bin Muhamad Sham
amer85@um.edu.my
Tel. No : 03-79675318

Operational Assistant N11

Syed Razif Bin Syed Sulaiman
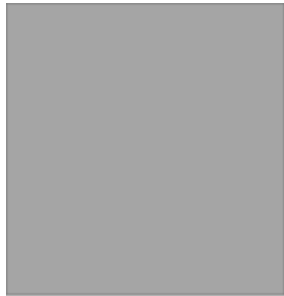ajit@um.edu.my
Tel. No : 03-79675318

OFFICE OF DEPUTY DEAN (RESEARCH)

Nurfadila Shafina Binti Mohd Redha
E: nurfadilashafina@um.edu.my
T: 03-79677634

Finance Officer W41

Alinawati Binti Ibrahim
E : alinawati@um.edu.my
T : 03-79675225

Assistant Accountant W29

Lailah Binti Hamzah
Senior Administrative Asst. N22
E: lailah@um.edu.my
T: 03-79677645

Senior Administrative Assistant N22

Norhazura Binti Abdullah
Senior Administrative Asst. N22
E: azura@um.edu.my
T: 03-79677645

Senior Administrative Assistant N22

Administrative Assistant N19

Noraqidah Binti Ghazali
E : noraqidah@um.edu.my
T: 03-79677645

Administrative Assistant (Finance) N19

Ariza Binti abdullah
E : lisma_nazura@um.edu.my
T: 03-79677645

DEPUTY DEAN (POSTGRADUATE STUDIES) OFFICE

Professor Ir. Dr. Ngoh Gek Cheng
E: ngoh@um.edu.my
Tel. No. : 03-79675301

Deputy Dean (Postgraduate Studies)

Junainah Binti Jamaluddin
E: junainah@um.edu.my
Tel. No. : 03-79675209

Senior Assistant Registrar N44

Nuur Hakimah Binti Mohd Din
E: nuur.hakimah@um.edu.my
Tel. No. : 03-79674477

Confirmation Letters/ Supporting / Verification Letters
Approval Attending Labs
Higher Degree Committee Meetings
Deputy Dean (Higher Degree) Schedules
General Official Letters Purposes

Secretary N29

Asst. Administrative Officer N29

Noor Hafiza Binti Halim
E: hafizahalim@um.edu.my
Tel. No. : 03-79674481

PhD & Master Application, Intake and Registration
Deferment of Registration
Promotional/ Internationalization /Events
Self-Development/Students Activities

Senior Administrative Asst. N22

Halijah Binti Ramlan
E: rhalijah@um.edu.my
Tel. No. : 03-79674481

Approval Attending Labs
Master's and PhD Dissertation and
First Submission
Examiner Nomination in UMSiTS
Appeals for Reactivation of Candidature (Master's
Degree by Research)
Withdrawal from Semester/ Programme

Senior Administrative Asst. N22

Maznah Binti Mohammad Zin
E: maznah_mohammadzin@um.edu.my
Tel. No. : 03-79675298

Application, Intake and Registration for Master's
Degree (by coursework)
Examination Master's Degree
Application for Title Approval (Master's Degree by
coursework)
E-Course File
Part Time Teaching

Senior Administrative Asst. N22

Norhanis Binti Ahmad
E: arenys@um.edu.my
Tel. No. : 03-79672177

Thesis Seminar
Confirmation / Candidature Defence
Postponement of Thesis Seminar /Candidature /
Confirmation Defence
Fast Track Interviews
Status of payment for Examiners

Administrative Assistant N19

Meena Subramaniam
E: meena@um.edu.my
Tel. No. : 03-79674480

Proposal Defence
Master's and PhD Examination
Master's and PhD Graduation
Final Thesis Submission
Examiner Nomination in UMSiTS
Appeals for Reactivation of Candidature

Administrative Assistant N19

Siti Khairiah Binti Ibrahim
E: ski_83@um.edu.my
Tel. No. : 03-79674481

Extend Maximum Period of Candidature
Nomination of Thesis/Dissertation Examiners (PhD and Master's Degree)
Additional/Change/Drop of Supervisors
Application for Thesis/Dissertation Title Approval
Support /Verification Letters for Research Field

DEPUTY DEAN (UNDERGRADUATE STUDIES) OFFICE

Deputy Dean Undergraduate

Professor Ir. Dr. Hazlie Bin Mokhlis
E: hazli@um.edu.my
Tel. No. : 03-79675238

Assistant Registrar N41

Nur Asmawarmi Binti Abdullah
E: mawar_04@um.edu.my
Tel. No. : 03-79677636

Secretary N30

Zunaida Binti Alwadood
E: zunaida@um.edu.my
Tel. No. : 03-79675209

Asst. Administrative Officer N29

Munawwarah Binti Husain
E: munawwarah@um.edu.my
Tel. No. : 03-79677621

Aishatul Fiza Binti Azmi
E: aisha@um.edu.my
Tel. No. : 03-79672749

Senior Administrative Asst. N22

Janathal Karuppaya
E: jana@um.edu.my
Tel. No. : 03-79674581

Senior Administrative Asst. N22

Noor Arhanani Binti Hasan
E: hananie_77@um.edu.my
Tel. No. : 03-79674581

Senior Administrative Asst. N22

Salina Binti Maiden
E: salina_m@um.edu.my
Tel. No. : 03-79675298

Senior Administrative Asst. N22

Senior Administrative Asst. N22

Syuhada Binti Yahaya
E: hada@um.edu.my
Tel. No. : 03-79675351

Administrative Assistant N19

Chemat Bin Keling
E: awangs@um.edu.my
Tel. No. : 03-79674580

Administrative Assistant N19

Yusniza Binti Awang Ahmad @ Muhamed
E: yusz@um.edu.my
Tel. No. : 03-79675234

DEPUTY DEAN (RESEARCH) OFFICE

Associate Professor Ir. Dr. Lai Sai Hin
E: laish@um.edu.my
Tel. No. : 03-79676859

Deputy Dean (Research)

Fatinurshaira Binti Mohd Yunus
E: shirayunus@um.edu.my
Tel. No. : 03-79675277. :

Asst. Administrative Officer N29

Nasriyah Binti Ahmad
E: nasriyah@um.edu.my
Tel. No. : 03-79677684

Senior Administrative Asst. N22

Norazirah Binti Mohd Supi
E: norazirah@um.edu.my
Tel. No. : 03-79675209

Administrative Assistant N19

Administrative Assistant W19

Muhammad Faiz Aiman Bin Ibrahim
E: aimanfaiz231096@gmail.com
Tel. No. : 03-79674452
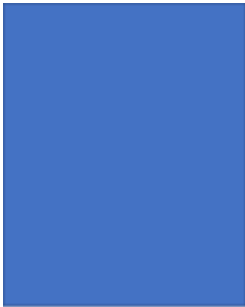
Assistant IT Officer FA29

Ku Mohd Haziq Bin Ku Yusof
E: ku.haziq@um.edu.my
TEL: 03-79675209

DEPUTY DEAN'S (DEVELOPMENT) OFFICE

Deputy Dean Development

Associate Professor Ir. Dr. Ahmad Khairi Bin Abdul Wahab
E: khairi@um.edu.my
Tel. No. : 03-79674488

Science Officer C52

Lee Kok Yuen
E: patrick@um.edu.my
Tel. No. : 03-79675323

**Information Technology Officer
F44**

Ahmad Ali Emran Bin Emran
E: ali_e@um.edu.my
Tel. No. : 03-79675221

Anantheraj Pavaraj
E: ananraj@um.edu.my
Tel. No. : 03-79677692

Engineer J41

Nor Sabrina Binti Nordin
E: sabrinanordin@um.edu.my
Tel. No. : 03-79674479

Engineer J41

Mohd Ridzal Bin Abdul Samat
E: ridzal@um.edu.my
Tel. No. : 03-79677617

Principal Assistant Engineer JA38

Wan Mohd Hasanul Isyraf Bin Wan Yusoff
E: isyraf@um.edu.my
Tel. No. : 03-79675306

Senior Assistant IT Officer F32

Roslaili Binti Rusli
E: rose@um.edu.my
Tel. No. : 03-79675202

Secretary N30

Mohamad Shukri Bin Abdul Jamil
E: shukri@um.edu.my
Tel. No. : 03-79676865

Assistant Science Officer C29

Nik Fasihah Binti Ismail
E: nikfasihah@um.edu.my
Tel. No. : 03-79676865

Assistant Science Officer C29

Nur Kamisah Binti Mohd Ishak
E: nkamisah@um.edu.my
Tel. No. : 03-79676865

Assistant Science Officer C29

Assistant IT Officer FA29

Exram Bin Masroh
E: exram@um.edu.my
Tel. No. : 03-79672776

Assistant IT Officer FA29

Mohamad Ramadan Bin Ramle
E: adan@um.edu.my
Tel. No. : 03-79675343

Assistant IT Officer FA29

Mohd Asni Bin Mohamad
E: asni@um.edu.my
Tel. No. : 03-79675307

Assistant IT Officer FA29

Sainah Binti Che Umar
E: sainah@um.edu.my
Tel. No. : 03-79675307

Hafizuddin Bin Asman
E: hafizuddin@um.edu.my
Tel. No. : 03-79675315

Assistant Engineer JA29

Mohamad Halim Bin M.Yatim
E: mhalim@um.edu.my
Tel. No. : 03-79677635

Assistant Engineer JA29

Mohd Hanafi Bin Zainal Abidin
E: ruudbos@um.edu.my
Tel. No. : 03-79675307

Assistant Engineer JA29

Mohd Khairul Anwar Bin Abu
E: anwarabu@um.edu.my
Tel. No. : 03-79677692

Assistant Engineer JA29

Mohd Syazwan Bin Safiee
E: syazwan@um.edu.my
Tel. No. : 03-79672748

Assistant Engineer JA29

Mohd Syukri Bin Ab Razak
E: syukri_sp@um.edu.my
Tel. No. : 03-7967530

Assistant Engineer JA29

Mohd Yusof Bin Yazid
E: yusof@um.edu.my
Tel. No. : 03-79675315

Assistant Engineer JA29

Nik Mohd Nasrullah Bin Nik Ahmad
E: nmnasrullah@um.edu.my
Tel. No. : 03-79677692

Assistant Engineer JA29

Zulkefle Bin Kassim
E: zulkefle@um.edu.my
Tel. No. : 03-79675307

Assistant Engineer JA29

Dehis Bin Mastik
E: dehis@um.edu.my
Tel. No. : 03-79676865

Senior Lab Assistant C22

Ramis K. D. Rada
E: ramis@um.edu.my
Tel. No. : 03-79672761

Senior Computer Technician FT22

Saipul Bahtiar Bin Masri
E: saiful80@um.edu.my
Tel. No. : 03-79672171

Senior Computer Technician FT22

Seemandass Ryepun
E: dass@um.edu.my
Tel. No. : 03-79675343

Senior Computer Technician FT22

Ahmad Nuairi Bin Samsudin
E: nuairi@um.edu.my
Tel. No. : 03-79675307

Technician J19

Faziati Binti Mohd
E: faziati@um.edu.my
Tel. No. : 03-79672170

Administrative Assistant N19

Ahmad Daman Huri Bin Idris
E: huri@um.edu.my
Tel. No. : 03-79675315

Driver H11

Abd Razak Bin Md Jani
E: araz@um.edu.my
Tel. No. : 03-79675315

Operational Assistant N11

Mohd Fahmy Bin Rusli
E: amyjem@um.edu.my
Tel. No. : 03-79675315

Operational Assistant N11

Zulnasri Diabu Bin Shahbudin
E: diabu@um.edu.my
Tel. No. : 03-79675315

General Office Assistant N1

DEPARTMENT OF BIOMEDICAL ENGINEERING

Head of Department

Ir. Dr. Nasrul Anuar Bin Abd Razak
nasrul.anuar@um.edu.my
Tel. No. : 03-79675341
Area of Expertise:
Manufacturing in Prosthetics, Biosculptor CAD/CAM System, Prosthetics & Orthotics Engineering

Professor

Professor Ir. Dr. Noor Azuan Bin Abu Osman
azuan@um.edu.my
Tel. No. : 03-79676852
Area of Expertise:
Artificial Organs, Biomechanical Engineering, Rehabilitation Engineering

Professor

Professor Ir. Dr. Fatimah Binti Ibrahim
fatimah@um.edu.my
Tel. No. : 03-79676818
Area of Expertise:
Physiological measurement and modeling, Medical and health informatics, BIOMEMS

Associate Professor

Associate Professor Ir. Dr. Ahmad Khairi Bin Abdul Wahab
khairi@um.edu.my
Tel. No. : 03-79674488
Area of Expertise:
Bio-instrumentation, Process Control, Input, Output and Data Devices

Associate Professor

Associate Professor Ir. Dr. Lim Einly
einly_lim@um.edu.my
Tel. No. : 03-79677612
Area of Expertise:
Artificial Organs, Cardiovascular System, Cardiac Assist Devices

Associate Professor

Associate Professor Dr. Nahrizul Adib Bin Kadri
nahrizuladib@um.edu.my
Tel. No. : 03-79674485
Area of Expertise:
Biomems, Microengineering, Biomedical Computer Applications

Associate Professor

Associate Professor Dr. Nur Azah Binti Hamzaid
azah.hamzaid@um.edu.my
Tel. No. : 03-79674487
Area of Expertise:
Biomechatronics, Functional Electrical Stimulation, Prosthetics & Orthotics

Associate Professor

Associate Professor Ir. Dr. Ting Hua Nong
tinghn@um.edu.my
Tel. No. : 03-79676882
Area of Expertise:
Artificial Intelligence, Digital Signal Processing, Diagnostic Tools

Dr. Chan Chow Khuen
ckchan@um.edu.my
Tel. No. : 03-79674581
Area of Expertise:
Biomechanics, Bioartificial Intelligence, Signal Processing

Senior Lecturer

Dr. Farina Binti Muhamad
farinamuhamad@um.edu.my
Tel. No. : 03-79676898
Area of Expertise:
Regenerative Medicines

Senior Lecturer

Dr. Hamidreza Mohafez
h.mohafez@um.edu.my
Tel. No. : 03-79675307
Area of Expertise:
Medical Imaging, Medical Image Analysis, Sport Biomechanics

Senior Lecturer

Dr. Juliana Binti Usman
juliana_78@um.edu.my
Tel. No. : 03-79677681
Area of Expertise:
Sports Biomechanics, Injury Prevention, Performance Enhancement

Senior Lecturer

Ir. Dr. Khairunnisa Binti Hasikin
khairunnisa@um.edu.my
Tel. No. : 03-79675220
Area of Expertise:
Medical Image Analysis, Medical Image Processing, Artificial Intelligence

Senior Lecturer

Ir. Dr. Lai Khin Wee
lai.khinwee@um.edu.my
Tel. No. : 03-79677627
Area of Expertise:
Virtual Reality Software, Artificial Intelligent Diagnostic Technique,Magnetic Resonance Imaging

Senior Lecturer

Ir. Dr. Liew Yih Miin
liewym@um.edu.my
Tel. No. : 03-79675349
Area of Expertise:
Healthcare, Medical Imaging Technology, Diagnostic Imaging

Senior Lecturer

Ir. Dr. Mas Sahidayana Binti Mokhtar
mas_dayana@um.edu.my
Tel. No. : 03-79677681
Area of Expertise:
Monitoring Technology, Artificial Intelligent Diagnostic Technique, Telemedicine Technology

Senior Lecturer

Dr. Mohd Yazed Bin Ahmad
myaz@um.edu.my
Tel. No. : 03-79677695
Area of Expertise:
Microwave, System-On-Chip, Embedded System

Senior Lecturer

Dr. Ng Siew Cheok
siewcng@um.edu.my
Tel. No. : 03-79676819
Area of Expertise:
Artificial Intelligent Diagnostic Technique, Rehabilitation Engineering

Senior Lecturer

Dr. Nooranida Binti Arifin
anidaum@um.edu.my
Tel. No. : 03-79677693
Area of Expertise:
Biomechanics, Prosthetics & Orthotics, Rehabilitation Engineering

Senior Lecturer

Dr. Salmah Binti Karman
salmah_karman@um.edu.my
Tel. No. : 03-79647694
Area of Expertise:
Diagnostic Tools (BIOSENSOR)

Senior Lecturer

Dr. Wan Safwani Binti Wan Kamarulzaman
wansafwani@um.edu.my
Tel. No. : 03-79677693
Area of Expertise:
Medical and Health Sciences, Biological Sciences, Physiology

Senior Lecturer

Mdm. Norita Binti Mohd Zain
nmz1969@um.edu.my
Tel. No. : 03-79676890
Area of Expertise:
Polymer Composites, Polymer Electrolytes, Bio-Polymers

Lecturer

Norhafizal Bin Ahmad
hafizal@um.edu.my
Tel. No. : 03-79674581

Administrative Assistant N19

Muhairizam Bin Manan
muhairizam@um.edu.my
Tel. No. : 03-79672754

Assistant Science Officer C29

Abd Halim Bin Mohamed
alim@um.edu.my
Tel. No. : 03-79677619

Assistant Engineer JA29

Adhli Iskandar Putera Bin Hamzah
aiputera@um.edu.my
Tel. No. : 03-79672826

Assistant Engineer JA29

Azuan Bin Othman
azone75@um.edu.my
Tel. No. : 03-79672819

Assistant Engineer JA29

Fairus Hanum Binti Mohammad
f_hanum@um.edu.my
Tel. No. : 03-79672780

Assistant Engineer JA29

Assistant Engineer JA29

Mohamad Zaki Bin Jaafar
j_zaki@um.edu.my
Tel. No. : 03-79672779

Assistant Engineer JA29

Mohd Khairul Bin Amran
khairulamran@um.edu.my
Tel. No. : 03-79674580

Assistant Engineer JA29

Rahimi Bin Abdul Manaf
razalee_zali@um.edu.my
Tel. No. : 03-79672778

Assistant Engineer JA29

Yuslialif Bin Mohd Yusup
yuslialifyusup@um.edu.my
Tel. No. : 03-79672785

Medical Laboratory Technologist
U29

Liyana Binti Abu
liyana_9068@um.edu.my
Tel. No. : 03-79672781

DEPARTMENT OF CIVIL ENGINEERING

Professor Ir. Dr. Faridah Binti Othman
E: faridahothman@um.edu.my
Tel. No. : 03-79674584
Area of Expertise:
River Engineering, Environmental Science, Water Resources

Head of Deparment

Professor Dr. Ahmed Hussein Kamel Nasser El Shafie
E: elshafie@um.edu.my
Tel. No. : 03-79677651
Area of Expertise:
Water Body Management, Water Body Management, River Engineering

Professor

Professor Dr. Zubaidah Binti Ismail
E: zu_ismail@um.edu.my
Tel. No. : 03-79675284
Area of Expertise:
Education and Instruction, Structural Engineering, River Rehabilitation

Professor

Associate Professor Ir. Dr. Lai Sai Hin
E: laish@um.edu.my
Tel. No. : 03-79676859
Area of Expertise:
Water Resources, River Engineering, Storm Water Management

Associate Professor

Associate Professor

Associate Professor Dr. Meldi Bin Suhatril
E: meldi@um.edu.my
Tel. No. : 03-79675285
Area of Expertise:
Geotechnical Engineering, Earthquake Engineering, Forensic Engineering

Associate Professor

Associate Professor Ir. Dr. Norazura Muhamad Bunnori
E: nmb77@um.edu.my
Tel. No. : 03-79675203
Area of Expertise:
Structural Health Monitoring, Concrete Technology, Acoustic Emission

Associate Professor

Associate Professor Dr. Ubagaram Johnson Alengaram
E: johnson@um.edu.my
Tel. No. : 03-79677632
Area of Expertise:
Concrete Materials, Lightweight Concrete, Structural Behaviour

Associate Professor

Associate Professor Dr. Zainah Binti Ibrahim
E: zainah@um.edu.my
Tel. No. : 03-79674460
Area of Expertise:
Wind Engineering, Vibration Engineering, Structural Engineering

Dr. Huzaifa Bin Hashim
E: huzaifahashim@um.edu.my
Tel. No. : 03-79675224
Area of Expertise:
Structural Engineering, Geotechnical Engineering

Senior Lecturer

Dr. Majid Mirzaei
E: mirzaei.majid@gmail.com
Tel. No. : 03-79675203
Area of Expertise:
Water and Environmental Engineering

Senior Lecturer

Ir. Ts. Dr. Mo Kim Hung
E: khmo@um.edu.my
Tel. No. : 03-79677678
Area of Expertise:
Concrete Materials, Cementitious Composite, Lightweight Concrete

Senior Lecturer

Dr. Mohd Fazaulnizam Bin Shamsudin
E: fazaul@um.edu.my
Tel. No. : 03-79675353
Area of Expertise:
Structural Engineering (Steel & Composite Structures)

Senior Lecturer

Dr. Mohd Rasdan Bin Ibrahim
E: rasdan@um.edu.my
Tel. No. : 03-79676881
Area of Expertise:
Highway Engineering, Traffic and Transportation

Senior Lecturer

Dr. Muhammad Shazril Idris Bin Ibrahim
E: shazril.idris@um.edu.my
Tel. No. : 03-7967767
Area of Expertise:
River Engineering and Coastal and Offshore Engineering

Senior Lecturer

Dr. Nuruol Syuhadaa Binti Mohd
E: n_syuhadaa@um.edu.my
Tel. No. : 03-79677650
Area of Expertise:
Water and Wastewater Processes, Water and Wastewater Management, ustainable Water Resources

Senior Lecturer

Dr. Onn Chiu Chuen
E: onnchiuchuen@um.edu.my
Tel. No. : 03-79675269
Area of Expertise:
Solid Waste Management, Environmental Impact Assessment (Eia), Climate Change

Senior Lecturer

Dr. Suhana Binti Koting
E: suhana_koting@um.edu.my
Tel. No. : 03-79677648
Area of Expertise:
Traffic and Transportation, Highway Engineering

Senior Lecturer

Dr. Tan Chee Ghuan
E: tancg@um.edu.my
Tel. No. : 03-79677653
Area of Expertise:
Structural Engineering

Senior Lecturer

Dr. Wan Zurina Binti Wan Jaafar
E: wzurina@um.edu.my
Tel. No. : 03-79677677
Area of Expertise:
**Remote Sensing and Geographical Information Systems,
Flood Risk Assessment and Climate Change, Hydrometeorology**

Senior Lecturer

Dr. Yap Soon Poh
E: spyap@um.edu.my
Tel. No. : 03-79677649
Area of Expertise:
Structural Engineering

Senior Lecturer

Ir. Ts. Dr. Yuen Choon Wah
E: yuencw@um.edu.my
Tel. No. : 03-79675355
Area of Expertise:
Traffic and Transportation

Senior Lecturer

Rahimah Binti Alias
E: imah17@um.edu.my
Tel. No. : 03-79672160

Administrative Assistant N19

Sreedharan V.k.raman
E: sree@um.edu.my
Tel. No. : 03-79672757

Senior Asst. Science Officer C32

Zulkafli Bin Muhammad
E: zulkafli@um.edu.my
Tel. No. : 03-79675273

Senior Asst. Science Officer C32

Rozita Binti Yusop
E: roy69@um.edu.my
Tel. No. : 03-79672756

Senior Assistant Engineer JA36

Alfi Sahrina Binti Mohd Masyumudin
E: alfisahrina@um.edu.my
Tel. No. : 03-79672162

Assistant Science Officer C29

Mohammad Termizi Bin Mohamed Kasim
E: mohdtermizi@um.edu.my
Tel. No. : 03-79672753

Assistant Science Officer C29

Mohd Faiz Bin Ibrahim
E: faiz8821@um.edu.my
Tel. No. : 03-79672756

Assistant Science Officer C29

Muhamad Izzat Bin Zaki
E: izzat_zaki@um.edu.my
Tel. No. : 03-79672754

Assistant Science Officer C29

Noor Syakira Binti Sulaiman
E: syakirasulaiman@um.edu.my
Tel. No. : 03-79675273

Assistant Science Officer C29

Nurfazeeha Binti Omar Zainal
E: nurfazee@um.edu.my
Tel. No. : 03-79675362

Assistant Engineer JA29

Shahrul Rafiq Bin Arifin
E: shahrulr@um.edu.my
Tel. No. : 03-79675273

Assistant Engineer JA29

Suhaimi Bin Jusoh
E: soaimi@um.edu.my
Tel. No. : 03-79672754

Assistant Engineer JA29

Alya Farhana Binti Shaffiee
E: alyafarhana@um.edu.my
Tel. No. : 03-79672750

Medical Laboratory Technologist U29

DEPARTMENT OF CHEMICAL ENGINEERING

Dr. Mahar Diana Binti Hamid
E: mahar.diana@um.edu.my
Tel. No. : 03-79675295
Area of Expertise:
Combustion Technology, Engineering Sciences, Chemical Engineering

Head Of Deparment

Professor Ir. Dr. Abdul Aziz Bin Abdul Raman
E: azizraman@um.edu.my
Tel. No. : 03-79675300
Area of Expertise:
Applied Sciences and Technologies, Educational Technology, Water and Wastewater Treatment Technology

Professor

Professor Ir. Dr. Ngoh Gek Cheng
E: ngoh@um.edu.my
Tel. No. : 03-79675301
Area of Expertise:
Fermentation Technology

Professor

Professor Ir. Dr. Rozita Binti Yusoff
E: ryusoff@um.edu.my
Tel. No. : 03-79676891
Area of Expertise:
Life Cycle Analysis, Separation Process, Advanced Material Processing

Professor

Professor

Professor Ir. Dr. Wan Mohd Ashri Bin Wan Daud
E: ashri@um.edu.my
Tel. No. : 03-79675297
Area of Expertise:
Separation Process, Polymerisation Process, Catalyst and Reaction Engineering

Associate Professor

Associate Professor Ir. Dr. Adeline Chua Seak May
E: adeline@um.edu.my
Tel. No. : 03-79675291
Area of Expertise:
**Bioconversion ,
Microbial Structure and Functions Analyses in Activated Sludge,
Biochemical Engineering**

Associate Professor

Associate Professor Ir. Dr. Ang Bee Chin
E: amelynang@um.edu.my
Tel. No. : 03-79675258
Area of Expertise:
Polymers , Thermal Insulation Materials, Nano-Materials

Associate Professor

Associate Professor Dr. Badrul Hisham Bin Mohamad Jan
E: badrules@um.edu.my
Tel. No. : 03-79676869
Area of Expertise:
Micro Emulsion for Enhanced Oil Recovery, Drilling and Completion Fluids Technology, Fluid Mechanics

Associate Professor

Associate Professor Dr. Che Rosmani Binti Che Hassan
E: rosmani@um.edu.my
Tel. No. : 03-79675314
Area of Expertise:
Environmental Sciences, Environmental Issues and Assessment, Process Safety

Associate Professor

Associate Professor Dr. Nur Awanis Binti Hashim
E: awanis@um.edu.my
Tel. No. : 03-79676892
Area of Expertise:
Separation Process, Membranes, Polymerisation Process

Associate Professor

Associate Professor Ir. Dr. Teoh Wey Yang
E: wy.teoh@um.edu.my
Tel. No. : 03-79675313
Area of Expertise: Hydrogen production, particulate systems

Senior Lecturer

Dr. Adeeb Hayyan
E: adeeb@um.edu.my
Tel. No. : 03-79676000
Area of Expertise:
Palm oil processing, biodiesel, catalysis, deep eutectic solvents, ionic liquids

Senior Lecturer

Ir. Dr. Ching Yern Chee
E: chingyc@um.edu.my
Tel. No. : 03-79674445
Area of Expertise:
**Micro Electro-
Mechnical System, Adhesive,Coating and Ink, Environmental Friendly Products and Technologies**

Senior Lecturer

Dr. Fathiah Binti Mohamed Zuki
E: fathiahmz@um.edu.my
Tel. No. : 03-79676879
Area of Expertise:
Biochemical Engineering, Separation Process, Environmental Protection

Senior Lecturer

Dr. Hanee Farzana Binti Hizaddin
E: hanee@um.edu.my
Tel. No. : 03-79675206
Area of Expertise:
Chemical Process Simulation, Separation Process

Senior Lecturer

Dr. Izzudin Izzat Bin Zainal Abidin
E: izzudinizzat@um.edu.my
Tel. No. : 03-1133065679
Area of Expertise:
Fluid Mechanics (experimental And Simulation)

Senior Lecturer

Ir. Dr. Jegalakshimi Jewaratnam
E: jegalaxmi24@um.edu.my
Tel. No. : 03-79677689
Area of Expertise:
Waste recovery options, Machine Learning, Fermentation Systems, Quantitative Risk Assessment

Dr. Mohamad Fairus Bin Rabuni
E: fairus.rabuni@um.edu.my
Tel. No. : 03-1133065679
Area of Expertise:
Solid Oxide Fuel Cell, Ceramic and Polymeric Membranes Fabrication and Applications

Senior Lecturer

Mr. Mohamad Iskandr Bin Mohamad Nor
E: misk@um.edu.my
Tel. No. : 03-79676895
Area of Expertise:
Process Simulation (Aspen Plus & Hysis), Pinch Analysis (Aspen Energy Analyser), Virtual Labs Development

Senior Lecturer

Dr. Mohd Usman Bin Mohd Junaidi
E: usmanj@um.edu.my
Tel. No. : 03-79675206
Area of Expertise:
Coating , Separation Process

Senior Lecturer

Dr. Muhamad Fazly Bin Abdul Patah
E: fazly.abdulpatah@um.edu.my
Tel. No. : 03-79677657
Area of Expertise:
Plant Design and Testing, Catalyst and Reaction Engineering , Biomass Energy Technology

Senior Lecturer

Dr. Tan Chee Keong
E: tanck@um.edu.my
Tel. No. : 03-79675360
Area of Expertise:
Process Modelling, Advanced Process Control, Chemical Process Simulation

Senior Lecturer

Ir. Dr. Teoh Wen Hui
E: whteoh@um.edu.my
Tel. No. : 03-79677690
Area of Expertise:
Thermodynamics, Dense Gas Technologies, Sustainability, Soldering Materials

Senior Lecturer

Dr. Zulhelmi Bin Amir
E: zulhelmi.amir@um.edu.my
Tel. No. : 03-79674480
Area of Expertise:
Oilfield water control,Conformance control, Polymer gel,Drilling and completion

Senior Lecturer

Mohd Rizuwan Bin Mahmad
E: mr.rizuwan@um.edu.my
Tel. No. : 03-79674480

Administrative Assistant N19

Nasrul Fawaid Bin Anas
E: nas_ed@um.edu..my
Tel. No. : 03-79672774

Senior Assistant Engineer JA36

Azira Binti Idris
E: azira@um.edu.my
Tel. No. : 03-79675286

Assistant Science Officer C29

Fazizah Binti Abdullah
E: fazizah@um.edu.my
Tel. No. : 03-79672770

Assistant Science Officer C29

Muhammad Noorhadi Bin Mohammad
E: hadi.mohammad@um.edu.my
Tel. No. : 03-79672771

Assistant Science Officer C29

Azaruddin Bin Ibrahim
E: azrdin@um.edu.my
Tel. No. : 03-79672773

Assistant Engineer JA29

Ismail Hakim Bin Nasirin
E: ismile@um.edu.my
Tel. No. : 03-79672772

Assistant Engineer JA29

Kamaruddin Bin Hassan
E: kdin@um.edu.my
Tel. No. : 03-79672773

Assistant Engineer JA29

Muhammad Kamalrul Ariffin Bin Mohd Shariffuddin
E: kamalrul@um.edu.my
Tel. No. : 03-79675206

Assistant Engineer JA29

Assistant Engineer JA29

Muhammad Syarafi Bin Mohd Sharif
E: syarafi@um.edu.my
Tel. No. : 03-79675307

Assistant Engineer JA29

Rizman Bin A. Lateff
E: rizman2009@um.edu.my
Tel. No. : 03-79672773

Assistant Engineer JA29

Rustam Bin Ramlan
E: ras64@um.edu.my
Tel. No. : 03-79672775

Assistant Engineer JA29

Sazali Bin Mohd Sapie
E: sazly@um.edu.my
Tel. No. : 03-79672773

DEPARTMENT OF ELECTRICAL ENGINEERING

Professor Ir. Dr. Sulaiman Wadi Harun
E: swharun@um.edu.my
Tel. No. : 03-79675205
Area of Expertise:
Photonics and fiber-optic devices

Head Of Deparment

Professor Ir. Dr. Kaharudin Bin Dimyati
E: kaharudin@um.edu.my
Tel. No. : 03-79675205
Area of Expertise:
Electrical Engineering

Professor

Professor Ir. Dr. Hazlie Bin Mokhlis
E: hazli@um.edu.my
Tel. No. : 03-79675238
Area of Expertise:
Power System Analysis (Distribution Automation, Power Quality, Fault Location)

Professor

Professor Ir. Dr. Hamzah Bin Arof
E: ahamzah@um.edu.my
Tel. No. : 03-79674456
Area of Expertise:
Time Series Economics, Image Processing, Robotics, Biomedical Signals, Photonics

Professor

Professor

Professor Ir. Dr. Norhayati Binti Soin
E: norhayatisoin@um.edu.my
Tel. No. : 03-79674583
Area of Expertise:
Microelectronics, Micro Electro-Mechnical System

Professor

Professor Dr. Mahmoud Moghavvemi
E: mahmoud@um.edu.my
Tel. No. : 03-79676817
Area of Expertise:
Applied Electronics, Power and Control Systems

Associate Professor

Associate Professor Ir. Dr. Chow Chee Onn
E: cochow@um.edu.my
Tel. No. : 03-79674457
Area of Expertise:
Wireless Technology, Neural Networks, Genetic Algorithms & Fuzzy Logic

Associate Professor

Associate Professor Ir. Dr. Harikrishnan Ramiah
E: hrkhari@um.edu.my
Tel. No. : 03-79675262
Area of Expertise:
RFIC Design,Mixed Signal
IC Design,Analog Integrated Circuit Design

Associate Professor

Associate Professor Ir. Dr. Hazlee Azil Bin Illias
E: h.illias@um.edu.my
Tel. No. : 03-79674483
Area of Expertise:
Dielectric materials characterisation, epoxy resin and polyethylene applications in power engineering

Associate Professor

Ir. Dr. Jeevan Kanesan
Associate Professor
E: jievan@um.edu.my
T: 03-79675388
Area of Expertise:
Swarm intelligence, Optimal Control , Multi Agent System

Associate Professor

Ir. Dr. Kamarul Ariffin Bin Noordin
Associate Professor
E: kamarul@um.edu.my
Tel. No. : 03-79675328
Area of Expertise:
Cognitive Radio, Wireless Access Technology, Quality of Service in Wireless Broadband

Associate Professor

Ir. Dr. Mahidzal Bin Dahari
Associate Professor
E: mahidzal@um.edu.my
Tel. No. : 03-79676806
Area of Expertise:
Chemical Process Simulation, Intelligent Robot, Underwater

Associate Professor

Associate Professor Dr. Mohamed Abdel Moneim Shaaban
Mohamed
E: m.shaaban@um.edu.my
Tel. No. : 03-79675203
Area of Expertise:
Power Systems, Energy Economics, Renewable Energy,
Digital Energy Grids

Associate Professor

Associate Professor Dr. Narendra Kumar Aridas
E: narendra.k@um.edu.my
Tel. No. : 03-79672662
Area of Expertise:
**Industry 4.0, Applied Semiconductor Devices, Rf and Microwave
Engineering**

Associate Professor

Associate Professor Ir. Dr. Suhana Binti Mohd Said
E: smsaid@um.edu.my
Tel. No. : 03-79675399
Area of Expertise:
**Molecular Modeling, Electronics Packaging: Lead free solder
alloys**

Associate Professor

Associate Professor Dr. Wan Nor Liza Binti Mahadi
E: wnliza@um.edu.my
Tel. No. : 03-79674589
Area of Expertise:
**Antenna applications, design,simulations, Magnetic Field,
Magnetic Flux**

Dr. Anis Salwa Binti Khairuddin
E: anissalwa@um.edu.my
Tel. No. : 03-79672139
Area of Expertise:
Intelligent system, pattern recognition, image processing

Senior Lecturer

Dr. Wong Jee Keen Raymond
E: wjkraymond@um.edu.my
Tel. No. : 03-79675203
Area of Expertise:
Power Engineering (partial Discharge, Insulation Diagnostics, Condition Monitoring, Machine/deep Learning, Optimization).

Senior Lecturer

Ir. Dr. Chuah Joon Huang
E: jhchuah@um.edu.my
Tel. No. : 03-79676863
Area of Expertise:
Neural Networks, Genetic Algorithms and Fuzzy Logic

Senior Lecturer

Dr. Effariza Binti Hanafi
E: effarizahanafi@um.edu.my
Tel. No. : 03-79674456
Area of Expertise:
Wireless Communications, Cognitive Radio, Internet-of-Things

Senior Lecturer

Dr. Marizan Binti Mubin
E: marizan@um.edu.my
Tel. No. : 03-79675260
Area of Expertise:
Control Engineering

Senior Lecturer

Dr. Mohamad Sofian Bin Abu Talip
E: sofian_abutalip@um.edu.my
Tel. No. : 03-79672661
Area of Expertise:
Reconfigurable System, Embedded System, System On Programmable Chip

Senior Lecturer

Dr. Mohamadariff Bin Othman
E: mohamadariff@um.edu.my
Tel. No. : 03-79675205
Area of Expertise:
Electric Resonator Characterization, Dielectric Resonator Antenna Design

Senior Lecturer

Dr. Mohammad Aminul Islam
E: aminul.islam@um.edu.my
Tel. No. : 03-79675205
Area of Expertise:
Renewable energy, Semiconductor Processing and Charaterizatin, Micro/Nano Technology

Senior Lecturer

Dr. Mohd Faiz Bin Mohd Salleh
E: faizsalleh@um.edu.my
Tel. No. : 03-79675205
Area of Expertise:
Thermoelectric

Senior Lecturer

Dr. Noraisyah Binti Mohd. Shah
E: noraisyah@um.edu.my
Tel. No. : 03-79672663
Area of Expertise:
Signal processing, Radiowave propagation

Senior Lecturer

Dr. Norrima Binti Mokhtar
E: norrimamokhtar@um.edu.my
Tel. No. : 03-79674599
Area of Expertise:
**Human-
Machine Interface, EEG teleoperated robot, Brain Computer Inter
face**

Senior Lecturer

Dr. Nurulafiqah Nadzirah Binti Mansor
E: afiqah.mansor@um.edu.my
Tel. No. : 03-79675205
Area of Expertise:
**Power System, Power Distribution System, Renewable Energy Int
egration**

Senior Lecturer

Senior Lecturer

Dr. Sharifah Fatmadiana Binti Wan Muhammad Hatta
E: sh_fatmadiana@um.edu.my
Tel. No. : 03-79672188
Area of Expertise:
System-On-Chip (Soc) (PUF-
FPGA architectures, cybersecurity), Reliability Characterization

Senior Lecturer

Dr. Tarik Bin Abdul Latef
E: tariqlatef@um.edu.my
Tel. No. : 03-79672660
Area of Expertise:
Antenna Design and Optimization, Circularly Polarized Antenna
for GPS Application

Senior Lecturer

Dr. Tengku Faiz Bin Tengku Mohmed Noor Izam
E: tengkufaiz@um.edu.my
Tel. No. : 03-79675205
Area of Expertise:
Wireless Channel Characterization, Electromagnetic Band Gap
Antenna, MIMO Antenna Selection

Senior Lecturer

Dr. Wan Amirul Bin Wan Mohd Mahiyidin
E: wanamirul@um.edu.my
Tel. No. : 03-79675205
Area of Expertise:
Multiple antenna systems

Dr. Wong Wei Ru
E: weiru@um.edu.my
Tel. No. : 03-79672659
Area of Expertise:
Optical fiber, Surface plasmon, integrated optic

Senior Lecturer

Mr. Mahazani Bin Mohamad
E: mahazani@um.edu.my
Tel. No. : 03-79675246
Area of Expertise:
Computer Systems Engineering

Lecturer

Noor Aini Binti Dochik
E: noor_aini@um.edu.my
Tel. No. : 03-79675203

Administrative Assistant N19

Mohammad Bin Said
E: mohdsaid@um.edu.my
Tel. No. : 03-796752724

Senior Asst. Science Officer C32

Mohd Isa Bin Mohd Hamdan
E: isa86@um.edu.my
Tel. No. : 03-79677684

Assistant Science Officer C29

Mohd Akmal Rizuan Bin Abdul Rahman
E: mohdakmalrizuan@um.edu.my
Tel. No. : 03-79675315

Assistant Engineer JA29

Mohd Zailani Bin Abd Aziz
E: jai5683@um.edu.my
Tel. No. : 03-79672717

Assistant Engineer JA29

Syuib Bin Samsir
E: johncena@um.edu.my
Tel. No. : 03-79672748

Assistant Engineer JA29

Assistant Engineer JA29

Wan Nur Murnizawati Binti Wan Mohamad
E: murni_1711@um.edu.my
Tel. No. : 03-79677644

DEPARTMENT OF MECHANICAL ENGINEERING

Associate Professor Dr. Farazila Binti Yusof
E: farazila@um.edu.my
Tel. No. : 03-79677633
Area of Expertise:
Advanced Materials Joining, Metal, Cad/Cam/Cae Applications

Head Of Deparment

Professor Dr. A. S. M. A. Haseeb
E: haseeb@um.edu.my
Tel. No. : 03-79674492
Area of Expertise:
Materials Degradation, Nano-Materials, Electronic Packaging Materials

Professor

Professor Dr. Imtiaz Ahmed Choudhury
E: imtiaz@um.edu.my
Tel. No. : 03-79675384
Area of Expertise:
Material Processing Technology, Statistical Analysis, Sustainable and Green Machining

Professor

Professor Dr. Kazi Md. Salim Newaz
E: salimnewaz@um.edu.my
Tel. No. : 03-79674582
Area of Expertise:
Heat Transfer, Fluid Mechanics, Industrial Heat Exchanger Design and Fouling Mitigation

Professor

Professor

Professor Dr. Md. Abul Kalam
E: kalam@um.edu.my
Tel. No. : 03-79674459
Area of Expertise:
**Engineering Sciences,
Mechanical Engineering, Alternative Fuel**

Professor

Professor Dato' Ir. Dr. Mohd Hamdi Bin Abd Shukor
E: hamdi@um.edu.my
Tel. No. : 03-79677633
Area of Expertise:
**Non-Traditional Machining, Soldering/ Brazing, Machining
Process / Bioceramic**

Professor

Professor Ir. Dr. Nukman Bin Yusoff
E: nukman@um.edu.my
Tel. No. : 03-79676850
Area of Expertise:
**Applied Sciences and Technologies, Process Technology and
Engineering,**

Professor

Professor Ir. Dr. Ramesh Singh A/L Kuldip Singh
E: ramesh79@um.edu.my
Tel. No. : 03-79675209
Area of Expertise:
Failure Analysis, Cutting Tool Technology, Ceramics

Professor

Professor Ir. Dr. Yau Yat Huang
E: yhyau@um.edu.my
Tel. No. : 03-79675210
Area of Expertise:
M&E Engineering; HVAC&R Engineering; Green Building Study in the Tropics

Associate Professor

ssociate Professor Dr. Amalina Binti Muhammad Afifi
E: amalina@um.edu.my
Tel. No. : 03-79675385
Area of Expertise:
**Engineering Sciences,
Materials Engineering and Metallurgy**

Associate Professor

Associate Professor Dr. Andri Andriyana
E: andri.andriyana@um.edu.my
Tel. No. : 03-79675254
Area of Expertise:
Mechanics of Polymers and Elastomers

Associate Professor

Associate Professor Datin Ir. Dr. Bushroa Binti Abd Razak
E: bushroa@um.edu.my
Tel. No. : 03-79675239
Area of Expertise:
Surface Coating Technology, Application of Coating and Thin Films, Material Processing Technology

Associate Professor

Associate Professor Ir. Dr. Chong Wen Tong
E: chong_wentong@um.edu.my
Tel. No. : 03-79676842
Area of Expertise:
**Wind, Industrial Design,
Green Technology**

Associate Professor

Associate Professor Dr. Hendrik Simon Cornelis Metselaar
E: h.metselaar@um.edu.my
Tel. No. : 03-79674451
Area of Expertise:
**Material Processing Technology, Tribology of Ceramics,
Composite Materials**

Associate Professor

Associate Professor Ir. Dr. Mohd Faizul Bin Mohd Sabri
E: faizul@um.edu.my
Tel. No. : 03-79677637
Area of Expertise:
**Applied Sciences and Technologies, Precision Engineering,
Waste-Heat Recovery**

Associate Professor

Associate Professor Ir. Dr. Nik Nazri Bin Nik Ghazali
E: nik_nazri@um.edu.my
Tel. No. : 03-79674454
Area of Expertise:
Fluid Mechanics, Aerodynamics, Machine Design

Associate Professor

Associate Professor Ir. Dr. Poo Balan Ganesan
E: poo_ganesan@um.edu.my
Tel. No. : 03-79677670
Area of Expertise:
Hydro Power Technology, Process Control, Applied Sciences and Technologies

Associate Professor

Associate Professor Ir. Dr. Rahizar Bin Ramli
E: rahizar@um.edu.my
Tel. No. : 03-79677623
Area of Expertise:
Automotive Control, Vehicle Dynamics, Nvh and Durability, Vibration and Noise Control

Associate Professor

Associate Professor Dr. Roslina Binti Ahmad
E: roslina@um.edu.my
Tel. No. : 03-79674497
Area of Expertise:
Bio-Compatible Materials, Composite Materials, Metals and Metal Alloy Materials

Associate Professor

Associate Professor Dr. Salwa Hanim Binti Abdul Rashid
E: salwa_hanim@um.edu.my
Tel. No. : 03-79676832
Area of Expertise:
Change Management, Lean Manufacturing, Sustainable Manufacturing

Associate Professor

Associate Professor Ir. Dr. Siti Zawiah Binti Md Dawal
E: sitizawiahmd@um.edu.my
Tel. No. : 03-79675251
Area of Expertise:
Work Design, Ergonomic Aspects, Flexible Manufacturing Systems

Associate Professor

Associate Professor Ir. Dr. Tan Chou Yong
E: chouyong@um.edu.my
Tel. No. : 03-79672764
Area of Expertise:
Electro-Active Ceramics, Nano-Materials, Pigments

Associate Professor

Associate Professor Ir. Dr. Wong Yew Hoong
E: yhwong@um.edu.my
Tel. No. : 03-79672654
Area of Expertise:
Electronic Materials, Nanomaterials, Electronic Packaging Materials, Semiconductor Manufacturing Technology, Thin Film Technology

Associate Professor

Associate Professor Dr. Yap Hwa Jen
E: hjyap737@um.edu.my
Tel. No. : 03-7967524
Area of Expertise:
Robotics and Mechatronics, Virtual Manufacturing, Flexible Manufacturing Systems

Dr. Ahmad Saifizul Bin Abdullah

Dr. Ahmad Saifizul Bin Abdullah
E: saifizul@um.edu.my
Tel. No. : 03-79672758
Area of Expertise:
Instrumentation Engineering, Control Engineering, IoT

Senior Lecturer

Dr. Azuddin Bin Mamat
E: azuddin@um.edu.my
Tel. No. : 03-79675265
Area of Expertise:
Machining, Plastic Moulding Technology, Cad/Cam/Cae Applications

Senior Lecturer

Dr. Chew Bee Teng
E: chewbeeteng@um.edu.my
Tel. No. : 03-79675256
Area of Expertise:
Nano Materials, Air-Conditioning and Refrigeration

Senior Lecturer

Dr. Edzrol Niza Bin Mohamad
E: edzrol@um.edu.my
Tel. No. : 03-79675204
Area of Expertise:
Machine Design

Senior Lecturer

Dr. Goh Yingxin
E: gohyingxin@um.edu.my
Tel. No. : 03-79675267
Area of Expertise:
Electrochemical Materials, Electronic Packaging Materials, Packaging Technology and Materials Sn: Including Standard Supporting Technologies

Senior Lecturer

Dr. Iswadi Bin Jauhari
E: iswadi@um.edu.my
Tel. No. : 03-79674465
Area of Expertise:
Superplasticity, Materials Engineering, Fatigue

Senior Lecturer

Dr. Khoo Shin Yee
E: khooshinyee@um.edu.my
Tel. No. : 03-79672176
Area of Expertise:
Vibration & Structural Dynamic; Force Identification (Inverse Problem); Instrumentation & Signal Processing

Senior Lecturer

Dr. Mahendra Varman A/L Munusamy
E: mahendra@um.edu.my
Tel. No. : 03-79675228
Area of Expertise:
Combustion and Fuel Engineering (Biomass and Biofuel)

Senior Lecturer

Dr. Mohammed Abdo Hashem Ali
E: hashem@um.edu.my
Tel. No. : 03-79675341
Area of Expertise:
Autonomous Navigation System and Robotics, Automation and Industry IR.4.0, Artificial Intelligence, Mechatronics and intelligent control system, Image and Signal Processing

Senior Lecturer

Dr. Mohd Nashrul Bin Mohd Zubir
E: nashrul@um.edu.my
Tel. No. : 03-79675204
Area of Expertise:
Mechanism Design and Synthesis and Dynamic system, Power Plant Engineering

Senior Lecturer

Dr. Mohd Ridha Bin Muhamad
E: ridha@um.edu.my
Tel. No. : 03-79676806
Area of Expertise:
Surface Engineering Sn: Including Standard Supporting Technologies in Surface Treatment and Welding Technologies

Senior Lecturer

Dr. Mohd Sayuti Bin Ab Karim
E: mdsayuti@um.edu.my
Tel. No. : 03-79674489
Area of Expertise:
CNC Milling, CNC Turning, Lubrication System

Senior Lecturer

Dr. Mohd Zamri Bin Zainon @ Baharom
E: zzainon@um.edu.my
Tel. No. : 03-79676832
Area of Expertise:
Power Plant Engineering, Combustion and Fuel Engineering

Senior Lecturer

Dr. Muhammad Khairi Faiz Bin Ahmad Hairuddin
E: mkhairifaiz@um.edu.my
Tel. No. : 03-79675247
Area of Expertise:
Power Electronic Packaging Technology, Soldering, Sintering, Casting Technology

Senior Lecturer

Dr. Nazatul Liana Binti Sukiman
E: nazatul@um.edu.my
Tel. No. : 03-79672656
Area of Expertise:
Metals and Metal Alloy Materials (corrosion, alloying, electrochemistry)

Senior Lecturer

Dr. Nor Ishida Binti Zainal Abidin
E: ishida@um.edu.my
Tel. No. : 03-79672174
Area of Expertise:
Bio-Meterial (Magnesium; Biomaterials; Corrosion;)

Senior Lecturer

Senior Lecturer

Dr. Nurin Wahida Binti Mohd Zulkifli
E: nurinmz@um.edu.my
Tel. No. : 03-79675204
Area of Expertise:
Combustion and Fuel Engineering

Senior Lecturer

Ir. Dr. Ong Zhi Chao
E: alexongzc@um.edu.my
Tel. No. : 03-79676815
Area of Expertise:
Impact-Synchronous Modal Analysis (Isma), Vibration, Rotor Dynamics, Signal Processing & Instrumentation

Senior Lecturer

Dr. Raja Ariffin Bin Raja Ghazilla
E: r_ariffin@um.edu.my
Tel. No. : 03-79675250
Area of Expertise:
Design for Environment, Ergonomic Aspects, Design for Manufacturing and Assembly

Senior Lecturer

Dr. Sabariah Binti Julai @ Julaihi
E: sabsz@um.edu.my
Tel. No. : 03-79674461
Area of Expertise:
Optimization using Ant Colony, Particle Swarm, Artificial Bee Colony and Genetic Algorithm

Senior Lecturer

Dr. Shaifulazuar Bin Rozali
E: azuar@um.edu.my
Tel. No. : 03-7967217
Area of Expertise:
Nano Materials, Fatigue, Powder Metallurgy

Senior Lecturer

Dr. Siti Nurmaya Binti Musa
E: nurmaya@um.edu.my
Tel. No. : 03-79676876
Area of Expertise:
**Operations
Research/ Management Science, Production Economics,
Production and Logistics**

Senior Lecturer

Dr. Soong Ming Foong
E: mfsoong@um.edu.my
Tel. No. : 03-79675204
Area of Expertise:
Passenger Comfort and Human Factors, Suspension System

Senior Lecturer

Dr. Suriani Binti Ibrahim
E: sue_83@um.edu.my
Tel. No. : 03-79675204
Area of Expertise:
**Biosensor, bio-catalyst, polymer electrolytes, protein
engineering**

Senior Lecturer

Dr. Tan Chin Joo
E: tancj@um.edu.my
Tel. No. : 03-79675237
Area of Expertise:
Metal Forming, Fem Simulation, Forming of Product Having Lightweight & High Strength

Senior Lecturer

Dr. Tuan Zaharinie Binti Tuan Zahari
E: tzaharinie@um.edu.my
Tel. No. : 03-79675204
Area of Expertise:
Metals and Metal Alloy Materials, Joining Technology

Lecturer

Mr. Aznijar Bin Ahmad Yazid
E: aznijar@um.edu.my
Tel. No. : 03-79676838
Area of Expertise:
Computer Aided Design, Manufacture & Engineering, CadCamCae, CAD/M/E, Milling, HSM, Metal Cutting

Lecturer

Mr. Norhafizan Bin Ahmad
E: norhafizan@um.edu.my
Tel. No. : 03-79675243
Area of Expertise:
Biomechanical Engineering, Engineering Sciences, Mechanical Engineering

Raja Kamariah Binti Raja Bakar
Administrative Assistant N19
E: rajakamariah@um.edu.my
Tel. No. : 03-79672798

Administrative Assistant N19

Mohd Nazarul Zaman Bin Mohd Nazir
E: mnzman@um.edu.my
Tel. No. : 03-79675204

Senior Asst. Science Officer C32

Zulkarnain @ Khayree Faisal Bin Ishak
E: khayree_faisal@um.edu.my
Tel. No. : 03-79672764

Senior Assistant Engineer JA36

Mohd Asri Bin Ismail
E: adi123@um.edu.my
Tel. No. : 03-79675281

Assistant Science Officer C29

Mohd Taufiq Bin Md. Yusof
E: taufiqm@um.edu.my
Tel. No. : 03-79674595

Assistant Science Officer C29

Muhammad Khlaid Bin Hashim
E: khlaid@um.edu.my
Tel. No. : 03-79676865

Assistant Science Officer C29

Norzirah Binti Hasan
E: norzirah@um.edu.my
Tel. No. : 03-79672165

Assistant Science Officer C29

Sarimaniza Binti Hj Salleh
E: sarima@um.edu.my
Tel. No. : 03-79674598

Assistant Science Officer C29

Siti Rohaya Binti Ahmad
E: s.rohaya_a@um.edu.my
Tel. No. : 03-79675204

Assistant Science Officer C29

Zainul Jamal Bin Ghiasuddin
E: zainulj@um.edu.my
Tel. No. : 03-79675337

Assistant Science Officer C29

Afendi Bin Ayob
E: afendi@um.edu.my
Tel. No. : 03-79675383

Assistant Engineer JA29

Hartini Binti Baharum
E: tin420@um.edu.my
Tel. No. : 03-79672765

Assistant Engineer JA29

Mohd Fauzi Bin Bakri@hashim
E: mohd.fauzi@um.edu.my
Tel. No. : 03-79675383

Assistant Engineer JA29

Mohd. Nasrul Bin Mohd. Yusof
E: nasrul@um.edu.my
Tel. No. : 03-79675282

Assistant Engineer JA29

Nasarizam Bin Mohamed
E: nasarizam@um.edu.my
Tel. No. : 03-79675383

Assistant Engineer JA29

ACADEMIC CALENDAR FOR 2021/2022 ACADEMIC SESSION
(HIGHER DEGREE LEVEL)
(amended June 2021)

SEMESTER I

Course Registration (Module) *(Refer Registration Schedule at https://umsitsguide.um.edu.my/)*	2 weeks	24.09.2021	-	08.10.2021
Lectures	7 weeks*	18.10.2021	-	05.12.2021
Mid-Semester I Break	1 week	06.12.2021	-	12.12.2021
Lectures	7 weeks*	13.12.2021	-	30.01.2022
Revision Week	1 week*	31.01.2022	-	06.02.2022
Semester I Final Examination	2 weeks	07.02.2022	-	20.02.2022
Semester Break	3 weeks	21.02.2022	-	13.03.2022
	23 weeks			

SEMESTER II

Course Registration (Module) *(Refer Registration Schedule at https://umsitsguide.um.edu.my/)*	2 weeks	18.02.2022	-	04.03.2022
Lectures	7 weeks*	14.03.2022	-	01.05.2022
Mid-Semester II Break	1 week*	02.05.2022	-	08.05.2022
Lectures	7 weeks*	09.05.2022	-	26.06.2022
Revision Week	1 week	27.06.2022	-	03.07.2022
Semester II Final Examination	2 weeks*	04.07.2022	-	17.07.2022
	20 weeks			

SEMESTER BREAK

Break	9 weeks*	18.07.2022	-	18.09.2022

SPECIAL SEMESTER

Course Registration (Module)	1 week	01.07.2022	-	08.07.2022
Lectures	7 weeks*	18.07.2022	-	04.09.2022
Special Semester Final Examination	1 week	05.09.2022	-	11.09.2022
Break	1 week*	12.09.2022	-	18.09.2022
	10 weeks			

* The Academic Calendar has taken into account public and festive holidays

National Day (31 August 2021)
Malaysia Day (16 September 2021)
Maulidur Rasul (19 October 2021)
Deepavali (4 November 2021)
Christmas Day (25 December 2021)
New Year (1 January 2022)
Thaipusam (18 January 2022)
Federal Territory Day (1 February 2022)

Chinese New Year (1 & 2 February 2022)
Nuzul Al-Quran (19 April 2022)
Labour Day (1 May 2022)
Eidul Fitri (2 & 3 May 2022)
Wesak Day (15 May 2022)
His Majesty's King's Birthday (6 June 2022)
Eidul Adha (9 July 2022)
Awal Muharam (30 July 2022)
National Day (31 August 2022)

Master of Biomedical Engineering
Faculty of Engineering

Programme Coordinator

Assoc. Prof. Ir. Dr. Ting Hua Nong

tinghn@um.edu.my   03-79676882

UNIVERSITI MALAYA

MASTER OF ENGINEERING

Admission Requirements

(1)   Qualifications for Admission

      (a)   Bachelor Degree or equivalent with a CGPA > 3.00

          OR

      (b)   CGPA 2.0 to 2.99: Must fulfill the following criteria subject to the qualification categories as prescribed by the Senate:
- *a.*   Related working experience
- *b.*   At least 1 ISI publication published
- *c.*   Recipients of scholarships
- *d.*   Government agencies staff
- *e.*   Graduate of University Malaya
- *f.*   Pass Faculty interview
- *g.*   Pass Faculty special assessment

          OR

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

(2)   Additional English Language requirement for international students:

A candidate who is not a Malaysian citizen and who possesses a degree or degrees from a university or an institution of higher education where the medium of instruction is not the English language for that degree or degrees must

      (i)   obtain a score of 550 for the Test of English as a Foreign Language (TOEFL); **OR**

      (ii)   obtain a band of 5.5 in the International English Language Testing System (IELTS);

          OR

      (iii)   pass any English language test prescribed by the University

1. Program Structure

(1)   The program has a total load of forty-two (42) credit hours consisting of:
- (a)   Five (5) core courses whereby each course carries three (3) credit hours **AND**;
- (b)   Research Project (12 credits) **AND**;
- (c)   Three (3) elective courses whereby each course carries three (3) credit hours;
- (d)   Any other course offered by the Faculty.

(2)   Details of the offered courses are according to those approved by the Senate from time to time, upon the acknowledgement by the Faculty, and is informed the candidate at the beginning of each session.

(3)   The list of courses approved by the Senate for the degree of Master of Biomedical Engineering is a stated in **List 1**. The candidates shall be informed of the combination of courses which need be taken for the program before registering for the course.

(4)   Course Registration

   (a)   Course registration is done within two weeks preceding the beginning of the semester.

   (b)   A candidate must register for at least six (6) credit hours in any semester except:

      (a)   In the final semester of the candidate's course of study, where the candidate may register for fewer credit hours than that stipulated above;

         OR

      (b)   the candidate's appeal to withdraw from a particular course has been approved;

         OR

      (c)   subject to Faculty approval to allow the candidate to register for 3 credit hours only.

   (c)   Registration for Research Project can only be done after the candidate has taken **Research Methodology** and the candidate must not be in under observation category.

(5)   Determination of Field of Research

The field of research must be determined **before** the candidate commences the research portion of the course.

(6)   Supervision

Appointment of a Supervisor may be done in parallel with the submission of Research Project Title Application.

(7)   Submission of Research Project

   (a)   Notice of the Research Project Submission will be given to the candidate upon receiving the title and supervision approval of Research Project.

   (b)   A candidate must submit the Research Project **before** the end of the maximum period of candidature.

2. **Duration of Study**

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

COURSES APPROVED BY SENATE FOR THE PROGRAMME OF MASTER OF BIOMEDICAL ENGINEERING BY COURSEWORK

1.   **CORECOURSES**

Course Code	Title	Credit Hours
KQB 7001	Research Project	12
KQB 7002	Bioinstrumentation	3
KQB 7003	Engineering Biomechanics and Motion Analysis	3
KQB 7004	Healthcare Technology	3
KQB 7005	Medical Imaging	3
KQB 7006	Tissues Engineering	3
KQX 7001	Research Methodology	3
KQX 7002	Project Management	3

2.   **ELECTIVECOURSES**

Course Code	Title	Credit Hours
KQB 7007	Physiological Signal & Image Analysis	3
KQB 7008	Artificial Intelligence in Medicine	3
KQB 7009	Rehabilitation Engineering	3
KQB 7010	Telemedicine	3
KQB 7011	Safety, Standard and Ethics in Biomedical Engineering	3

**COURSES OFFERED FOR THE PROGRAMME OF MASTER OF
BIOMEDICAL ENGINEERING BY COURSEWORK**

Code	Course	Credit Hours	Duration of Examination	Distribution of Marks	
				% Continuous Assessments	% Final Examination
CORE COURSES					
KQB 7001	Research Project	12	-	100	-
KQB 7002	Bioinstrumentation	3	2 hours	50	50
KQB 7003	Engineering Biomechanics and Motion Analysis	3	2 hours	50	50
KQB 7004	Healthcare Technology	3	2 hours	50	50
KQB 7005	Medical Imaging	3	2 hours	50	50
KQB 7006	Tissues Engineering	3	2 hours	50	50
KQX 7001	Research Methodology	3	-	100	-
KQX 7002	Project Management	3	2 hours	50	50
ELECTIVE COURSES					
KQB 7007	Physiological Signal & Image Analysis	3	2 hours	50	50
KQB 7008	Artificial Intelligence in Medicine	3	2 hours	50	50
KQB 7009	Rehabilitation Engineering	3	2 hours	50	50
KQB 7010	Telemedicine	3	2 hours	50	50
KQB 7011	Safety, Standard and Ethics In Biomedical Engineering	3	2 hours	50	50

AND

(1)   Any other course approved by the Senate.
(2)   Elective course offered in each semester may vary from semester to semester.

PROGRAMME GOALS AND OUTCOMES

AIM OF THE PROGRAMME

The aim of the program is to produce graduates who are knowledgeable in the field of Biomedical Engineering, providing them with high professionalism value, competitive, high ethical values as well as critical thinking skills to make decisions on issues related to field of Biomedical Engineering based on basic knowledge and expertise through the designed program structures.

OBJECTIVE

The programme objectives are:

1. Graduates hold a senior or decision making position in government or biomedical engineering sectors

2. Graduates engage in Research and Development activities in biomedical engineering for their career development

3. Graduates contribute actively in sustainable development of biomedical engineering and well-being of society

PROGRAMME LEARNING OUTCOMES

No.	Programme Learning Outcome(s) (PLO)	Taxonomy Category (K/P/A)*
PLO1	*Demonstrate continuing advanced knowledge in solving complex biomedical engineering problem.*	K, P
PLO2	*Analyze complex biomedical engineering problems critically and provide solutions through research, using advanced techniques, tools, skills or by a range of integrated approaches.*	K, P
PLO3	*Conduct standard and specialized research approaches and apply practical skills, tools or investigative techniques in formulating solutions for contemporary complex biomedical engineering problems.*	K, P
PLO4	*Communicate effectively as individual or in a group to peers, experts, or non-experts ethically and professionally using appropriate methods.*	K, P
PLO5	*Demonstrate competency in using and adapt relevant digital technologies, statistical and numerical knowledge in designing solutions for complex biomedical engineering problems.*	K, P

PLO6	*Demonstrate significant independence, leadership, and interpersonal skills as a member or leader in project planning in complex biomedical engineering application.*	**A, K**
PLO7	*Identify the needs of self-advancement through continuous professional development and adapt entrepreneurial element in the context of biomedical engineering.*	**A, K**
PLO8	*Demonstrate adherence to ethical and professional codes of practice in planning and execution of the technical or research project relevant to biomedical engineering.*	**A, K**

Reference notes:

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

PO Domain

PLO1 Knowledge and Understanding
PLO2 Cognitive Skills
PLO3 Practical Skills
PLO4 Interpersonal and Communication Skills
PLO5 Digital and Numeracy Skills
PLO6 Leadership, Autonomy and Responsibility
PLO7 Personal and Entrepreneurial Skills
PLO8 Ethics and Professionalism.

Taxonomic Category

K Cognitive
A Affective
P Psychomotor

PLANNER FOR MASTER OF BIOMEDICAL ENGINEERING

COURSE CODE	SEMESTER 1			SEMESTER 2			SEMESTER 3**		
	COURSE CODE		CREDIT	COURSE CODE		CREDIT	COURSE CODE		CREDIT
	Code	Subject		Code	Subject		Code	Subject	
Core Courses	KQB7002	Bioinstrumentation	3	*KQB 7001	Research Project (P)	6	*KQB7001	Research Project (P)	6
	KQB7003	Engineering Biomechanics and Motion Analysis	3	KQB7005		3			
	KQB7004	Healthcare Technology	3	KQB7006	Medical Imaging Tissue Engineering	3			
	KQX7001	Research Methodology	3						
	KQX7002	Project Management	3						

	Code	Subject		Code	Subject		Code	Subject	
Elective Courses	**KQB7008**	Artificial Intelligence in Medicine	3	**KQB7007**	Physiological Signal & Image Analysis	3			
				KQB7009	Rehabilitation Engineering	3			
	KQB7011	Safety, Standard and Ethics In Biomedical Engineering	3	**KQB7010**	Telemedicine	3			

NOTE:

(1) *****Registration for Research Project can only be done after the candidate has **Research Methodology** and the candidate must not be in under observation category.

(2) ******Courses will be offered if there are sufficient request.

	PRO FORMA KURSUS *COURSE PRO FORMA*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. *Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Bioperubatan	*Department of Biomedical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Bioperubatan	*Master of Biomedical Engineering*
Kod Kursus* *Course Code**	KQB7001	*KQB7001*
Tajuk Kursus* *Course Title**	Projek Penyelidikan	*Research Project*
Kredit* *Credit**	12	*12*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	480	*480*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	KQX7001 - Metodologi Penyelidikan	KQX7001 – Research Methodology
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Membina ulasan kritikal dan kajian teori yang diperlukan untuk penyelidikan. 2. Mereka bentuk kaedah untuk menjalankan penyelidikan kejuruteraan yang kompleks 3. Menyelesaikan masalah penyelidikan melalui metodologi dan alat yang bersesuaian.	*At the end of the course, students are able to:* 1. *Construct critical review and theoretical study required for the research.* 2. *Design a methodology to carry out complex engineering research* 3. *Analyse research problem through advanced methodology and tools.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	4. Menilai data dan penemuan penyelidikan menggunakan alat digital yang sesuai. 5. Menunjukkan hasil projek penyelidikan kepada latar belakang khalayak yang berbeza melalui pembentangan. 6. Menggunakan kemahiran pengurusan projek yang sesuai dalam menyelesaikan projek penyelidikan. 7. Menjelaskan kesan kewangan dan ekonomi daripada hasil penyelidikan. 8. Menghubungkaitkan hasil penyelidikan berkenaan dengan kesannya kepada masyarakat.	4. *Evaluate the data and findings of the research using the appropriate digital tools.* 5. *Demonstrate the outcome of research project to different background of audience through presentation.* 6. *Apply appropriate project management skills in completing the research project.* 7. *Explain the financial and economic impacts of the research outcomes.* 8. *Relate the outcomes of the research with respect to its impacts on society.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	• Projek penyelidikan akan mendedahkan pelajar dalam membuat ulangkaji risalah berkaitan dengan topik kajian spesifik, merancang kaedah kajian, mengumpul data eksperimen dan menghuraikan data, menulis laporan dan membuat pembentangan.	• *Research project will expose students to carry out literature review on a specific research topic, plan a research methodology, collect experimental data and Interpret data, write a dissertation and carry out a presentation*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 100% Peperiksaan Akhir: 0%	*Continuous Assessment:100%* *Final Examination: 0%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UNIVERSITI MALAYA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. *Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Kejuruteraan Bioperubatan	*Biomedical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Bioperubatan	*Master of Biomedical Engineering*
Kod Kursus* *Course Code**	KQB 7002	KQB 7002
Tajuk Kursus* *Course Title**	Bioinstrumentasi	*Bioinstrumentation*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Pada akhir kursus ini, pelajar dapat: 1. Menggunakan prinsip-prinsip kejuruteraan untuk memilih alat yang optimum untuk mengukur pembolehubah perubatan. (C3) 2. Menganalisa masalah utama sistem analog dan digital instrumentasi. (C4) 3. Merekabentuk sebuah peralatan canggih untuk	*At the end of the course, students are able to:* *1. Use the principles of engineering to choose the optimal instrument for measuring medical variables. (C3)* *2. Analyze the problem of analog and digital instrumentation systems. (C4)* *3. Design an advanced instrumentation for*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	mengukur pembolehubah perubatan dan dalam penyelidikan biologi dengan mengambilkira aspek inovasi baru bagi persiapan IR4.0. (P5)	*measurement of medical variables and in biological research by considering the new innovation aspect for IR4.0 preparation. (P5)*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini merangkumi prinsip-prinsip, teknologi, kaedah dan aplikasi biosensor dan bioinstrumentation. Objektifnya adalah untuk menghubungkan prinsip-prinsip kejuruteraan untuk memahami biosistem pada deria dan bioelectronics. Penguat instrumentasi dan litar jambatan akan diajar secara terperinci. Sistem biosensor berasaskan prinsip transduksi juga akan diberi perhatian yang meluas. Para pelajar akan dapat merekabentuk dan memilih komponen-komponen yang sesuai terhadap masalah pengukuran.	*This course covers the principles, technologies, methods and applications of biosensor and bioinstrumentation. The objective is to link engineering principles to understanding of biosystems in sensors and bioelectronics. Instrumentation amplifier and the bridge circuit will be covered in detail. The transduction principle based biosensor systems will also be discussed extensively. The students will be able to design and select the appropriate components in response to measurement problems.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian	*Online feedback*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. *Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Kejuruteraan Bioperubatan	*Biomedical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Bioperubatan	*Master of Biomedical Engineering*
Kod Kursus* *Course Code**	KQB7003	*KQB7003*
Tajuk Kursus* *Course Title**	Biomekanik Kejuruteraan dan Analisis Gerakan	Engineering Biomechanics and Motion Analysis
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	122	*122*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Pada akhir kursus ini, pelajar dapat: 1. Menyelesaikan persamaan-persamaan gerakan untuk sistem jasad tegar multisegmen. (C4) 2. Menjelaskan anatomi dan fungsi otot-rangka tangan kaki dan badan. (C5) 3. Menggabung pengetahuan anatomi dan fungsi otot-rangka dengan dinamik mekanik untuk	*At the end of the course, students are able to:* 1. Solve equations of motion for multisegment systems of rigid bodies. (C4) 2. Explain the musculoskeletal anatomy and function of the limbs and trunk. (C5) 3. Combine knowledge of the musculoskeletal anatomy and function with mechanical dynamics

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	mensamagerakkan kawalan gerakan. (P4)	to simulate the control of movement.(P4)
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini meliputi deskripsi kuantitatif dan kuanlitif bagi tindakan otot-otot berkaitan gerakan manusia; pengenalan kepada dinamik jasad tegar dan dinamik sistem-sistem multipaut dengan menggunakan pendekatan Newtonan dan Langrangian; model otot dengan aplikasi untuk mengawal gerakan multisendi; dinamik ke hadapan dan songsang bagi sistem-sistem terpacu multisendi dan otot.	The course covers quantitative and qualitative descriptions of the action of muscles in relation to human movement; introduction to rigid body dynamics and dynamics of multi-link systems using Newtonian and Lagrangian approaches; muscle models with application to control of multi-joint movement; forward and inverse dynamics of multi-joint and muscle driven systems.
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian	Online feedback
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

PRO FORMA KURSUS
COURSE PRO FORMA

PENTING/*IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Kejuruteraan Bioperubatan	*Biomedical Engineering*
Nama Program Akademik Name of Academic*Programme*	Sarjana Kejuruteraan Bioperubatan	*Master of Biomedical Engineering*
Kod Kursus* *Course Code**	KQB7004	*KQB7004*
Tajuk Kursus* *Course Title**	Teknologi Penjagaan Kesihatan	*Healthcare Technology*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Pada akhir kursus ini, pelajar dapat: 1. Menentukan kepentingan pengurusan teknologi penjagaan kesihatan (C4) 2. Menyesuaikankepentingan Teknologi Informasi dan Komunikasi dalam sektor penjagaan kesihatan.(C5) 3. Menjelaskan teknologi terkini yang digunakan dalam industri penjagaan kesihatan. (C5)	*At the of this course, student will be able to:* *1. Determine the importance of Healthcare Technology.(C4)* *2. Accommodate the prominence of Information and Communication Technology in Healthcare Sector.(C5)* *3. Explain the current technologies used in*

UM-PT01-MQF-BR005-S01

	PRO FORMA KURSUS ***COURSE PRO FORMA***	

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
	4. Mengenalpasti kepentingan keselamatan, standard dan etika yang berkaitan penjagaan kesihatan. (C5)	*Healthcare Industry. (C5)* *4. Identify the importance of safety, standards and ethics related to Healthcare. (C5)*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini merangkumi topik yang berkaitan dengan Penjagaan KesihatanTeknologi. Kursus ini bertujuan untuk menerangkanPengetahuan mengenai teknologi semasa yang digunakan dalam sektor kesihatan Menguraikan keselamatan medis, piawaian Peranti dan isu etika untuk membimbing jurutera bioperubatan.	*The course covers topics related to Healthcare Technologies. The course is intended to describe knowledge of current technologies used in the health sector elaborating medical safety, Device standards and Ethicalissues to guide biomedical engineers.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian	Online feedback
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master'sDegree) 2019 University of MalayaRegulations (Master's Degree) 2019*

	PRO FORMA KURSUS *COURSE PRO FORMA*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Bioperubatan	*Department of Biomedical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Bioperubatan	*Master of Biomedical Engineering*
Kod Kursus* *Course Code**	KQB7005	*KQB7005*
Tajuk Kursus* *Course Title**	Pengimejan Perubatan	*Medical Imaging*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Pada akhir kursus ini, pelajar dapat: 1. Mengintepretasi prinsip-prinsip kerja, reka bentuk dan aplikasi pelbagai peralatan perubatan pengimejan diagnostik dan terapeutik. (C5) 2. Menjelaskan konsep dalam perlindungan dan keselamatan sinaran. (C5) 3. Membangun penilaian kualiti imej pada kaedah imej	*At the end of the course, students are able to:* *1. Interpret the working principles, designs and applications of various medical diagnostic imaging and therapeutic equipment. (C5)* *2. Explain radiation protection and safety concept. (C5)* *3. Develop image quality assessment on different*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	perubatan yang berbeza. (P4)	*medical image modalities (P4)*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini memperkenalkan prinsip-prinsip asas dan rekabentuk peralatan pengimejan perubatan diagnostik. Beberapa topik pengimejan perubatan diliputi seperti asas atom dan sifat radiasi, penghasilan x-ray dan interaksi dengan bahan, sinar gamma, radiografi projeksi, mamografi, fluroskopi, tomografi berkomputer, pengimejan resonans magnetik, sistem ultrabunyi, pengimejan perubatan nuklear, laser dan optoeletronik. Kursus ini juga mendedahkan pelajar-pelajar kepada konsep kualiti imej dan keselamatan radiasi dalam pengimejan perubatan.	The course introduces the basic principles and designs of medical diagnostic imaging equipment. Topics covered include basic atomics and nature of radiation, X-ray production and interaction with matter, gamma rays, projection radiography, mammography, fluoroscopy, computed tomography, magnetic resonance imaging, ultrasound system, nuclear medicine imaging, laser and optoelectronics. The course also exposes students to the concept of image quality and radiation safety in medical imaging.
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malay Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

	PRO FORMA KURSUS *COURSE PRO FORMA*
UNIVERSITI MALAYA	

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Bioperubatan	*Department of Biomedical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Bioperubatan	*Master of Biomedical Engineering*
Kod Kursus* *Course Code**	KQB 7006	KQB 7006
Tajuk Kursus* *Course Title**	Kejuruteraan Tisu	*Tissue Engineering*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	121	*121*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menerangkan prinsip-prinsip di sebalik Kejuruteraan Tisu. (C5) 2. Menilai cabaran dan penyelesaian Kejuruteraan Tisu. (C5) 3. Menghujah isu-isu pengawalseliaan dan etika yang berkaitan dengan Kejuruteraan Tisu. (C5)	*At the end of the course, students are able to:* *1. Explain the principles behind Tissue Engineering (C5)* *2. Evaluate Tissue Engineering challenges and solutions. (C5)* *3. Justify the regulatory and ethical issues related to Tissue Engineering. (C5)*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini merangkumi prinsip- prinsip kejuruteraan tisu bertumpu kepada kombinasi sel, perancah, komponen-komponen matriks sel luar dan stimulasi sesuai. Ia juga memberi ulasan semasa mengenai strategi dan penggunaan kejuruteraan tisu serta isu-isu etika.	*This course covers the principles of tissue engineering focused upon the combination of cells, scaffolds, components of extracellular matrix and appropriate stimulation. It also reviews current strategies and usage of tissue engineering as well as ethical issues.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malay Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

PRO FORMA KURSUS
COURSE PRO FORMA

PENTING/*IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Bioperubatan	*Department of Biomedical Engineering*
Nama Program Akademik Name of Academic*Programme*	Sarjana Kejuruteraan Bioperubatan	*Master of Biomedical Engineering*
Kod Kursus* *Course Code**	KQB 7007	KQB 7007
Tajuk Kursus* *Course Title**	Isyarat Fisiologi dan Analisis Imej	*Physiological Signal and Image Analysis*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Pada akhir kursus ini, pelajar dapat: 1. Mencadangkan kaedah pemprosesan isyarat bagi aplikasi isyarat fisiologi. (C5) 2. Mereka bentuk pemprosesan isyarat yang bersesuaian untuk pelbagai isyarat fisiologi. (P5) 3. Menilai teknik-teknik pemprosesan imej perubatan untuk tujuan diagnostik. (C5)	*At the end of the course, students are able to:* 1. *Recommend signal processing methods applied to physiological signals. (C5)* 2. *Design appropriate signal processing methods for various physiological signals. (P5)* 3. *Evaluate medical image processing*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	4. Menjelaskan pelbagai operasi analisis imej dalam kedua-dua domain ruang dan frekuensi bagi tujuan perbandingan. (C5)	techniques for diagnostic purposes. (C5) 4. Explain different image analysis operations in both spatial and frequency domain for comparison (C5)
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini merangkumi teknik pemprosesan isyarat fisiologi dan teknik analisis imej perubatan maju. Topik dalam pemprosesan isyarat termasuk pembuangan artifak, penguatan isyarat dan pemilihan ciri-ciri isyarat fisiologi biasa seperti ECG, EEG, EMG dan bunyi. Topik dalam pemprosesan imej termasuk transformasi skala kelabu, segmentasi dan ekstraksi ciri-ciri imej x-ray dan ultrabunyi.	This course covers advanced physiological signal processing techniques as well as medical image analysis techniques. The topics on signal processing include artefact removal, signal enhancement and feature selection of common physiological signals such as ECG, EEG, EMG and sound. The topics on image processing include grayscale transformation, segmentation and feature extraction of x-ray and ultrasound images.
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan:50% Peperiksaan Akhir:50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master'sDegree) 2019* *University of MalayaRegulations (Master's Degree) 2019*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Bioperubatan	*Department of Biomedical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Bioperubatan	*Master of Biomedical Engineering*
Kod Kursus* *Course Code**	KQB 7008	KQB 7008
Tajuk Kursus* *Course Title**	Kepintaran Buatan dalam Perubatan	*Artificial Intelligence in Medicine*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	122	*122*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Pada akhir kursus ini, pelajar dapat: 1. Mengintegrasikan teknik kecerdasan buatan ke arah pembangunan profesional dan keusahawanan dalam bidang perubatan. (C5) 2. Menentukan teori-teori teknik kecerdikan buatan dalam kejuruteraan bioperubatan. (C4) 3. Mengaplikasikan teknik-teknik kecerdikan buatan	*At the end of the course, students are able to:* *1. Integrate the artificial intelligence technique towards professional development and entrepreneurship in medicine. (C5)* *2. Determine the theories of artificial inteeligence techniques. (C4)* *3. Apply the artificial intelligence techniques in some*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	kepada beberapa kegunaan dalam kejuruteraan bioperubatan. (C3)	*biomedical engineering applications. (C3)*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini meliputi asas-asas kefahaman tentang konsep-konsep kecerdikan buatan dan kegunaankegunaan asasnya dalam Kejuruteraan Bioperubatan.	*The course covers the fundamental understanding of the artificial intelligence concepts and its basic applications in biomedical engineering.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. *Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Bioperubatan	*Department of Biomedical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Bioperubatan	*Master of Biomedical Engineering*
Kod Kursus* *Course Code**	KQB7009	*KQB7009*
Tajuk Kursus* *Course Title**	Kejuruteraan Rehabilitasi	*Rehabilitation Engineering*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Pada akhir kursus ini, pelajar dapat: 1. Menyelesaikan masalah rehabilitasi klinikal dan yang berkaitan dengan menggunakan instrumentasi biomekanikal termaju. (C4) 2. Menggunakan konsep dan teori rehabilitasi dalam menilai pergerakan manusia yang kurang upaya.(A5)	*At the end of the course, students are able to:* *1. Solve clinical rehabilitation problems and related issues by using advanced biomechanical instrumentation.(C4)* *2. Use the concepts and theories of rehabilitation in assessing disordered human movements. (A5)*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini meliputi teknik untuk gerakan manusia dan analisis beban dan gait patologi dan aktiviti-aktiviti lain. Aplikasi teknik kepada rekabentuk dan penilaian untuk implan ortopedik.	*The course covers techniques of human movement and load analysis in normal and pathological gait and other activities. Application of the techniques to the design and evaluation of orthopaedic implants.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

	PRO FORMA KURSUS
UNIVERSITI MALAYA	***COURSE PRO FORMA***

PENTING/***IMPORTANT***:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. *Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Bioperubatan	*Department of Biomedical Engineering*
Nama Program Akademik Name of Academic*Programme*	Sarjana Kejuruteraan Bioperubatan	*Master of Biomedical Engineering*
Kod Kursus* *Course Code**	KQB 7010	KQB 7010
Tajuk Kursus* *Course Title**	Teleperubatan	*Telemedicine*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menggunakan konsep perangkaian komputer dan komunikasi serta protokol dalam teleperubatan. (C3) 2. Membangun seni bina Internet dalamapplikasi kejuruteraan bioperubatan yang relevan. (P4)	*At the of this course, student will be able to:* *1. Use the concept of computer networking and communication as well as protocols in telemedicine. (C3)* *2. Develop the architecture of Internet in relevant biomedical engineering applications. (P4)* *3. Propose solutions to biomedical engineering-related communications problems. (C4)*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	3. Menyelesaikan masalah-maslah komunikasi berkaitan dengan kejuruteraan bioperubatan. (C4)	
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini meliputi teleperubatan dan pelbagai topik berkaitan perangkaian, terutamanya yang digunakan dalam bidang kejuruteraan bioperubatan. Topik termasuklah pengenalan kepada topologi perangkaian dan piawaian yang berkaitan; pengenalan kepada internet dan kegunaannya; asas-asas antaramuka komputer; dan teknologi-teknologi perangkaian komputer yang ada pada masa ini relevan kepada penyelidikan dan pembekalan perkhidmatan kejuruteraan bioperubatan.	*The course covers the telemedicine and various networking-related topics, particularly those applicable to biomedical engineering applications. Topics include an introduction to network topologies and related standards, introduction to the Internet and its applications, fundamentals of computer interface, and currently available computer networking technologies relevant to biomedical engineering research and service provision.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	1) Markah untuk tugasan dan penilaian berterusan diumumkan sebelum peperiksaan akhir 2) Gred untuk peperiksaan akhir akan diberikan.	*1) Announcement of marks for assignments and continuous assessment before the final examination.* *2) Grades for final exam will be given.*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master'sDegree) 2019* *University of MalayaRegulations (Master's Degree) 2019*

	PRO FORMA KURSUS
UNIVERSITI MALAYA	***COURSE PRO FORMA***

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. *Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Bioperubatan	*Department of Biomedical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Bioperubatan	*Master of Biomedical Engineering*
Kod Kursus* *Course Code*	KQB 7011	*KQB 7011*
Tajuk Kursus* *Course Title*	Keselamatan, Piawaian dan Etika dalam Kejuruteraan Bioperubatan	*Safety, Standard and Ethics in Biomedical Engineering*
Kredit* *Credit*	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes*	Di akhirkursusini, pelajardapat: 1. Menjelaskan peraturan-peraturan peranti perubatan dan badan-badan penguatkuasa.(C5) 2. Menilai pengukuran keselamatan elektrik dalam menganalisis Keselamatan elektrik dan pengujian dalam Peralatan Perubatan. (C5)	*At the of this course, student will be able to:* 1. *Explain the regulation of medical device regulation and regulatory bodies.(C5)* 2. *Evaluate electrical safety measurement in analysing the electrical Safety and Tests in Medical Devices. (C5)*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	3. Menghuraikan isu-isu etika dalam Kejuruteraan Bioperubatan(A3)	3. *Describe the ethical issues in biomedical engieering.(A3)*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini merangkumi peraturan peranti perubatan dan badan-badan kawal selia dan menunjukkan peranti perubatan peraturan antarabangsa dan nasional ,keselamatan dan piawaan. Keselamatan elektrik dan ujian dalam peranti perubatan juga dijelaskan. Pengiraan rekabentuk untuk keselamatan elektrik alat-alat perubatan.Garis panduan bagi alat-alat perubatan yang selamat ,alatperubatan , kemalangan elektrik, contohnya mikro dan kejutan makro , kesanfisiologi elektrik kepada manusia, arus bocor , dan alat-alat untuk melindungi daripada kejutan elektrik. Industri pengeluaran menganalisis ujian keselamatan alat-alat perubatan yang digunakan di hospital-hospital seperti mesin ECG .Kursus ini juga meliputi isu-isu etika dan bioetika yang berkaitan dengan kejuruteraan bioperubatan.	*The course covers the medical device regulation and regulatory bodies and demonstrates the international and national medical devices regulation, safety and standards. The electrical safety and tests in Medical devices are also explained. Design calculations for electrical safety of medical devices. Guidelines for of safe medical devices , medical instruments, electrical accidents , eg micro and macro shocks , electrical physiological effects to humans ,leakage current , and devices to protect against electric shock. Industrial in production of analyzing the safety testing of medical devices used in hospitals such as ECG machine. The course also covers ethical and bioethical issues related to biomedical engineering.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019

	PRO FORMA KURSUS *COURSE PRO FORMA*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. *Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Pejabat Timbalan Dekan (Ijazah Tinggi)	*Deputy Dean (Postgraduates) Office*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Bioperubatan Sarjana Kejuruteraan Mekanikal Sarjana Kejuruteraan Sistem Sarjana Kejuruteraan Keselamatan, Kesihatan dan Alam Sekitar	*Master of Biomedical Engineering* *Master of Mechanical Engineering* *Master of Systems Engineering* *Master of Safety, Health and Environment Engineering*
Kod Kursus* *Course Code**	KQX7001	*KQX7001*
Tajuk Kursus* *Course Title**	Metodologi Penyelidikan	*Research Methodology*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menentukan masalah penyelidikan yang bersesuai	*At the end of the course, students are able to:* *1. Determine research problem or issues*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	dengan bidang kejuruteraan 2. Merekabentuk kaedah kajian untuk menyelesaikan masalah kajian 3. Menilai secara kritikal kebolehlaksanaan dan kepraktisan kaedah kajian untuk menyelesaikan masalah kajian. 4. Menyelaras maklumat penyelidikan yang relevan ke dalam laporan teknikal yang komprehensif	*related to the respective engineering field.* *2. Design appropriate research methodology to solve the research problem* *3. Evaluate critically the feasibility and practicality of relevant methods and tools to solve the research problem* *4. Coordinate relevant research information into comprehensive technical report.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini mendedahkan pelajar kepada teknik – teknik bagaimana untuk menjalankan kajian. Di awal kursus pelajar di ajar dengan pelbagai teknik kajian termasuk, kaedah kajian saintifik. Kemudian, etika kajian, reka bentuk eksperimen dan teknik statistik di terangkan kepada pelajar di ikuti dengan mengenal pasti masalah kajian dan penulisan cadangan. Pelajar akan menguasai kemahiran kajian, penulisan saintifik, komunikasi lisan bagi dapatan kajian.	*This course exposes students to the techniques of how to conduct research. At the beginning of the course students are taught with various research techniques including, scientific research methods. Then, research ethics, experimental design and statistical techniques are explained to students followed by identifying research problems and writing suggestions. Students will master research skills, scientific writing, and oral communication for research findings.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 100% Peperiksaan Akhir:-	*Continuous Assessment:100%* *Final Examination: -*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

	PRO FORMA KURSUS *COURSE PRO FORMA*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Pejabat Timbalan Dekan (Ijazah Tinggi)	*Deputy Dean (Postgraduates) Office*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Bioperubatan Sarjana Kejuruteraan Mekanikal Sarjana Kejuruteraan Sistem Sarjana Kejuruteraan Keselamatan, Kesihatan dan Alam Sekitar	*Master of Biomedical Engineering* *Master of Mechanical Engineering* *Master of Systems Engineering* *Master of Safety, Health and Environment Engineering*
Kod Kursus* *Course Code**	KQX7002	*KQX7002*
Tajuk Kursus* *Course Title**	Pengurusan Projek	*Project Management*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisa prinsip komponen dan konsep	*At the end of the course, students are able to:* *1. Analyze the principle components and concepts*

UM-PT01-MQF-BR005-S01

117

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	pengurusan projek. 2. Membenarkan pelbagai pemacu perubahan yang boleh menjejaskan projek selama kitaran hidupnya. 3. Menyelesaikan segala cabaran semasa projek secara efektif. 4. Mengaplikasikan kemahiran keusahawanan dan kepimpinan dalam pengurusan sesuatu projek.	*of project management.* *2. Justify the various drivers of change which may impact a project during its life cycle.* *3. Solve every challenges faced during the project.* *4. Apply entrepreneurial and leadership skills in a project management.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini memberikan pengenalan yang sistematik dan menyeluruh untuk semua aspek pengurusan projek. Projek adalah aspek yang semakin penting dalam perniagaan kejuruteraan moden. Oleh itu, kursus ini mengutarakan pentingnya memahami hubungan antara projek dan matlamat strategik organisasi. Kursus ini juga membincangkan kemahiran teknikal, budaya, dan interpersonal yang diperlukan untuk menguruskan projek dengan jayanya dari awal hingga akhir. Ia menekankan bahawa pengurusan projek adalah disiplin profesional yang merangkumi pengetahuan dan kemahirannya yang tersendiri. Konsep diperkukuhkan dengan menggunakan kajian kes yang merangkumi pelbagai jenis projek dan industri.	*This course provides a systematic and thorough introduction to all aspects of project management. Projects are an increasingly important aspect of modern engineering business. Therefore, the course underlines the importance of understanding the relation between projects and the strategic goals of the organisation. The course also discusses the technical, cultural, and interpersonal skills necessary to successfully manage projects from start to finish. It emphasises that project management is a professional discipline with its own tools, body of knowledge, and skills. Concepts are reinforced by case studies covering a wide variety of project types and industries.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

Master of Mechanical Engineering
Faculty of Engineering

Programme Coordinator
Dr. Khoo Shin Yee

khooshinyee@um.edu.my | 03-79672176

UNIVERSITI MALAYA

MASTER OF MECHANICAL ENGINEERING

1. **Admission Requirements**

   (a) Qualifications for Admission

   (i) Bachelor Degree or equivalent with a CGPA > 3.00

   OR

   (ii) CGPA 2.0 to 2.99: Must fulfill the following criteria subject to the qualification categories as prescribed by the Senate:
   - *a.* Related working experience
   - *b.* At least 1 ISI publication published
   - *c.* Recipients of scholarships
   - *d.* Government agencies staff
   - *e.* Graduate of University Malaya
   - *f.* Pass Faculty interview
   - *g.* Pass Faculty special assessment

   OR

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

   (b) Additional English Language requirement for international students:

   A candidate who is not a Malaysian citizen and who possesses a degree or degrees from a university or an institution of higher education where the medium of instruction is not the English language for that degree or degrees must

   (i) obtain a score of 550 for the Test of English as a Foreign Language (TOEFL); **OR**

   (ii) obtain a band of 5.5 in the International English Language Testing System (IELTS);
   OR

   (iii) pass any English language test prescribed by the University

2. Program Structure

(1)   The program has a total load of forty-two (42) credit hours consisting of:

    (a)   Seven (7) core courses whereby each course carries three (3) credit hours **AND**;

    (b)   Research Project (12) credit **AND**;

    (c)   Three (3) elective courses whereby each course carries three (3) credit hours; **AND/OR**

    (d)   Any other course offered by the Faculty (Bahasa Malaysia).

(2)   Details of the offered courses are according to those approved by the Senate from time to time, upon the acknowledgement by the Faculty, and is informed the candidate at the beginning of each session.

(3)   The list of courses approved by the Senate for the degree of Master Engineering is stated in List 1. The candidates shall be informed of the combination of courses that need to be taken for the program before registering for the course.

(4)   Course Registration

    (a)   Course registration is done within the week preceding of the beginning semester.

    (b)   A candidate must register for at least six credit (6) hours in any semester except:

        (i)   In the final semester of the candidate's course of study, where the candidate may register for fewer credit hours than that stipulated above;

        OR

        (ii)   the candidate's appeal to withdraw from a particular course has been approved;

        OR

        (iii)   Subject to Faculty approval to allow the candidate to register for 3 credit hours only.

    (c)   Registration for Research Project can only be done after the candidate has taken Research Methodology and the candidate must not under observation category.

(5) Determination of Field of Research

The field of research must be determined **<u>before</u>** the candidate commences the research portion of the course.

(6) Supervision

Appointment of a Supervisor may be done in parallel with the submission of Research Project Title Application.

(7) Submission of Research Project

(a)   Notice of the Research Project Submission will be given to the candidate upon receiving the title and supervision approval of Research Project.

(b)   A candidate must submit the Research Project **<u>before</u>** the end of the maximum period of candidature.

COURSES APPROVED BY SENATE FOR THE PROGRAMME OF MASTER OF MECHANICAL ENGINEERING BY COURSEWORK

1. **CORE COURSES**

Course Code	Title	Credit Hours
KQK 7001	Research Project	12
KQK 7002	Engineering Data Analytics	3
KQK 7003	Thermal Systems Engineering	3
KQK 7004	Energy Conversion and Storage	3
KQK 7005	Applied Mechanics	3
KQX 7001	Research Methodology	3
KQX 7002	Project Management	3
KQK 7006	Fatigue and Fracture Mechanics	3

2. **ELECTIVE COURSE**

Course Code	Title	Credit Hours
KQK 7007	Computational Fluid Dynamics	3
KQK 7008	HVAC and Building Energy Management	3
KQK 7009	Sensors and Actuators	3
KQK 7010	Machinery Vibration and Condition Monitoring	3
KQK 7011	Power Plant Engineering	3
KQK 7012	Sustainability Energy Technology	3
KQK 7013	Finite Element Analysis	3
KQK 7014	Materials Selection and Mechanical Design	3
KQK 7015	Advanced Manufacturing Technology	3
KQK 7016	Integrated Computer Aided Design in Product Development	3
KQK 7017	Pump Characteristics and Applications	3

COURSE OFFERED FOR THE PROGRAMME OF
MASTER OF MECHANICAL ENGINEERING

Code	Course	Credit Hours	Duration of Examination	Distribution of Marks	
				% Continuous Assessments	% Final Examination
CORE COURSES					
KQK 7001	Research Project	12	-	100	-
KQK 7002	Engineering Data Analytics	3	2 hours	50	50
KQK 7003	Thermal Systems Engineering	3	2 hours	50	50
KQK 7004	Energy Conversion and Storage	3	2 hours	50	50
KQK 7005	Applied Mechanics	3	2 hours	50	50
KQX 7001	Research Methodology	3	-	100	-
KQX 7002	Project Management	3	2 hours	50	50
KQK 7006	Fatigue and Fracture Mechanics	3	2 hours	50	50
ELECTIVE COURSES					
KQK 7007	Computational Fluid Dynamics	3	2 hours	50	50
KQK 7008	HVAC and Building Energy Management	3	2 hours	50	50
KQK 7009	Sensors and Actuators	3	2 hours	50	50
KQK 7010	Machinery Vibration and Condition Monitoring	3	2 hours	50	50
KQK 7011	Power Plant Engineering	3	2 hours	50	50
KQK 7012	Sustainability Energy Technology	3	2 hours	50	50
KQK 7013	Finite Element Analysis	3	2 hours	50	50

KQK 7014	Materials Selection and Mechanical Design	3	2 hours	50	50
KQK 7015	Advanced Manufacturing Technology	3	2 hours	50	50
KQK 7016	Integrated Computer Aided Design in Product Development	3	2 hours	50	50
KQK7017	Pump Characteristics and Applications	3	2 hours	50	50

AND

(1)   Any other course approved by the Senate

(2)   Elective course offered in each semester may vary from semester to semester and subject to offer.

(3)   Elective course offered by Faculty is subject to change. Notice will be given to the candidate by the Program Coordinator or Deputy Dean (Postgraduate Studies)'s office from time to time.

PROGRAMME GOALS AND OUTCOMES

AIM OF THE PROGRAMME

The aim of the program is to produce graduates who are knowledgeable in the field of Mechanical Engineering, providing them with high professionalism value, competitive, high ethical values as well as critical thinking skills to make decisions on issues related to field of Mechanical Engineering based on basic knowledge and expertise through the designed program structures.

OBJECTIVE

The programme objectives are:

1. Graduates hold a senior or decision-making position in mechanical engineering or related field in both private and public sectors

2. Graduates engage in research and development activities in mechanical engineering or related field for their career advancement

3. Graduates contribute actively in sustainable development and well-being of the society

PROGRAMME LEARNING OUTCOMES

No.	Programme Learning Outcome(s) (PLO)	Taxonomy Category (K/P/A)*
PLO1	Demonstrate continuing advanced knowledge and apply the knowledge in solving complex mechanical engineering problems.	K, P
PLO2	Analyze and evaluate complex mechanical engineering problems or issues critically and provide solutions through the application of mechanical engineering concepts.	K, P
PLO3	Formulate and design solutions for the complex mechanical engineering problems using appropriate methods and tools.	K, P
PLO4	Communicate critically based on the mechanical engineering knowledge using oral or written medium as individual or in a group.	K, P
PLO5	Demonstrate competency incorporating advanced numerical concept and adopt relevant digital technologies in solving complex mechanical engineering problems.	K, P
PLO6	Demonstrate significant leadership skills in project management and technical project in the context of complex mechanical engineering application.	A, K

PLO7	Identify the need for continuous professional development and entrepreneurial element in the context of mechanical engineering discipline.	A, K
PLO8	Plan and execute technical or research project ethically and professionally as a socially responsible mechanical engineer.	A, K

Reference notes:

The Domain of the MQF in Programme Learning Outcomes program (PLO)

PLO Domain

      PLO1   Knowledge and Understanding
      PLO2   Cognitive Skills
      PLO3   Practical Skills
      PLO4   Interpersonal and Communication Skills
      PLO5   Digital and Numeracy Skills
      PLO6   Leadership, Autonomy and Responsibility
      PLO7   Personal and Entrepreneurial Skills
      PLO8   Ethics and Professionalism.

Taxonomic Category

      K   Cognitive
      A   Affective
      P   Psychomotor

PLANNER FOR MASTER OF MECHANICAL ENGINEERING

COURSE CODE	SEMESTER 1		CREDIT	SEMESTER 2		CREDIT	SEMESTER 3**		CREDIT
	COURSE CODE			COURSE CODE			COURSE CODE		
	Code	Subject		Code	Subject		Code	Subject	
Core Courses	KQX7001	Research Methodology		KQX7002	Project		KQK7001	Research Project * (P)	
	KQK7002	Engineering Data Analytics		KQK7001	Management				
	KQK7003	Thermal Systems Engineering		KQK7005	Research Project *				
	KQK7004	Energy Conversion and Storage		KQK7006	(P)				
					Applied				
					Mechanics				
					Fatigue and Fracture Mechanics				

	Code	Subject		Code	Subject		Code	Subject	
Elective Courses	KQK7007	Computational Fluid Dynamics		KQK7009	Sensors and Actuators				
	KQK7008	HVAC and Building Management		KQK7011	Power Plant Engineering				
	KQK7010	Machinery Vibration and Condition Monitoring		KQK7012	Sustainability Energy Technology				
				KQK7013	Finite Element Analysis				
	KQK7014	Materials Selection in Mechanical Design		KQK7015	Advanced Manufacturing Technology				
	KQK7016	Integrated Computer Aided Design in Product Development		KQK7017	Pump Characteristics and Applications				

NOTE:

(3)   *Registration for Research Project can only be done after the candidate has completed **Research Methodology** and the candidate must not be under observation category.

(4)   **Courses will be offered if there are sufficient requests.

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7001	*KQK7001*
Tajuk Kursus* *Course Title**	Projek Penyelidikan	*Research Project*
Kredit* *Credit**	12	*12*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	480	*480*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	KQX7001 - Metodologi Penyelidikan	KQX7001 – Research Methodology
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menentukan kajian literatur dan kajian teori yang diperlukan untuk penyelidikan. 2. Merekabentuk kaedah untuk membuat kajian eksperimen atau teori. 3. Menyelesaikan masalah penyelidikan melalui metodologi dan alat yang ditentukan.	*At the end of the course, students are able to:* 1. *Determine literature review and theoretical study required for the research.* 2. *Design a methodology to carry out experimental or theoretical research* 3. *Solve a research problem through a defined methodology and tools.*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	4. Menilai data dan penemuan penyelidikan menggunakan alat digital yang sesuai. 5. Menggunakan kemahiran pengurusan projek yang sesuai dalam menyelesaikan projek penyelidikan. 6. Menunjukkan hasil projek penyelidikan kepada latar belakang khalayak yang berbeza melalui pembentangan. 7. Meneliti kesan kewangan dan ekonomi daripada hasil penyelidikan yang dilakukan 8. Menghubungkaitkan hasil penyelidikan yang diperolehi dengan impak kepada masyarakat.	*4. Evaluate the data and findings of the research using the appropriate digital tools.* *5. Apply appropriate project management skills in completing the research project.* *6. Demonstrate the outcome of research project to different background of audience through presentation.* *7. Examine the financial and economic impacts of the research outcomes.* *8. Relate the research results obtained to the impact on society*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Projek penyelidikan akan mendedahkan pelajar dalam menjalankan penyelidikan bermula daripada membuat ulangkaji risalah yang berkaitan dengan topik kajian. Kemudian diikuti dengan merancang dan menjalankan kajian dengan kaedah yang bersesuaian. Data kajian akan dikumpulkan dan dianalisa bagi menyelesaikan permasalahan penyelidikan. Laporan projek penyelidikan dan pembentangan hasil penyelidikan pada akhir semester.	*Research projects will expose students in conducting research starting from reviewing the literature review related to the topic of study. Then followed by planning and conducting a research by utilizing an appropriate method. The data will be collected and analysed to solve the research problems. Research project reports and presentation of research results will be done at the end of the semester*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 100% Peperiksaan Akhir: 0%	*Continuous Assessment:100%* *Final Examination:0%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7002	*KQK7002*
Tajuk Kursus* *Course Title**	Analisis Data Kejuruteraan	*Engineering Data Analytics*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisa data kejuruteraan dengan mengunakan kaedah berangka 2. Menganalisa data kejuruteraan dengan mengunakan kaedah pemprosesan isyarat digit.	*At the end of the course, students are able to:* *1. Analyse engineering data using numerical methods.* *2. Analyse engineering data using digital signal processing methods.*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	3. Meramal suatu hasil kejuruteraan yang diinginkan dengan menggunakan sifat data dan algoritma pembelajaran mesin yang sesuai.	3. *Predict a desired engineering outcome using suitable data feature and machine learning algorithm.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Proses membuat keputusan berasaskan data adalah komponen penting dalam sistem kejuruteraan yang baru muncul di industri 4.0. Ia terutamanya melibatkan tugas penyifatan data dan kemahiran pemodelan sistem diskret yang berkesan. Kursus ini memperkenalkan alat matematik umum yang digunakan untuk menganalisa data kejuruteraan seperti analisa berangka dan pemprosesan isyarat, untuk menyari sift data yang sesuai untuk ramalan hasil yang diinginkan. Pelajar perlu membangun model matematik atau model 'kotak hitam' dengan pembelajaran mesin dan mengaplikasikannya bersama sifat data yang dipilih untuk menganggar penyelesaian. Dengan itu, penyelesaian ini dapat memberikan celik akal untuk membuat keputusan yang lebih baik dalam aplikasi kejuruteraan.	*Data-driven decision making process is an essential component of emerging engineering systems in industry 4.0. It mainly involves effective data featuring task and discrete system modelling skill. This course introduces general mathematical tools used to analyse engineering data such as numerical analysis and signal processing, in order to extract its suitable feature for prediction of the desired outcome. Students need to develop a mathematical model or a 'black-box' model with machine learning, and apply it with the selected data feature to estimate the solution. Hence, this solution will give a new insight for better decision making in engineering application.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

	PRO FORMA KURSUS *COURSE PRO FORMA*
UNIVERSITI MALAYA (logo)	

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7003	*KQK7003*
Tajuk Kursus* *Course Title**	Kejuruteraan Sistem Haba	*Thermal Systems Engineering*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Model sistem haba yang kompleks kepada komponen-komponen asas pemindahan haba dan aliran bendalir. 2. Menilai sistem haba berdasarkan prinsip pemindahan haba dan aliran bendalir. 3. Mengukur potensi penambahbaikan reka bentuk	*At the end of the course, students are able to:* *1. Model a complex thermal system into basic components of heat transfer and fluid flow.* *2. Evaluate a thermal system based on principles of heat transfer and fluid flow.* *3. Measure the potential of thermal design improvement and optimization by means of*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	dan pengoptimuman sistem haba dengan mengunakan alatan atau kaedah moden.	*modern tools or methods.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Rangkaian rintangan termal untuk pemindahan haba yang stabil, Pemindahan haba yang stabil dari permukaan bersirip atau penukar haba, Pengaliran haba konduksi tak stabil dalam geometri-geometri asas, Pengaliran haba tak stabil pada kedudukan yang berlainan, Aliran bendalir dan pemindahan haba pada plat rata, silinder dan sfera, dan di atas tiub-tiub yang tersusun, Kaedah berangka dan perisian komputer aliran bendalir dan haba (kes-kes 2D dan 3D), Aliran laminar dan aliran bergelora dan pemindahan haba dalam tiub, Sistem penukar haba, Pemindahan Haba Radiasi.	*Thermal resistance network for steady heat transfer, Steady heat transfer from finned surfaces or heat exchanger, Transient heat conduction in uniform and standard geometries and with spatial effects, Fluid flow and heat transfer over flat plate, cylinders and sphere and ove tube banks, Laminar and turbulent flow and heat transfer in tubes, Numerical Method and Computational Fluid Dynamics (2D & 3D cases), Heat exchangers, Radiation Heat Transfer*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019*

	PRO FORMA KURSUS
UNIVERSITI MALAYA	***COURSE PRO FORMA***

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7004	*KQK7004*
Tajuk Kursus* *Course Title**	Penukaran Tenaga dan Penyimpanan	*Energy Conversion and Storage*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisis penukaran tenaga dalam proses thermo-mekanikal, thermo-kimia, elektrokimia dan fotoelektrik. 2. Menunjukkan pengaruh parameter utama yang mempengaruhi kecekapan loji janakuasa 3. Membanding pelbagai sistem penukaran tenaga	*At the end of the course, students are able to:* *1. Analyse energy conversion in thermo-mechanical, thermo-chemical, electrochemical, and photoelectric processes.* *2. Demonstrate the influence major parameters that influence the efficiency of*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	termasuk kos, penerimaan sosial dan juga akibat alam sekitar	*the power plants* 3. *Compare various energy conversion systems including cost, social acceptability as well as environmental consequences*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Pengenalan kepada tenaga, Senario tenaga, Ekonomi tenaga, Enjin haba dan termodinamik: kuasa bendalir dan enjin haba, Enjin haba dan termodinamik: proses termodinamik dan ciri-ciri, Penukaran termal kepada tenaga mekanikal: Kitaran Rankine, Penukaran kimia kepada tenaga termal - Bahan Api & Pembakaran, Penukaran termal kepada tenaga mekanikal: Kitaran Brayton, Penukaran nuklear kepada tenaga terma, Penukaran elektromagnetik kepada tenaga termal – Solar, Penukaran elektromagnetik kepada tenaga termal – PV, Penukaran kimia kepada tenaga elektrik- Fuel Cells, Peningkatan kecekapan tenaga, Penyimpanan Tenaga	*Introduction to energy, Energy scenario, Energy economics, Heat Engines & thermodynamics: fluid power and heat engine, Heat Engines & thermodynamics ;thermodynamic processes and properties, Thermal to mechanical energy conversion: Rankine Cycle, Chemical to thermal energy conversion - Fuels & Combustion, Thermal to mechanical energy conversion- Brayton cycle, Nuclear to Thermal Energy Conversion, Electromagnetic to Thermal Energy Conversion- Solar, Electromagnetic to Electrical Energy Conversion- PV, Chemical to Electrical Energy Conversion- Fuel Cells, Energy efficiency improvement, Energy Storage*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019*

PENTING / IMPORTANT:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7005	*KQK7005*
Tajuk Kursus* *Course Title**	Mekanik Gunaan	*Applied Mechanics*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisa masalah mekanik gunaan secara logik. 2. Mengaplikasi teori mekanik gunaan dalam masalah kehidupan sebenar 3. Merumuskan penyelesaian kepada masalah mekanik gunaan tiga dimensi	*At the end of the course, students are able to:* 1. *Analyse applied mechanics problem in a logical manner.* 2. *Apply theory of applied mechanics in the real life problem.* 3. *Formulate solution to a three-dimensional applied mechanics problem.*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Pengenalan kepada Mekanik, Mekanik Jasad Tegar dan Mekanisme Planar, Struktur Kerangka, Pengurangan Beban Tergaih, Kekuatan Ricih dan Momen Lentur, Geseran dan Pelinciran, Hubungan, Analisis Kinematik Grafik dan Analisa Mekanisme Planar, Kerja, Tenaga dan Kuasa, Gerakan Berkala , Dinamik Putaran, Pengimbangan Mesin – Putaran dan Salingan, Pemacu talisawat dan Brek, Gear Trains	*Introduction to Mechanics, Mechanics of Rigid Bodies and Planar Mechanisms, Framework Structure, Reduction of a Simple Distributed Loading, Shear Force and Bending Moment, Friction and Lubrication, Linkages, Graphical and Analytical Kinematic Analysis of Planar Mechanisms , Work, Energy and Power, Periodic Motion, Dynamics of Rotation, Balancing of Machines – Rotating and Reciprocating, Belt Drives and Brakes, Gear Trains*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7006	*KQK7006*
Tajuk Kursus* *Course Title**	Kelesuan dan Mekanik Retak	*Fatigue and Fracture Mechanics*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menjelaskan mekanisme-mekanisme kegagalan dalam bahan 2. Merekabentuk bahan dan komponen melawan kegagalan 3. Menjalankan analisis kegagalan bahan kejuruteraan, komponen dan struktur	*At the end of the course, students are able to:* *1. Explain failure mechanisms in materials* *2. Design materials & components against failure* *3. Perform failure analysis of engineering materials, components and structures*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini dimulakan dengan memberi pengenalan pada kegagalan yang selalu dihadapi oleh bahan semasa perkhidmatannya. Kaji semula yang ringkas berkaitan dengan konsep tegasan dan terikan akan diajarkan. Selepas ini, tiga kegagalan akan dibincangkan dengan teliti: deformasi plastik, kagagalan rapuh dan keletihan. Akhirnya, beberapa contoh mengenali dengan kegagalan kejuruteraan akan dianalisasikan dan dibincangkan.	*The course starts with general introduction on failures commonly encountered in materials during the service. A brief review on the concept of stress and strain will be given. Then, three failures will be discussed in detail: yielding, brittle fracture and fatigue. Finally, some examples of engineering failure analysis will be discussed.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7007	*KQK7007*
Tajuk Kursus* *Course Title**	Dinamik Bendalir Berkomputer	*Computational Fluid Dynamics*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menentukan kesedaran yang kritikal persamaan mekanik bendalir dan sifat-sifat matematik mereka dalam formulasi yang pelbagai. 2. Menilai prinsip-prinsip dan batasan teknik alternatif bagi simulasi aliran bergelora dan peralihan. 3. Menilai sumber potensi ralat dan ketidakpastian	*At the end of the course, students are able to:* *1. Determine a critical awareness of the governing equations of fluid mechanics, and their mathematical properties, in various formulations.* *2. Appraise the principles and limitations of alternative techniques for the simulation of*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	simulasi berangka.	*turbulent and transitional flows.* *3. Evaluate the potential sources of error and uncertainty in numerical simulations.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini akan menyediakan pelajar dengan kefahaman yang jelas terhadap penggunaan simulasi pengiraan dan teknik-teknik pemodelan digunakan untuk masalah kejuruteraan. Ia juga akan menyediakan perspektif struktur data canggih, algoritma dan reka bentuk perisian. Pengenalan kepada kaedah pengkomputeran teragih dan berprestasi tinggi juga akan pelajari.	*The course will provide students with a sound understanding of the use of computational simulation and modeling techniques applied to engineering problems. It will also provide insight into advanced data structures, algorithms and software design. An introduction to distributed and high performance computing methods will also be included.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7008	*KQK7008*
Tajuk Kursus* *Course Title**	HVAC dan Pengurusan Tenaga Bangunan	*HVAC and Building Energy Management*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Merekabentuk sistem HVAC & R untuk bangunan. 2. Menghitung beban pemanasan dan penyejukan bangunan. 3. Menaksir operasi sistem HVAC & R di bawah keadaan beban pemanasan dan penyejukan yang	*At the end of the course, students are able to:* *1. Design HVAC & R systems for buildings.* *2. Calculate building heating and cooling load* *3. Evaluate the operation of HVAC & R systems under different heating and cooling load conditions.*

UM-PT01-MQF-BR005-S01

	PRO FORMA KURSUS *COURSE PRO FORMA*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	berbeza.	
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Menggunakan prinsip rekabentuk untuk sistem penyamanan udara dan pendinginan. Menaksir operasi peralatan penyamanan udara di bawah keadaan beban yang berbeza. Membina kebolehan untuk menggunakan maklumat dari buku pegangan rekabentuk tertubuh seperti panduan ASHRAE. Mempunyai kebolehan untuk melakukan pengiraan beban penyamanan udara bangunan dan menilai faktor yang mempengaruhinya.	*Understand the design principles for air conditioning and refrigeration apparatus. Evaluate the operation of air conditioning equipment under varying load conditions. Develop the ability to use information from established design handbooks such as the ASHRAE guide. Be able to perform building air conditioning load calculations and appreciate factors influencing them*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

	Universiti Malaya	**PRO FORMA KURSUS** *COURSE PRO FORMA*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7009	*KQK7009*
Tajuk Kursus* *Course Title**	Penderia dan Penggerak	*Sensors and Actuators*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Memilih penderia yang sesuai berdasarkan prinsip kerja untuk penggunaan dalam sistem pengukuran 2. Mengaplikasi pasca-pemprosesan isyarat yang diperolehi daripada penderia dalam sistem pengukuran	*At the end of the course, students are able to:* *1. Choose appropriate sensors based on working principles for use in measurement system* *2. Apply post-processing on signals acquired from sensors in a measurement system* *3. Decide suitability of actuators and*

UM-PT01-MQF-BR005-S01

	3. Menentukan kesesuaian penggerak dan mekanisme berdasarkan aplikasi yang diperlukan 4. Mereka sistem automatik lengkap yang mengandungi penderia dan penggerak	*mechanisms according to required applications* *4. Design a complete automated system containing sensors and actuation*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini mendedahkan pelajar kepada penderia, penggerak, dan pembangunan sistem dengan komponen berkenaan. Ini termasuk pengenalan kepada penderia, penggerak dan Internet Pelbagai Benda (IoT), pelantar-pelantar IoT dan sistem pengukuran, penderia-penderia dalam pelbagai pengukuran, termasuk sesaran, kehampiran, getaran, pecutan, suhu, tekanan, dan penderia piezorintangan dan piezoelektrik serta penggunaan, prinsip dan praktik perolehan data, pasca-pemprosesan isyarat daripada penderia, pelbagai jenis penggerak, penggerakan lelurus, berputar serta mekanisme penukaran pergerakan, kawalan sistem penggerakan, dan sistem automatik lengkap dengan integrasi penderia, penggerak dan IoT.	*This course exposes students to sensors, actuators, and the development of systems with relevant components. This includes introduction to sensors, actuators and Internet of Things (IoT), platforms of IoT and measurement systems, sensors in various measurements, including displacement, proximity, vibration, acceleration, temperature, pressure, and piezoresistive and piezoelectric sensors together with applications, data acquisition principles and practices, post-processing of acquired data from sensors, various types of actuators, linear and rotary actuation together with motion conversion mechanisms, controls for actuation systems, and integration of sensors, actuators and IoT for complete automated system.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PRO FORMA KURSUS
COURSE PRO FORMA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7010	*KQK7010*
Tajuk Kursus* *Course Title**	Getaran Jentera dan Pemantauan Keadaan	*Machinery Vibration and Condition Monitoring*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisa data getaran jentera melalui teknik pementauan keadaan 2. Menentukan kegagalan jentera yang umum dengan data getaran 3. Menilai masalah getaran rumit yang melibatkan isu-isu dinamik jentera	*At the end of the course, students are able to:* 1. *Analyse machinery vibration through condition monitoring technique* 2. *Determine common machinery fault conditions using vibration data* 3. *Evaluate complex vibration problem involving machinery dynamics issues*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Asas getaran, had dan piawai getaran, Pelaksanaan penyelenggaraan, Skim pemantauan keadaan dan audit kualiti, Pengumpulan isyarat getaran dengan menggunakan transduser, penukaran isyarat getaran dari isyarat analog ke digital, Domain masa- analisa gelombang, Domain frekuensi- analisa 'FFT', analisa fasa, Diagnostik kegagalan jentera, *Dinamik Jentera, analisa ragaman, analisa 'ODS', analisa bunyi*	*Fundamentals of vibration, Limits and standards of vibration Maintenance practices, Condition monitoring scheme and Quality Auditing, Collection of vibration signal using transducers. Conversion of vibration signals from analogue to digital signals, Time domain - waveform analysis, Frequency domain - Fast Fourier transform (FFT) analysis, Phase analysis, Machinery faults diagnostics, Machinery dynamics, Modal Analysis, Operating Deflection Shape Analysis, Noise Analysis*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7011	*KQK7011*
Tajuk Kursus* *Course Title**	Kejuruteraan Lojikuasa	*Power Plant Engineering*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisis sistem asas kuasa wap dan gas; untuk loji haba kovensional dan nuclear 2. Menyelesaikan masalah-masalah kecekapan tenaga di dalam sistem lojikuasa 3. Mengenalpasti kaedah modifikasi yang boleh diambil untuk mengoptimumkan sistem lojikuasa	*At the end of the course, students are able to:* 1. *Analyse on fundamental systems of vapor and gas sytems and applying on thermal plants for conventional and nuclear plant* 2. *Solve all the energy efficiencies problems in power systems* 3. *Identify the modification methods that can*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
		be applied to optimize the power plant
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Pengenalan – Ekonomi Penjanaan Kuasa - Sistem wap – sistem gas – Kitaran Gabungan – Sistem Nuklear - Loji Nuklear – Fizik Reaktor - Loji Hidro – Ladang Suria – Loji Sumber Alternative – Kecekapan Loji - Ulangkaji	*Introduction – Economics of Power Generation – Vapor System – Gas System – Combine Cycle – Nuclear System – Reactor Physics – Hydro Plant – Solar Farm – Alternative Energy Plants – Plant Efficiency - Revision*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UNIVERSITI MALAYA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7012	*KQK7012*
Tajuk Kursus* *Course Title**	Teknologi Tenaga Lestari	*Sustainability Energy Technology*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menerangkan tenaga asas, penukaran tenaga dan kegunaannya 2. Menganalisa isu teknikal di dalam sistem tenaga dan kebolehmampanan 3. Menerangkan pelbagai teknologi penghasilan tenaga boleh diperbaharui dan konvensional,	*At the end of the course, students are able to:* *1. Explain energy basics, renewable energy conversion and its applications* *2. Analyse the technical issues in renewable energy systems and sustainability* *3. Explain various renewable and conventional energy production technologies, practices*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	amalan serta alternatif penggunaan tenaga	*and alternatives to energy use*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Sistem-sistem tenaga memainkan satu peranan penting dalam kehidupan harian dan mustahak dalam kejuruteraan. Kajian mengenai sejarah penggunaan tenaga menunjukkan kepelbagaian teknologi-teknologi penjanaan tenaga, dan aliran ini berkemungkinan akan berterusan. Sumber-sumber tenaga lestari sedang giat bertambah dan akan wujud sebagai sumber penjanaan tenaga penting. Tenaga boleh diperbaharui bertambah dengan pesat pada kadar 30% atau lebih setiap tahun dan ia boleh memberi impak yang penting pada penjanaan dan penggunaan tenaga. Matlamat kursus ini adalah bagi membolehkan pelajar-pelajar untuk mengenalpasti di mana, bagaimana dan kenapa teknologi tenaga diperbaharui sepatutnya di gunakan secara berkesan.	*Energy systems play a critical role in everyday life and as such are an important part of engineering. Examination of historical energy patterns shows a continual diversification of energy generating technologies, and the trend is likely to continue. Sustainable energy sources are increasingly visible and are important part of the emerging energy mix. Renewable energy continues to grow rapidly at rates 30% per year or more and is now at a level that they can make a significant impact on energy generation and utilization. This course describes key renewable energy technologies. The goal of the course is for students to able to identify where, how and why renewable energy technologies should be appropriately used.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7013	*KQK7013*
Tajuk Kursus* *Course Title**	Analisis Unsur Terhingga	*Finite Element Analysis*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menunjukkan penggunaan kaedah elemen terhad untuk menyelesaikan masalah-masalah kejuruteraan asas. 2. Menilai had kaedah unsur terhingga khusus dan dapat membangunkan prosedur-prosedur paling sesuai untuk masalah kejuruteraan khusus.	*At the end of the course, students are able to:* 1. *Demonstrate the use of finite element methods to solve the basic engineering problems.* 2. *Assess the limitation of specific finite element method and be able to develop the*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	3. Pengoptimuman reka bentuk menggunakan teknik-teknik kaedah unsur terhingga.	*most suitable procedures for specific engineering problems.* *3. Design optimization utilising the techniques of finite element method.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Pengenalan kepada Matrix algebra, Jenis elemen-elemen terhad unsur-unsur Bar dan unsur-unsur,masalah-masalah dimensi, teori asas,tekanan, syarat-syarat sempadan. Elemen terhad memperagakan dan penyelesaian teknik, penyelesaian persamaan, kaedah-kaedah langsung dan berlelar. Elemen-elemen plat, teori plat dan aplikasi, mengopek teori unsur-unsur dan permohonan pepejal, unsur-unsur getaran dan struktur dinamik.	Introduction- Review of Matrix algebra- Type of finite elements-spring elements-Bar and Beam elements-Two-dimensional problems – basic theory – stress – strain relations – boundary conditions. Finite element modeling and solution techniques- Equation solving; direct and iterative methods. Plate elements – plate theory and application- shell elements-theory and application -solid elements-Structural vibration and dynamics; Frequency Response Analysis-Transient Response Analysis.
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019*

UNIVERSITI MALAYA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7014	*KQK7014*
Tajuk Kursus* *Course Title**	Pemilihan Bahan dalam Rekabentuk Mekanikal	*Materials Selection in Mechanical Design*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisis hubungan antara syarat rekabentuk produk, struktur dan sifat bahan kejuruteraan. 2. Menjelaskan kepentingan proses pembuatan dalam pemilihan bahan dan rekabentuk. 3. Merekabentuk bahan dalam situasi yang melibatkan pelbagai halangan dan konflik dari segi	*At the end of the course, students are able to:* *1. Analyse the relationships between product design requirements, structure and properties of engineering materials.* *2. Explain the importance of manufacturing process in materials selection and design.* *3. Design materials in situations involving*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	objektif	*multiple constraints and conflicting objectives.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini bermula dengan mengkaji semula struktur dan sifat-sifat keluarga besar bahan serta kajian semula proses reka bentuk kejuruteraan. Kemudian, memperkenalkan kriteria prestasi dan carta sifat bahan. Selepas itu, asas-asas di proses pemilihan bahan dalam reka bentuk kejuruteraan dibincangkan. Pelajar akan dilatih untuk memilih bahan-bahan dalam keadaan reka bentuk kompleks yang melibatkan pelbagai halangan dan objektif yang bercanggah. Faktor ekonomi dan alam sekitar akan dibincangkan.	*This course starts with a review of the structure and properties of major families of materials as well as a review of the engineering design process. It then introduces performance criteria and materials property charts. Basics of materials selection process in engineering design are covered. Students will be trained to select materials in complex design situations involving multiple constraints and conflicting objectives. Economic and environmental factors are discussed.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7015	*KQK7015*
Tajuk Kursus* *Course Title**	Teknologi Pembuatan Termaju	*Advanced Manufacturing Technology*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Mengklasifikasi teknologi pembuatan termaju sedia ada yang sesuai untuk aplikasi dan disiplin kejuruteraan yang tertentu. 2. Menganalisa had teknologi pembuatan termaju dalam proses pembuatan. 3. Mengaplikasikan konsep Kejuruteraan Balikan	*At the end of the course, students are able to:* *1. Classify the suitable established advanced manufacturing technology for particular engineering application and discipline.* *2. Analyse the advanced manufacturing technology limitation in the manufacturing processes.*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	dan menghujah teknik prototaip pantas untuk bahagian atau produk yang tertentu.	3. *Apply the concept of Reverse Engineering and justify rapid prototyping technique for a particular part or product.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Konsep teknologi pemprosesan bahan bukan tradisional akan diperkenalkan dengan pelbagai jenis pemesinan termaju meliputi kaedah berasaskan haba, proses reaksi kimia dan proses hakisan. Kaedah kejuruteraan balikan termasuk proses pendigitan melalui pengimbasan optik dan pengimbasan laser juga diperkenalkan. Pelbagai teknik prototaip pantas akan diterangkan kepada pelajar.	*The concept of non-traditional material processing technology will be introduced with various type of advanced machining encompasses thermal-based methods, chemical reaction processes and erosion processes. The method of reverse engineering including digitizing processes through optical scanning and laser scanning will be introduced. Various rapid prototyping techniques will be explained to the students.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

PRO FORMA KURSUS
COURSE PRO FORMA

UNIVERSITI MALAYA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7016	*KQK7016*
Tajuk Kursus* *Course Title**	Rekabentuk Terbantu Komputer Bersepadu dalam Pembangunan Produk	*Integrated Computer Aided Design in Product Development*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Ilustrisasikan prinsip komputer grafik di dalam aplikasi rekabentuk terbantu komputer. 2. Menunjukkan penggunaan sistem rekabentuk terbantu komputer dalam proses pembangunan produk. 3. Merekabentuk menggunakan sistem rekabentuk	*At the end of the course, students are able to:* *1. Illustrate the computer graphic principles in the Computer Aided Design application.* *2. Demonstrate the use of computer aided design systems in the product development process.* *3. Design using computer aided design system*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	terbantu komputer bagi pembangunan produk secara bersepadu.	*for concurrent product development.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini memberi penekanan kepada pemodelan parametrik pepejal dengan menggunakan perisian reka bentuk terbantu komputer yang komersial. Pelajar dijangka membangunkan kemahiran dan menggunakan Teknik yang bersesuaian untuk menghasilkan profil geometri yang berfungsi sebagai pangkalan data untuk menghasilkan model 3-D, lukisan kerja, bil bahan dan pandangan model yang dipasang. Di samping itu, pelajar akan didedahkan kepada pembangunan output prototaip pantas (percetakan 3-D) dan teknologi canggih realiti bertambah (AR).	*This course emphasis on parametric solid modelling using commercial computer aided design software. Student is expected to develop skills and utilize appropriate techniques to produce geometric profiles that serve as a database to produce 3-D models, working drawings, bill of materials and exploded views of assembled models. In addition, the student will be exposed into development of rapid prototype output (3-D printing) and advanced technology of augmented reality (AR).*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50%* *Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

	PRO FORMA KURSUS *COURSE PRO FORMA*
UNIVERSITI MALAYA	

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Mekanik	*Department of Mechanical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Mekanikal	*Master of Mechanical Engineering*
Kod Kursus* *Course Code**	KQK7017	*KQK7017*
Tajuk Kursus* *Course Title**	Ciri-ciri dan Aplikasi Pam	*Pump Characteristics and Applications*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Bandingkan pelbagai jenis pam berdasarkan kepada ciri-cirinya dan aplikasinya. 2. Menilai secara mendalam ciri-ciri pam. 3. Menilai prestasi pam termasuk sambungan paipnya berdasarkan aplikasi kehidupan sebenar.	*At the end of the course, students are able to:* 1. *Compare different types of pumps based on its characteristics and applications.* 2. *Evaluate detailed characteristics of pumps.* 3. *Evaluate pump performance including its piping network based on a real life application.*

	UNIVERSITI MALAYA	**PRO FORMA KURSUS**
		COURSE PRO FORMA

	Versi Bahasa Malaysia **Malay Version**	**Versi Bahasa Inggeris** **English Version**
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Rajah prestasi pam, Penggunakan pam yang sesuai untuk sistem paip, Pam adalah susunan bersiri dan selari, Penggunakan pam yang sesuai untuk sistem paip, Udara dalam pam dan Jumlah Bersih Sedutan Positif, Pam anjakan positif, Pam emparan, Penutup mekanikal, O-Rings.	*Pump performance curve, Matching a pump to a piping system, Pump is serial and parallel arrangement, Matching a pump to a piping system, Pump cavitation and Net Positive Suction Head (NPSH), Positive displacement pumps, Centrifugal pumps, Mechanical Seals, O-Rings.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment:50% Final Examination:50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	1. Menentukan masalah penyelidikan yang bersesuai dengan bidang kejuruteraan 2. Merekabentuk kaedah kajian untuk menyelesaikan masalah kajian 3. Menilai secara kritikal kebolehlaksanaan dan kepraktisan kaedah kajian untuk menyelesaikan masalah kajian. 4. Menyelaras maklumat penyelidikan yang relevan ke dalam laporan teknikal yang komprehensif	*related to the respective engineering field.* *2. Design appropriate research methodology to solve the research problem* *3. Evaluate critically the feasibility and practicality of relevant methods and tools to solve the research problem* *4. Coordinate relevant research information into comprehensive technical report.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini mendedahkan pelajar kepada teknik – teknik bagaimana untuk menjalankan kajian. Di awal kursus pelajar di ajar dengan pelbagai teknik kajian termasuk, kaedah kajian saintifik. Kemudian, etika kajian, reka bentuk eksperimen dan teknik statistik di terangkan kepada pelajar di ikuti dengan mengenal pasti masalah kajian dan penulisan cadangan. Pelajar akan menguasai kemahiran kajian, penulisan saintifik, komunikasi lisan bagi dapatan kajian.	*This course exposes students to the techniques of how to conduct research. At the beginning of the course students are taught with various research techniques including, scientific research methods. Then, research ethics, experimental design and statistical techniques are explained to students followed by identifying research problems and writing suggestions. Students will master research skills, scientific writing, and oral communication for research findings.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 100% Peperiksaan Akhir:-	*Continuous Assessment:100%* *Final Examination: -*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PRO FORMA KURSUS
COURSE PRO FORMA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. *Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Pejabat Timbalan Dekan (Ijazah Tinggi)	*Deputy Dean (Postgraduates) Office*
Nama Program Akademik *Name of Academic Programme*	Sarjana Kejuruteraan Bioperubatan Sarjana Kejuruteraan Mekanikal Sarjana Kejuruteraan Sistem Sarjana Kejuruteraan Keselamatan, Kesihatan dan Alam Sekitar	*Master of Biomedical Engineering* *Master of Mechanical Engineering* *Master of Systems Engineering* *Master of Safety, Health and Environment Engineering*
Kod Kursus* *Course Code**	KQX7002	*KQX7002*
Tajuk Kursus* *Course Title**	Pengurusan Projek	*Project Management*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisa prinsip komponen dan konsep	*At the end of the course, students are able to:* *1. Analyze the principle components and concepts*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	pengurusan projek. 2. Membenarkan pelbagai pemacu perubahan yang boleh menjejaskan projek selama kitaran hidupnya. 3. Menyelesaikan segala cabaran semasa projek secara efektif. 4. Mengaplikasikan kemahiran keusahawanan dan kepimpinan dalam pengurusan sesuatu projek.	*of project management.* *2. Justify the various drivers of change which may impact a project during its life cycle.* *3. Solve every challenges faced during the project.* *4. Apply entrepreneurial and leadership skills in a project management.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini memberikan pengenalan yang sistematik dan menyeluruh untuk semua aspek pengurusan projek. Projek adalah aspek yang semakin penting dalam perniagaan kejuruteraan moden. Oleh itu, kursus ini mengutarakan pentingnya memahami hubungan antara projek dan matlamat strategik organisasi. Kursus ini juga membincangkan kemahiran teknikal, budaya, dan interpersonal yang diperlukan untuk menguruskan projek dengan jayanya dari awal hingga akhir. Ia menekankan bahawa pengurusan projek adalah disiplin profesional yang merangkumi pengetahuan dan kemahirannya yang tersendiri. Konsep diperkukuhkan dengan menggunakan kajian kes yang merangkumi pelbagai jenis projek dan industri.	*This course provides a systematic and thorough introduction to all aspects of project management. Projects are an increasingly important aspect of modern engineering business. Therefore, the course underlines the importance of understanding the relation between projects and the strategic goals of the organisation. The course also discusses the technical, cultural, and interpersonal skills necessary to successfully manage projects from start to finish. It emphasises that project management is a professional discipline with its own tools, body of knowledge, and skills. Concepts are reinforced by case studies covering a wide variety of project types and industries.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019*

Master of Safety, Health & Environment Engineering
Faculty of Engineering

Programme Coordinator

Ir. Dr. Jegalakshimi Jewaratnam

jegalaxmi24@um.edu.my   03-79677689

UNIVERSITI MALAYA

MASTER OF SAFETY, HEALTH AND ENVIRONMENT ENGINEERING

1. **Admission Requirements**

   (1) Qualifications for Admission

       (a) Bachelor Degree or equivalent with a CGPA > 3.00

           OR

       (b)   CGPA 2.0 to 2.99: Must fulfill the following criteria subject to the qualification categories as prescribed by the Senate:

           a.   Related working experience
           b.   At least 1 ISI publication published
           c.   Recipients of scholarships
           d.   Government agencies staff
           e.   Graduate of University Malaya
           f.   Pass Faculty interview
           g.   Pass Faculty special assessment

           OR

       (c) Other qualifications approved by the Senate.

   (2)   Additional English Language requirement for international students:

   A candidate who is not a Malaysian citizen and who possesses a degree or degrees from a university or an institution of higher education where the medium of instruction is not the English language for that degree or degrees must

       (i)   obtain a score of 550 for the Test of English as a Foreign Language (TOEFL);
           OR
       (ii)   obtain a band of 5.5 in the International English Language Testing System (IELTS);
           OR
       (iii)   pass any English language test prescribed by the University

2. Program Structure

(1)   The program has a total of **forty-three (43) credits** consisting of:

    (a)   seven (7) core courses, each consist of three credits hours **AND;**

    (b)   research project (10 credits) **AND**;

    (c)   four (4) elective courses each consist of three (3) credits

(2)   Details of the offered courses, approved by the Senate, and acknowledged by the Faculty, will be informed to the candidate at the beginning of each session.

(3)   The list of courses approved by the Senate for the degree of Master Engineering is a stated in **List 1.** The candidates shall be informed of the combination of courses which need be taken for the program before registering for the course.

(4)   Course Registration

    (a)   Course registration is done two weeks preceeding the beginning of the semester.

    (b)   A candidate must register for **at least six (6) credits** in any semester except:

        (i)   in the final semester of the candidate's course of study, where the candidate may register for fewer credit hours than that stipulated above;

        OR

        (ii)   the candidate's appeal to withdraw from a particular course has been approved

        OR

        (iii)   subject to Faculty's approval allowing the candidate to register for 3 credit hours only.

(5)   Determination of Field of Research

The field of research must be determined before the candidate commences the research portion of the course.

(6)   Supervision

Appointment of a Supervisor may be done in parallel with the submission of Research Project Title Application.

(7)   Submission of Research Project

(a)   Notice of the Research Project Submission will be given to the candidate upon receiving the title and supervision approval of Research Project.

(b)   A candidate must submit the Research Project before the end of the maximum period of candidature.

COURSES APPROVED BY SENATE FOR THE PROGRAMME OF MASTER OF SAFETY, HEALTH AND ENVIRONMENT ENGINEERING

1. **CORE COURSES**

Course Code	Title	Credit Hours
KQX 7001	Research Methodology	3
KQX 7002	Project Management	3
KQD 7001	Research Project	10
KQD7002	Safety, Health and Environmental Legislation in Malaysia	3
KQD7003	Occupational and Industrial Health in Engineering	3
KQD 7004	Sustainable Process Engineering	3
KQD 7005	Quantitative Risk Assessment	3
KQD7006	Hazard Identification and Evaluation	3

2. **ELECTIVE COURSE**

Course Code	Title	Credit Hours
KQD 7007	Environmental Monitoring and Assessment	3
KQD7008	Life Cycle Assessment and Management	3
KQD7009	Hazardous Waste Control	3
KQD7010	Industrial Ergonomics	3
KQD7011	Air Pollution Management and Control	3
KQD7014	Human Factor and Management at Work Place	3
KQD7015	Industrial Emergency and Crisis Management	3

COURSE OFFERED FOR THE PROGRAMME OF

MASTER OF SAFETY, HEALTH AND ENVIRONMENT ENGINEERING

Code	Course	Credit Hours	Duration of Examination	Distribution of Marks	
				% Continuous Assessments	% Final Examination
CORE COURSES					
KQX 7001	Research Methodology	3	-	100	-
KQX 7002	Project Management	3	2 hours	50	50
KQD 7001	Research Project	10	-	100	-
KQD7002	Safety, Health and Environmental Legislation in Malaysia	3	2 hours	50	50
KQD7003	Occupational and Industrial Health in Engineering	3	2 hours	50	50
KQD 7004	Sustainable Process Engineering	3	2 hours	50	50
KQD 7005	Quantitative Risk Assessment	3	2 hours	50	50
ELECTIVE COURSES					
KQD 7007	Environmental Monitoring and Assessment	3	2 hours	50	50
KQD7008	Life Cycle Assessment and Management	3	2 hours	50	50
KQD7009	Hazardous Waste Control	3	2 hours	50	50
KQD7010	Industrial Ergonomics	3	2 hours	50	50
KQD7011	Air Pollution Management and Control	3	2 hours	50	50

KQD7014	Human Factor and Management at Work Place	3	2 hours	50	50
KQD 7007	Environmental Monitoring and Assessment	**KQD 7007**	2 hours	50	50

AND

(1)   Any other course approved by the Senate

(2)   Elective course offered in each semester may vary from semester to semester and subject to offer.

(3)   Elective course offered by Faculty is subject to change. Notice will be given to the candidate by the Program Coordinator or Deputy Dean (Postgraduate Studies)'s office from time to time.

PROGRAMME GOALS AND OUTCOMES

AIM OF THE PROGRAMME

The aim of the program is to produce graduates who are knowledgeable in the field of Safety, Health and Environment, providing them with high professionalism value, competitive, high ethical values as well as critical thinking skills to make decisions on issues related to field of Safety, Health and Environment based on basic knowledge and expertise through the designed program structures.

OBJECTIVE

The programme objectives are:

1. Graduates hold a senior or decision-making position in safety, health and environment engineering or related field in both private and public sectors.

2. Graduates engage in research and development activities in safety, health and environment engineering or related field for their career advancement.

3. Graduates contribute actively in sustainable development and well-being of the society.

PROGRAMME LEARNING OUTCOMES

No.	Programme Learning Outcome(s) (PLO)	Taxonomy Category (K/P/A)*
PLO1	*Apply knowledge critically and integratively to resolve complex problems in safety, health and environment engineering using advance or innovative approaches.*	K, P
PLO2	*Analyze and synthesize complex engineering problems critically through the application of specialized concepts in safety, health and environment engineering.*	K ,P
PLO3	*Develop solutions for complex problems in safety, health and environment engineering using practical skills, tools or investigative techniques which are informed by knowledge.*	K, P
PLO4	*Communicate ideas and rationale of using appropriate methods to peers and experts in safety, health and environment engineering field using oral or written medium.*	A, K

PLO5	*Apply appropriate digital technologies and software competently to develop solutions for complex problems in safety, health and environment engineering field.*	K, A
PLO6	*Demonstrate leadership skill by responsibly planning and managing work within own team in safety, health and environment engineering projects.*	A, K
PLO7	*Identify need for professional advancement through continuous professional development and entrepreneurial ventures in safety, health and environment engineering.*	A, K
	Demonstrate adherence to ethical and professional codes of practice in addressing community and global issues related to safety, health and environment engineering.	A, K

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

Taxonomic Category

      K   Cognitive
      A   Affective
      P   Psychomotor

PLANNER FOR MASTER OF SAFETY, HEALTH AND ENVIRONMENT ENGINEERING

COURSE CODE	SEMESTER 1		CREDIT	SEMESTER 2		CREDIT	SEMESTER 3**		CREDIT
	COURSE CODE		CREDIT	COURSE CODE		CREDIT	COURSE CODE		CREDIT
	Code	Subject		Code	Subject		Code	Subject	
Core Courses	KQX7002	Project Management		KQX 7001	Research Methodology		KQD 7001	Research Project (P)	
	KQD7003	Occupational and Industrial Health in Engineering		KQD 7001	Research Project (P)				
				KQD7002	Safety, Health and Environmental Legislation in Malaysia				
	KQD 7004	Sustainable Process Engineering							
				KQD 7005	Quantitative Risk Assessment				
	KQD7006	Hazard Identification and Evaluation							

	Code	Subject		Code	Subject		Code	Subject	
Elective Courses	**KQD7008**	Life Cycle Assessment and Management		**KQD7009**	Hazardous Waste Control				
	KQD7010	Industrial Ergonomics		**KQD7014**	Human Factor and Management at Work Place				
	KQD7011	Air Pollution Management and Control		**KQD7015**	Industrial Emergency and Crisis Management				
	KQD 7007	Environmental Monitoring and Assessment							

NOTE:

**Courses will be offered if there are sufficient request.

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Kimia	*Department of Chemical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Keselamatan, Kesihatan, dan Alam Sekitar	*Master of Safety, Health and Environment Engineering*
Kod Kursus* *Course Code* *	KQD7001	*KQD7001*
Tajuk Kursus* *Course Title* *	Projek Penyelidikan	*Research Project*
Kredit* *Credit* *	10	*10*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	400	*400*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes* *	Di akhir kursus ini, pelajar dapat: 1. Mengkaji dokumen saintifik dan melaporkan tinjauan literatur 2. Menentukan jurang penyelidikan dan membina objektif yang boleh dicapai.	*At the end of the course, students can:* *1. Review scientific documents and report literature review* *2. Determine research gap and construct deliverable objectives*

UM-PT01-MQF-BR005-S01

	3.Mencadangkan metodologi yang sesuai untuk penyelidikan eksperimental atau bukan eksperimental 4. Menganalisa dapatan kajian dan menggunakan alat digital dan perisian yang sesuai. 5. Menunjukkan kemahiran pengurusan projek yang efektif dalam menyiapkan projek penyelidikan dalam masa yang ditentukan. 6. Menganalisa kesan ekonomi dari hasil projek penyelidikan. 7. Menganalisa hasil kajian berkenaan dengan kesannya terhadap kesihatan, keselamatan dan/atau alam sekitar. 8. Membentangkan hasil projek penyelidikan kepada khalayak.	*3. Propose suitable methodology to conduct experimental or non-experimental research* *4. Analyse the findings of the research and use appropriate software and digital tools.* *5. Demonstrate effective project management skills in completing the research project on time.* *6. Evaluate the economic impacts of the research project* *7. Evaluate the outcomes of the research with respect to safety, health and/or environment impact.* *8. Present outcome of research project to audience*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Projek penyelidikan akan mendedahkan pelajar dalam membuat ulangkaji risalah berkaitan dengan topik kajian spesifik, merancang kaedah kajian, mengumpul data eksperimen dan menghuraikan data, menulis laporan dan membuat pembentangan.	*Research project will expose students to carry out literature review on a specific research topic, plan a research methodology, collect experimental data and Interpret data, write a dissertation and carry out a presentation*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 100% Peperiksaan Akhir: 0%	*Continuous Assessment: 100%* *Final Examination: 0%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas dalam talian	*Online feedback*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

	UNIVERSITI MALAYA	**PRO FORMA KURSUS** ***COURSE PRO FORMA***

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Kejuruteraan	*Engineering*
Jabatan *Department*	Kejuruteraan Kimia	*Chemical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Keselamatan, Kesihatan, dan Alam Sekitar	*Master of Safety, Health and Environment Engineering*
Kod Kursus* *Course Code**	KQD7002	KQD7002
Tajuk Kursus* *Course Title**	Perundangan Keselamatan, Kesihatan dan Alam Sekitar di Malaysia	*Safety, Health and Environmental Legislation in Malaysia*
Kredit* *Credit**	3	3
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	120
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Mengenalpasti faktor pendorong utama terhadap pembangunan, tujuan dan bidang 'self regulating act'. 2. Menganalisa perbezaan di antara preskriptif dan deskriptif bagi undang-undang SHE di Malaysia.	*At the end of the course, students are able to:* *1. Identify the main driver towards the development, purpose and scope of self-regulating act.* *2. Analyse the difference of prescriptive and descriptive SHE legislation in Malaysia.*

UM-PT01-MQF-BR005-S01

	3. Mencadangkan sistem pengurusan Keselamatan dan Kesihatan di tempat kerja yang merangkumi kepatuhan kepada akta dan peraturan tempatan.	3. *Propose Safety and Health management system at workplace that incorporates compliance to local acts and regulation*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini akan memperkenalkan pelajar kepada undang-undang Sejarah keselamatan & kesihatan Malaysia (common law, tort, vicarious liability), Act, Regulation, Order, Code of Practice, Guidelines, Occupational Safety & Health Act 514 (1994), Factory and Machinery Act 139 (1967), Peraturan Kebijakan Keselamatan & Kesihatan (1995), Peraturan Jawatankuasa Keselamatan & Kesihatan (1996), Peraturan Pegawai Keselamatan & Kesihatan (1997), Peraturan Pengendalian Bahaya Kemalangan Besar Industri (CIMAH) (1996, Klasifikasi, Pelabelan dan Data Keselamatan Lembaran Bahan Kimia Berbahaya (2013), Penggunaan dan Pendedahan Piawai Bahan Kimia Berbahaya kepada Kesihatan (USECHH) (2000), Pemberitahuan Kemalangan, Kejadian Berbahaya, Keracunan Pekerjaan & Peraturan Penyakit Pekerjaan (NADOPOD) (2004), Pendedahan Kebisingan (2019) Kod Amalan DOSH: Kualiti Udara Dalam Ruangan / Ruang Terhad / AIDS / Dadah & Alkohol, Kilang dan Jentera Akta 139 (1967): BOWEC / Lead / Mineral Debu / Kebajikan Umum / Asbes, Akta Kualiti Alam Sekeliling (1974) & anak syarikat undang-undang, Akta Perkhidmatan Bomba 134, Sijil Kebakaran 2000, Undang-Undang Bangunan Seragam (1984), sistem Pengurusan Keselamatan & Kesihatan.	*This course will introduce students to History of Malaysian safety & health legislation (common law, tort, vicarious liability), Act, Regulation, Order, Code of Practice, Guidelines, Occupational Safety & Health Act 514 (1994), Factory and Machinery Act 139 (1967), Safety & Health Policy Regulation (1995), Safety & Health Committee Regulation (1996), Safety & Health Officer Regulation (1997), Control of Industrial Major Accidents Hazard Regulation (CIMAH) (1996, Classification, Labelling and Safety Data Sheet of Hazardous Chemicals (2013),Use and Standard Exposure of Chemicals Hazardous to Health Regulation (USECHH) (2000), Notification of Accident, Dangerous Occurrence, Occupational Poisoning & Occupational Disease Regulation (NADOPOD) (2004),Noise Exposure (2019) DOSH Code of Practice: Indoor Air Quality / Confined Space / AIDS / Drug & Alcohol, Factory and Machinery Act 139 (1967): BOWEC / Lead / Mineral Dust / General Welfare/Asbestos, Environmental Quality Act (1974) & subsidiary legislation, Fire Services Act 134 , Fire Certificate 2000, Uniform Building By Law (1984), Safety & Health Management system.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan:50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	1. Perbincangan di dalam kelas 2. Pengembalian penilaian dan ujian yang telah digredkan 3. Gred akhir akan diumumkan	1. *Discussions in class* 2. *Returning graded assignments and tests* 3. *Final grades are announced*

UM-PT01-MQF-BR005-S01

	PRO FORMA KURSUS
	COURSE PRO FORMA

Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PRO FORMA KURSUS
COURSE PRO FORMA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Kejuruteraan	*Engineering*
Jabatan *Department*	Kejuruteraan Kimia	*Chemical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Keselamatan, Kesihatan, dan Alam Sekitar	*Master of Safety, Health and Environment Engineering*
Kod Kursus* *Course Code**	KQD7003	*KQD7003*
Tajuk Kursus* *Course Title**	Kesihatan Pekerjaan dan Industri dalam Kejuruteraan	*Occupational and Industrial Health in Engineering*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisis bahaya di tempat kerja, penyakit atau ancaman kecederaan. 2. Menentukan langkah-langkah pencegahan untuk bahaya, penyakit dan ancaman kecederaan yang	*At the end of the course, students can:* *1. Analyze occupational hazards, diseases or impending injuries* *2. Determine preventive actions to address the identified hazards.*

	dikenalpasti. 3. Menyarankan persekitaran pekerjaaan dan perindustrian yang selamat dan sihat.	3. *Propose a safe and healthy occupational and industrial environment*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Dalam kursus ini, pelajar akan belajar tentang aspek penting kesihatan pekerjaan dalam industri, termasuk bahaya kesihatan, undang-undang kesihatan pekerjaan, penyakit pekerjaan, kesihatan higen, dan mencegah bahaya kesihatan ditempat kerja.	*In this course, students will be able to learn about the occupational health aspects important to the industry, inclusive of health hazards, occupational health laws, occupational disease, occupational hygiene and prevention of health hazards at the workplace.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	1. Perbincangan di dalam kelas 2. Pengembalian penilaian dan ujian yang telah digredkan 3. Gred akhir akan diumumkan	1. *Discussions in class* 2. *Returning graded assignments and tests* 3. *Final grades are announced*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

	PRO FORMA KURSUS *COURSE PRO FORMA*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Kejuruteraan	*Engineering*
Jabatan *Department*	Kejuruteraan Kimia	*Chemical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Keselamatan, Kesihatan, dan Alam Sekitar	*Master of Safety, Health and Environment Engineering*
Kod Kursus* *Course Code**	KQD7004	*KQD7004*
Tajuk Kursus* *Course Title**	Proses Kejuruteraan Lestari	*Sustainable Process Engineering*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menjelaskan sifat ekologi kitaran arus dan pengangkutan serta nasib bendasing 2. Menjelaskan kesan dan akibat dari aktiviti pemprosesan terhadap alam sekitar.	*At the end of the course, students can:* *1. Explain the ecological nature of cycles and flows and transport and fate of contaminants.* *2. Explain the effects and impacts of processing activities on the environment.*

UM-PT01-MQF-BR005-S01

	3. Mencadangkan strategi pencegahan pencemaran yang relevan dan bersepadu untuk pembangunan lestari bagi industri pemprosesan.	3. *Propose appropriate integrated pollution prevention strategy for sustainable development of processing industries.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini akan memperkenalkan pelajar kepada isu umum dalam pencemaran alam sekitar, Ciri-ciri dan nasib pencemar alam sekitar,pengangkutan dan transformasi pencemar, dan aktiviti industri dan alam sekitar. Selain itu, para pelajar juga akan diberi pendedahan mengenai pembangunan dan rekabentuk proses lestari, operasi proses lestari, pengurusan pencemaran berintegrasi, peraturan dan komitmen antarabangsa, serta pembangunan lestari.	*This course will introduce the students to general issues in environmental pollution, properties and fate of environmental contaminants, transport and transformation of contaminants and industrial activities and the environment. Moreover, the students also will be exposed to the sustainable process development and design, sustainable process operations, integrated pollution management, regulations and international commitments as well as the sustainable development.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	1. Perbincangan di dalam kelas 2. Pengembalian penilaian dan ujian yang telah digredkan 3. Gred akhir akan diumumkan	1. *Discussions in class* 2. *Returning graded assignments and tests* 3. *Final grades are announced*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Kejuruteraan	*Engineering*
Jabatan *Department*	Kejuruteraan Kimia	*Chemical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Keselamatan, Kesihatan, dan Alam Sekitar	*Master of Safety, Health and Environment Engineering*
Kod Kursus* *Course Code**	KQD7005	*KQD7005*
Tajuk Kursus* *Course Title**	Penilaian Risiko Kuantitatif	*Quantitative Risk Assessment*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Mengaplikasikan teknik mengenalpasti bahaya yang sesuai. 2. Menentukan kriteria risiko untuk industri proses dan kesihatan persekitaran. 3. Menganggarkan risiko kepada individu dan	*At the end of the course, students can:* *1. Apply suitable hazard identification techniques* *2. Determine risk characteristics for both process industry and environmental health hazard.* *3. Estimate individual and societal risks based on outcomes from consequence and probability*

UM-PT01-MQF-BR005-S01

	masyarakat berdasarkan hasil daripada analisa akibat dan kebarangkalian.	*analysis.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini akan memperkenalkan pelajar kepada penilaian risiko industri; Mengenalpasti sumber-sumber bahaya seperti ciri-ciri bahan mudah terbakar, meletup dan toksik, analisa pohon kegagalan ('fault tree') dan analisa pohon kejadian ('event tree'); Analisa akibat seperti kebakaran kolam ('pool fire'), kebakaran jet ('jet fire'), bebola api ('fireball') dan BLEVE dan letupan awan wap ('vapour cloud'); serta Analisa kesan yang merangkumi kesan terma, kesan peletupan dan kesan toksik. Selain itu, pelajar juga akan dapat mempelajari tentang Analisa frekuensi/Kebarangkalian seperti pengkalan data kadar kegagalan dan Peraturan kebarangkalian untuk pohon kegagalan; Anggaran Risiko yang merangkumi risiko individu dan risiko sosial; dan juga Penilaian Risiko Alam Sekitar seperti risiko sistematik kesihatan dan risiko kanser.	*This course will introduce student to industrial risk assessment; Identification of sources of hazard such as flammability, explosive and toxic properties of material, fault tree analysis and event tree analysis; Consequence Analysis such as pool fire, jet fire, fireball due to BLEVE and vapour cloud explosion; as well as Effect Analysis which include thermal effect, explosion effect and toxic effect. Besides, students also will be able to learn about Frequency/Probability Analysis like failure rate database and probability rules in fault tree analysis; Risk Estimation which include individual risk and societal risk; and also Environmental Risk Assessment such as systematic health risk and cancer risk.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	1. Perbincangan di dalam kelas 2. Pengembalian penilaian dan ujian yang telah digredkan 3. Gred akhir akan diumumkan	*1. Discussions in class* *2. Returning graded assignments and tests* *3. Final grades are announced*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PRO FORMA KURSUS
COURSE PRO FORMA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Kejuruteraan	*Engineering*
Jabatan *Department*	Kejuruteraan Kimia	*Chemical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Keselamatan, Kesihatan, dan Alam Sekitar	*Master of Safety, Health and Environment Engineering*
Kod Kursus* *Course Code**	KQD7006	*KQD7006*
Tajuk Kursus* *Course Title**	Mengenalpasti Hazad dan Penilaian	*Hazard Identification and Evaluation*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisa hazad di tempat kerja dan unit pemprosesan sebagai langkah pencegahan kemalangan.	*At the end of the course, students can:* *1. Analyze hazards at workplace and processing units as accident preventive measure.* *2. Propose a good safety management system at*

	2. Mencadangkan sistem pengurusan keselamatan yang baik di tempat kerja dan penunjuk aras prestasi yang baik untuk mempertingkatkan keselamatan proses. 3. Menganggarkan risiko oleh letupan dan kekurangan dalam sistem pengurusan keselamatan proses.	*workplace and better performance indicators for a safety improvement process.* *3. Estimate risks of explosions and deficiencies in process safety management system.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini akan memperkenalkan pelajar kepada Teknik Mengenalpasti Hazad seperti bancian hazad (Senarai semak), Analisis Keselamatan Kerja, Mengenalpasti Hazad dan Kawalan Penilaian Risiko (HIRAC), HAZOP, Analisis 'Fault Tree' serta Audit Keselamatan, Bahaya dari Tindakbalas Kimia, BLEVE, VCE, Pengendalian Selamat Bahan Kimia, Limit Mudah Terbakar bagi Wap, TLVs dan Letupan, Selain itu, pelajar juga akan dapat mempelajari mengenai Rekabentuk untuk Keselamatan, Pengurusan Proses Keselamatan, Prestasi Piawai bagi Peningkatan Proses Keselamatan, Sikap Keselamatan dan Perilaku Manusia, OSHA 1994, CIMAH, Penganggaran kos kemalangan, Mengulas Kemalangan dan Menganalisis,dan melakukan Penyiasatan Kemalangan.	*This course will introduce students to the Hazard Identification Techniques such as hazard survey (Checklist), Job Safety Analysis, Hazard Identification and Risk Assessment Control (HIRAC), HAZOP, Fault Tree Analysis as well as Safety Audits, Hazards from Chemical Reaction, BLEVE, VCE, Safe Handling of Industrial Chemicals, Flammability Limits for Vapor, TLVs and Explosion. Furthermore, students also will be able to learn about Designing for Safety, Process Safety Management, Performance Standards for a Safety Improvement Process, Safety Attitudes and Human Behaviour, OSHA 1994, CIMAH, Accident Cost Estimation, Accidents Review and Analysis and Accident Investigation Study.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	1. Perbincangan di dalam kelas 2. Pengembalian penilaian dan ujian yang telah digredkan 3. Gred akhir akan diumumkan	*1. Discussions in class* *2. Returning graded assignments and tests* *3. Final grades are announced*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

	PRO FORMA KURSUS *COURSE PRO FORMA*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Kejuruteraan	*Engineering*
Jabatan *Department*	Kejuruteraan Kimia	*Chemical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Keselamatan, Kesihatan, dan Alam Sekitar	*Master of Safety, Health and Environment Engineering*
Kod Kursus* *Course Code**	*KQD7007*	*KQD7007*
Tajuk Kursus* *Course Title**	Penilaian dan Pemantauan Alam Sekitar	*Environmental Monitoring and Assessment*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Mengenalpasti protokol terbaik pensampelan untuk tugas khusus dalam analisis persekitaran. 2. Melakukan analisis kualitatif dan kuantitatif bagi sampel gas, pepejal dan cecair dengan	*At the end of the course, students can:* *1. Identify the best sampling protocol for a specific environmental analysis task.* *2. Perform qualitative and quantitative analysis of gaseous, solids and liquid samples using GC,*

UM-PT01-MQF-BR005-S01

	menggunakan GC, HPLC dan ICP-AES. 3. Menganalisa spectrum GC, HPLC dan ICP-AES untuk menganggarkan komposisi elemen bagi sampel cecair, gas dan pepejal.	*HPLC and ICP-AES.* *3. Analyse GC, HPLC and ICP-AES spectra for elemental composition estimation of liquid, gas and solid samples.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini merangkumi beberapa topik penting berkaitan dengan penilaian dan pemantauan alam sekitar iaitu Pensampelan, peralatan pensampelan, protokol pensampelan dalam pensampelan udara (pensampelan cerombong dan pensampelan ambien), pensampelan air dan pensampelan pepejal, tanah dan lumpur. Selain itu, kursus ini memperkenalkan pelajar kepada teknik analitikal, penyediaan sampel, Teknik Kromatografik (GC teknik dan HPLC) secara teori dan aplikasi persekitaran, Teknik Spektroskopik (spektrofotometri); Teknik Spektroskopik (AA dan ICP-AES)- Teori dan Aplikasi Persekitaran; Teknik Elektroanalitikal- Teori dan Aplikasi Persekitaran; ICP-AES Makmal.	*This course covers few important topics for environmental monitoring and assessment such as sampling, sampling equipment, sampling protocols in air sampling (stack sampling and ambient sampling), water sampling and sampling of solids, soils and sludge. Besides, this course introduce students to analytical techniques, sample preparation; Chromatographic techniques (GC techniques)- Theory and Environmental applications; Chromatographic techniques (HPLC techniques)- Theory and Environmental applications; GC and HPLC Laboratory; Spectroscopic techniques (spectrophotometry) - Theory and Environmental applications; Spectroscopic techniques (AA and ICP-AES) - Theory and Environmental applications; Electroanalytical techniques; ICP-AES Laboratory - Theory and Environmental applications.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	1. Perbincangan di dalam kelas 2. Pengembalian penilaian dan ujian yang telah digredkan 3. Gred akhir akan diumumkan	*1. Discussions in class* *2. Returning graded assignments and tests* *3. Final grades are announced*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PRO FORMA KURSUS
COURSE PRO FORMA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Kejuruteraan	*Engineering*
Jabatan *Department*	Kejuruteraan Kimia	*Chemical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Keselamatan, Kesihatan, dan Alam Sekitar	*Master of Safety, Health and Environment Engineering*
Kod Kursus* Course Code*	KQD7008	*KQD7008*
Tajuk Kursus* Course Title*	Pengurusan dan Penilaian Kitar Hayat	*Life Cycle Assessment and Management*
Kredit* Credit*	3	*3*
Masa Pembelajaran Pelajar (SLT) Student Learning Time (SLT)	120	*120*
Prasyarat/Keperluan Minimum Kursus Course Pre-requisite(s)/Minimum Requirement(s)	Tiada	*None*
Hasil Pembelajaran Kursus* Course Learning Outcomes*	Di akhir kursus ini, pelajar dapat: 1. Menilai pembelajaran penilaian kitar hayat untuk analisis impak. 2. Mengaplikasikan konsep dan metodologi penilaian kitar	*At the end of the course, students can:* *1. Assess an LCA study for impacts analysis.* *2. Apply the concepts and methodologies of life cycle assessment.*

UM-PT01-MQF-BR005-S01

	hayat. 3. Menyelesaikan isu dan pengurusan alam sekitar dengan penggunaan strategi pengurusan kitar hayat	3. Solve environmental issues and management using life cycle management strategies.
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini akan memperkenalkan pelajar kepada isu alam sekitar dan Pengurusan, Kitar Hayat Berdasarkan Inisiatif Persekitaran, Pengenalan terhadap siri Matlamat Piawai Penilaian Kitar Hayat dan Definisi Skop, Inventori kitar hayat, Penilaian Kesan Kitar Hayat, Interpretasi Kitar Hayat, SIMA PRO – Perisian simulasi dan LCA, Pengurusan Kitar Hayat. Selain itu, pelajar juga akan diberi pendedahan kepada Peralatan LCM, Sistem Pengurusan Alam Sekitar, Pengurusan Rantaian Terintegrasi, Pendekatan Pengurusan Terhadap LCM, dan Persaingan bagi negara-negara yang sedang membangun.	This course will introduce students to Environmental Issues and Management, Life Cycle Based Environmental Initiatives, ISO 14040 – Introduction to Life Cycle Assessment (LCA) Series of Standards Goal and Scope Definition, Life Cycle Inventory, Life Cycle Impact Assessment, Life Cycle Interpretation, SIMA PRO – LCA simulation software and LCA course Project. Besides, students also will be exposed to the Life Cycle Management (LCM), LCM Tool Box, Environmental Management Systems, Integrated Chain Management, Management Approaches Toward LCM and Challenges for Developing Countries.
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	Continuous Assessment: 50% Final Examination: 50%
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	1. Perbincangan di dalam kelas 2. Pengembalian penilaian dan ujian yang telah digredkan 3. Gred akhir akan diumumkan	1. Discussions in class 2. Returning graded assignments and tests 3. Final grades are announced
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Kejuruteraan	*Engineering*
Jabatan *Department*	Kejuruteraan Kimia	*Chemical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Keselamatan, Kesihatan, dan Alam Sekitar	*Master of Safety, Health and Environment Engineering*
Kod Kursus* Course Code*	KQD7009	*KQD7009*
Tajuk Kursus* Course Title*	Kawalan Sisa Merbahaya	*Hazardous Waste Control*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Mengenalpasti pengurusan sisa berbahaya yang diperlukan bagi melindungi manusia dan alam sekitar	*At the end of the course, students are able to:* *1. Identify appropriate hazardous waste management practices required to protect human*

UM-PT01-MQF-BR005-S01

	dengan mempertimbangkan ciri-ciri sisa berbahaya yang umumnya dihasilkan di pelbagai lokasi industri dan bukan-industri. 2. Mengjustifikasi skim rawatan yang tepat untuk pelbagai jenis sisa berbahaya yang dihasilkan dan lokasi yang tercemar dengan sisa berbahaya. 3. Menyelesaikan kajian kes berdasarkan keperluan peraturan dan teknikal yang melibatkan isu-isu umum yang berkaitan dengan pengurusan sisa berbahaya.	*beings and the environment by taking into consideration the characteristics of hazardous waste commonly generated at various industrial and non-industrials premises.* *2. Justify appropriate treatment schemes for various hazardous waste types generated and sites contaminated with hazardous waste.* *3. Solve case studies based on regulatory and technical requirements involving common issues related to hazardous waste management.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Dalam kursus ini, pelajar akan diberi pendedahan mengenai pengenalan dan definasi sisa berbahaya, analisis toksik pada sisa berbahaya, secara amnya pengurusan sisa, audit dan teknik pemilihan pencegahan pencemaran untuk sisa berbahaya. Selain itu, pelajar akan dapat mempelajari mengenai rawatan terma, kimia, fizikal dan biologi, rekabentuk tempat pembuangan dan operasi pelupusan sisa berbahaya, teknik 'site-remediation', peraturan sisa berjadual dan komitmen antarabangsa bagi Malaysia dan juga analisis ringkas risiko yang melibatkan sisa berbahaya.	*In this course, students will be exposed to the introduction and definition of hazardous waste, toxicity analysis for hazardous waste, general waste management practices, auditing and selected pollution prevention techniques for hazardous wastes. Moreover, students also will be able to learn about thermal, chemical, physical and biological treatment, landfill design and operation of hazardous waste disposal, site-remediation techniques, scheduled waste regulations and international commitments for Malaysia and also brief risk analysis involving hazardous waste.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	1. Perbincangan di dalam kelas 2. Pengembalian penilaian dan ujian yang telah digredkan 3. Gred akhir akan diumumkan	*1. Discussions in class* *2. Returning graded assignments and tests* *3. Final grades are announced*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

UNIVERSITI MALAYA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Kejuruteraan	*Engineering*
Jabatan *Department*	Kejuruteraan Kimia	*Chemical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Keselamatan, Kesihatan, dan Alam Sekitar	*Master of Safety, Health and Environment Engineering*
Kod Kursus* Course Code*	KQD7010	*KQD7010*
Tajuk Kursus* Course Title*	Ergonomik Industri	*Industrial Ergonomics*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menentukan kepentingan faktor manusia & ergonomic dan keselamatan & kesihatan dalam aplikasi peralatan	*At the end of the course, students can:*

UM-PT01-MQF-BR005-S01

	dan peranti di persekitaran tempat kerja 2. Menyatakan kaedah ergonomik untuk mendiagnosis kerja dan rekabentuk pekerjaan. 3. Menginterpretasi amalan kerja dan rekabentuk pekerjaan dalam industri.	1. *Determine the important of human factors & ergonomics and safety & health in designing equipment and in work environments* 2. *Specify ergonomics methods in diagnosing job and work design* 3. *Interpret the practices in job and work design in industries*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini mengandungi lapan bahagian penting terutama: keselamatan dan kesihatan industri, industri ergonomik, prinsip ergonomik dalam rekabentuk, kesan persekitaran kepada pekerja, fisiologi manusia, antropometri, rekabentuk pekerjaan dan analisis tugas	*This course contains eight essential parts mainly: industrial safety and health, ergonomics industries, ergonomics principal in design, effect of environment on workers, human physiology, anthropometry, works design and analysis of tasks.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	1. Perbincangan di dalam kelas 2. Pengembalian penilaian dan ujian yang telah digredkan 3. Gred akhir akan diumumkan	1. *Discussions in class* 2. *Returning graded assignments and tests* 3. *Final grades are announced*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Kejuruteraan	*Engineering*
Jabatan *Department*	Kejuruteraan Kimia	*Chemical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Keselamatan, Kesihatan, dan Alam Sekitar	*Master of Safety, Health and Environment Engineering*
Kod Kursus* Course Code*	KQD7011	*KQD7011*
Tajuk Kursus* Course Title*	Pengurusan dan Kawalan Pencemaran Udara	*Air Pollution Management and Control*
Kredit* Credit*	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes*	Di akhir kursus ini, pelajar dapat: 1. Menerangkan konsep kualiti udara dan ciri-ciri, jenis serta sumber dan kesannya terhadap kesihatan dan	*At the end of the course, students are able to:* 1. *Explain the concept of air quality and its characteristics, types and sources and their*

UM-PT01-MQF-BR005-S01

	alam sekitar. 2. Menilai serakan pencemar melalui permodelan. 3. Merumuskan strategi kawalan dan pengurusan untuk pencemar zarahan dan gas.	*impact on health and environment.* *2. Evaluate the dispersion of pollutants through modelling.* *3. Formulate the control and management strategies for particulates and gaseous pollutants.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini akan memperkenalkan pelajar kepada isu umum yang berkaitan dengan pencemaran udara, kualiti udara, dan juga jenis, sumber dan kesan pencemar udara. Selain itu, pelajar juga akan diberi pendedahan kepada isu pemanasan global, meteorologi udara dan serakan pencemar, serta pengurusan dan kawalan pencemar udara gas dan zarahan udara.	*This course will introduce students to general issues on air pollution, air quality and also types, sources and impacts of air pollutants. Besides, students also will be exposed to the Global warming issue, air meteorology and dispersion of pollutants, as well as management and control of gaseous and particulate air pollutants.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	1. Perbincangan di dalam kelas 2. Pengembalian penilaian dan ujian yang telah digredkan 3. Gred akhir akan diumumkan	*1. Discussions in class* *2. Returning graded assignments and tests* *3. Final grades are announced*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PRO FORMA KURSUS
COURSE PRO FORMA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Kejuruteraan	*Engineering*
Jabatan *Department*	Kejuruteraan Kimia	*Chemical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Keselamatan, Kesihatan, dan Alam Sekitar	*Master of Safety, Health and Environment Engineering*
Kod Kursus* Course Code*	KQD7014	*KQD7014*
Tajuk Kursus* Course Title*	Faktor Kemanusian dan Pengurusan Tempat Kerja	*Human Factor and Management at Work Place*
Kredit* Credit*	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus Course Pre-requisite(s)/Minimum Requirement(s)	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Mengenalpasti kepentingan faktor kemanusian dalam aplikasi peralatan dan persekitaran tempat kerja	*At the end of the course, students are able to:* *1. Identify the importance of human factor in the application of tools and work*

	2. Menganalisa rekabentuk yang berkaitan dan penting bagi persekitaran tempat kerja di industri 3. Mengamalkan kesedaran diri, tanggungjawab dan kepercayaan diri di tempat kerja.	environment. 2. *Analyse relevant and significant human factor design for work environment in industries.* 3. *Practice self-awareness, responsibility and self-belief at the workplace.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini mengandungi beberapa bahagian penting terutama: mengenalpasti, aplikasi dan analisis rekabentuk untuk persekitaran tempat kerja. Kursus ini juga membincangkan pembangunan kesedaran, tanggungjawab dan kepercayaan diri, serta peranan pengurus, dalam mewujudkan organisasi berprestasi tinggi.	*This course contains topics which include: Identification, application and analysis the importance of ergonomics in the application and design for special population. This course also discusses the awareness building, responsibility and self-belief, as well as roles of manager, in creating a high performance organization.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	1. Perbincangan di dalam kelas 2. Pengembalian penilaian dan ujian yang telah digredkan 3. Gred akhir akan diumumkan	1. *Discussions in class* 2. *Returning graded assignments and tests* 3. *Final grades are announced*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

PRO FORMA KURSUS
COURSE PRO FORMA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with **. *Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakluti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Kimia	*Department of Chemical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Keselamatan, Kesihatan, dan Alam Sekitar	*Master of Safety, Health and Environment Engineering*
Kod Kursus* *Course Code**	KQD7015	*KQD7015*
Tajuk Kursus* *Course Title**	Pengurusan Kecemasan dan Krisis Industri	*Industrial Emergency and Crisis Management*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	122	*122*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Membangunkan Pelan Pengurusan Krisis (CMP) untuk industri yang spesifik. 2. Menyediakan Pelan Tindakan Kecemasan (ERP) untuk scenario industri.	*At the end of the course, students are able to:* *1. Develop appropriate Crisis Management Plan (CMP) for specific industries.* *2. Prepare an Emergency Response plan (ERP) for industrial scenarios.*

UM-PT01-MQF-BR005-S01

	3. Menggunakan kaedah terkini dalam pengurusan krisis.	*3. Use advanced tools in managing crisis.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Dalam kursus ini konsep dan definasi Pengurusan Krisis dan Perancangan Kecemasan di loji-loji industri akan diterangkan. Strategi secara sistematik dan pendekatan akan diajar untuk mengenalpasti, merancang dan mengurus scenario kecemasan di loji-loji industri. Beberapa pembelajaran kes akan digunakan untuk tujuan ini. Kursus ini merangkumi penerangan ke atas kaedah-kaedah pencegahan, persediaan, tindakan dan pemulihan seandainya terdapat sebarang krisis yang timbul. Pelajar juga akan mempelajari penggunaan teknik-teknik terkini seperti GIS (Sistem Informasi Geografi) dan perisian CAMEO di dalam pengurusan krisis.	*In this course the concepts and definitions of Crisis Management and Emergency Planning in industrial plants will be explained. Systematic strategies and approaches will be tough to identify, plan and manage emergency scenarios in industrial plants. Several case studies will be used for this purpose. This course includes explanation of methods of prevention, preparedness, response and recovery in case of crisis. Students will also learn the application of advanced techniques such as GIS (geographical Information System) and CAMEO software in managing emergencies.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian	*Online feedback*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

UNIVERSITI MALAYA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Pejabat Timbalan Dekan (Ijazah Tinggi)	*Deputy Dean (Postgraduates) Office*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Bioperubatan Sarjana Kejuruteraan Mekanikal Sarjana Kejuruteraan Sistem Sarjana Kejuruteraan Keselamatan, Kesihatan dan Alam Sekitar	*Master of Biomedical Engineering* *Master of Mechanical Engineering* *Master of Systems Engineering* *Master of Safety, Health and Environment Engineering*
Kod Kursus* *Course Code**	KQX7001	*KQX7001*
Tajuk Kursus* *Course Title**	Metodologi Penyelidikan	*Research Methodology*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat:	*At the end of the course, students are able to:*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	1. Mengenal pasti masalah penyelidikan yang bersesuai dengan bidang kejuruteraan 2. Merekabentuk kaedah kajian untuk menyelesaikan masalah kajian 3. Menilai secara kritikal kebolehlaksanaan dan kepraktisan kaedah kajian untuk menyelesaikan masalah kajian. 4. Menyelaras maklumat penyelidikan yang relevan ke dalam laporan teknikal yang komprehensif	1. *Determine research problem or issues related to the respective engineering field.* 2. *Design appropriate research methodology to solve the research problem* 3. *Evaluate critically the feasibility and practicality of relevant methods and tools to solve the research problem* 4. *Coordinate relevant research information into comprehensive technical report.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini mendedahkan pelajar kepada teknik – teknik bagaimana untuk menjalankan kajian. Di awal kursus pelajar di ajar dengan pelbagai teknik kajian termasuk, kaedah kajian saintifik. Kemudian, etika kajian, reka bentuk eksperimen dan teknik statistik di terangkan kepada pelajar di ikuti dengan mengenal pasti masalah kajian dan penulisan cadangan. Pelajar akan menguasai kemahiran kajian, penulisan saintifik, komunikasi lisan bagi dapatan kajian.	*This course exposes students to the techniques of how to conduct research. At the beginning of the course students are taught with various research techniques including, scientific research methods. Then, research ethics, experimental design and statistical techniques are explained to students followed by identifying research problems and writing suggestions. Students will master research skills, scientific writing, and oral communication for research findings.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 100% Peperiksaan Akhir:-	*Continuous Assessment:100%* *Final Examination: -*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019. Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019.	*University of Malaya Rules (Master's Degree) 2019 University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Pejabat Timbalan Dekan (Ijazah Tinggi)	*Deputy Dean (Postgraduates) Office*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Bioperubatan Sarjana Kejuruteraan Mekanikal Sarjana Kejuruteraan Sistem Sarjana Kejuruteraan Keselamatan, Kesihatan dan Alam Sekitar	*Master of Biomedical Engineering* *Master of Mechanical Engineering* *Master of Systems Engineering* *Master of Safety, Health and Environment Engineering*
Kod Kursus* *Course Code**	KQX7002	*KQX7002*
Tajuk Kursus* *Course Title**	Pengurusan Projek	*Project Management*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat:	*At the end of the course, students are able to:*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	1. Menganalisa prinsip komponen dan konsep pengurusan projek. 2. Membenarkan pelbagai pemacu perubahan yang boleh menjejaskan projek selama kitaran hidupnya. 3. Menyelesaikan segala cabaran semasa projek secara efektif. 4. Mengaplikasikan kemahiran keusahawanan dan kepimpinan dalam pengurusan sesuatu projek.	1. *Analyze the principle components and concepts of project management.* 2. *Justify the various drivers of change which may impact a project during its life cycle.* 3. *Solve every challenges faced during the project.* 4. *Apply entrepreneurial and leadership skills in a project management.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini memberikan pengenalan yang sistematik dan menyeluruh untuk semua aspek pengurusan projek. Projek adalah aspek yang semakin penting dalam perniagaan kejuruteraan moden. Oleh itu, kursus ini mengutarakan pentingnya memahami hubungan antara projek dan matlamat strategik organisasi. Kursus ini juga membincangkan kemahiran teknikal, budaya, dan interpersonal yang diperlukan untuk menguruskan projek dengan jayanya dari awal hingga akhir. Ia menekankan bahawa pengurusan projek adalah disiplin profesional yang merangkumi pengetahuan dan kemahirannya yang tersendiri. Konsep diperkukuhkan dengan menggunakan kajian kes yang merangkumi pelbagai jenis projek dan industri.	*This course provides a systematic and thorough introduction to all aspects of project management. Projects are an increasingly important aspect of modern engineering business. Therefore, the course underlines the importance of understanding the relation between projects and the strategic goals of the organisation. The course also discusses the technical, cultural, and interpersonal skills necessary to successfully manage projects from start to finish. It emphasises that project management is a professional discipline with its own tools, body of knowledge, and skills. Concepts are reinforced by case studies covering a wide variety of project types and industries.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*University of Malaya Rules (Master's Degree) 2019* *University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

Master of Systems Engineering
Faculty of Engineering

Programme Coordinator

Dr. Tengku Faiz Bin Tengku Mohmed Noor Izam

tengkufaiz@um.edu.my   03-79675205

UNIVERSITI MALAYA

MASTER OF SYSTEMS ENGINEERING

1. **Admission Requirements**

   (1) Qualifications for Admission

   (a) Bachelor Degree or equivalent with a CGPA > 3.00

   OR

   (b)　CGPA 2.0 to 2.99: Must fulfill the following criteria subject to the qualification categories as prescribed by the Senate:
   - *a.*　　Related working experience
   - *b.*　　At least 1 ISI publication published
   - *c.*　　Recipients of scholarships
   - *d.*　　Government agencies staff
   - *e.*　　Graduate of University Malaya
   - *f.*　　Pass Faculty interview
   - *g.*　　Pass Faculty special assessment

   OR

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

   (2)　Additional English Language requirement for international students:

   A candidate who is not a Malaysian citizen and who possesses a degree or degrees from a university or an institution of higher education where the medium of instruction is not the English language for that degree or degrees must

   (i)　　obtain a score of 550 for the Test of English as a Foreign Language (TOEFL);
   OR

   (ii)　　obtain a band of 5.5 in the International English Language Testing System (IELTS);
   OR

   (iii)　　pass any English language test prescribed by the University

2. Program Structure

(1)   The program has a total load of **forty-three (42) credits** consisting of:

    (a)   Five (5) core courses where each consists of three credits hours **AND;**

    (b)   Research Project (12 credits) **AND**;

    (c)   Five (5) elective courses where each consist of three (3) credits; **AND/OR**

    (d)   Any other course offered by the Faculty.

(2)   Details of the offered courses are according to those approved by the Senate from time to time, upon the acknowledgement by the Faculty, and as informed to the candidate at the beginning of each session.

(3)   The list of courses approved by the Senate for the degree of Master of Systems Engineering is as stated in **List 1.** The candidates shall be informed of the combination of courses which need be taken for the program before registering for the course.

(4)   Course Registration

    (a)   Course registration is done within two weeks preceding the beginning of the semester.

    (b)   A candidate must register for **at least six (6) credits** in any semester except:

        (i)   In the final semester of the candidate's course of study, where the candidate may register for fewer credit hour than as stipulated above;

            OR

        (ii)   the candidate's appeal to withdraw from a particular course has been approved

            OR

        (iii)   Subject to Faculty approval to allow the candidate to register for 3 credit hours only.

(5)   Determination of Field of Research

The field of research must be determined before the candidate commences the research portion of the course.

(6)   Supervision

Appointment of a Supervisor may be done in parallel with the submission of Research Project Title Application.

(7)   Submission of Research Project

   (a) Notice of the Research Project Submission will be given to the candidate upon receiving the title and supervision approval of Research Project.

   (b) A candidate must submit the Research Project before the end of the maximum period of candidature.

COURSES APPROVED BY SENATE FOR THE PROGRAMME OF MASTER OF SYSTEMS ENGINEERING

1.   **CORE COURSES**

Course Code	Title	Credit Hours
KQX 7001	Research Methodology	3
KQX 7002	Project Management	3
KQC 7001	Research Project	12
KQC7015	Machine Learning	3
KQC7016	Data Analytics	3
KQC7017	System Analysis and Design	3

2. **ELECTIVE COURSE**

Course Code	Title	Credit Hours
KQC7018	Smart Power Distribution System	3
KQC7019	Green Energy Systems	3
KQC7020	Power Electronics	3
KQC7021	Electrical Energy Conversion Technologies	3
KQC7022	Power Quality	3
KQC7023	Digital Signal Processing	3
KQC7024	Communication Networks	3
KQC7025	Wireless Communication Systems	3
KQC7026	Antenna and Propagation	3
KQC7027	Optical Devices	3
KQC7028	MEMS Design	3
KQC7029	Embedded Systems	3
KQC7030	IC Design	3
KQC7031	Industrial Automation and Robotics	3
KQC7032	Human Factor and Work Management	3
KQC7033	Discrete-time Control Systems	3
KQC7034	Electromagnetic Compatibility and Interference	3

COURSE OFFERED FOR THE PROGRAMME OF
MASTER OF SYSTEMS ENGINEERING

Code	Course	Credit Hours	Duration of Examination	Distribution of Marks	
				% Continuous Assessments	% Final Examination
CORE COURSES					
KQX 7001	Research Methodology	3	-	100	-
KQX 7002	Project Management	3	2 hours	50	50
KQC 7001	Research Project	12	-	100	-
KQC7015	Machine Learning	3	2 hours	50	50
KQC7016	Data Analytics	3	2 hours	50	50
KQC7017	System Analysis and Design	3	2 hours	50	50
KQX 7001	Research Methodology	3	2 hours	50	50
ELECTIVE COURSES					
KQC7018	Smart Power Distribution System	3	2 hours	50	50
KQC7019	Green Energy Systems	3	2 hours	50	50
KQC7020	Power Electronics	3	2 hours	50	50
KQC7021	Electrical Energy Conversion Technologies	3	2 hours	50	50
KQC7022	Power Quality	3	2 hours	50	50
KQC7023	Digital Signal Processing	3	2 hours	50	50

KQC7024	Communication Networks	3	2 hours	50	50
KQC7025	Wireless Communication Systems	3	2 hours	50	50
KQC7026	Antenna and Propagation	3	2 hours	50	50
KQC7027	Optical Devices	3	2 hours	50	50
KQC7028	MEMS Design	3	2 hours	50	50
KQC7029	Embedded Systems	3	2 hours	50	50
KQC7030	IC Design	3	2 hours	50	50
KQC7031	Industrial Automation and Robotics	3	2 hours	50	50
KQC7032	Human Factor and Work Management	3	2 hours	50	50
KQC7033	Discrete-time Control Systems	3	2 hours	50	50
KQC7034	Electromagnetic Compatibility and Interference	3	2 hours	50	50

AND

(1)   Any other course approved by the Senate

(2)   Elective course offered in each semester may vary from semester to semester and subject to offer.

(3)   Elective course offered by Faculty is subject to change. Notice will be given to the candidate by the Program Coordinator or Deputy Dean (Postgraduate Studies)'s office from time to time.

PROGRAMME GOALS AND OUTCOMES

AIM OF THE PROGRAMME

The aim of the program is to produce human capital who are knowledgeable, have high ethical values and practice a professional culture in developing the field of systems engineering through the designed program structures.

OBJECTIVE

The programme educational objectives are:

1. Graduates will be in senior position or as decision maker in government or private sectors in the field of system engineering.

2. Graduates will involve in research and development activities in the field of system engineering for their career development.

3. Graduates will actively contribute to sustainable development of the field of system engineering and the well-being of society.

PROGRAMME LEARNING OUTCOMES

No.	Programme Learning Outcome(s) (PLO)	Taxonomy Category (K/P/A)*
PLO1	Demonstrate continuing advanced knowledge and have the capabilities to further develop and use the knowledge in new situations or disciplines in systems engineering context.	K, P
PLO2	Analyze and evaluate problems in systems engineering contexts and disciplines critically, particularly in situations with limited information, and provide solutions through the application of appropriate tools and techniques.	K, P
PLO3	Analyze information and use it to develop solutions in the field of systems engineering using advanced practical skills.	K, P
PLO4	Report effectively the finding of the learning outcomes in the field of systems engineering using oral and written medium.	K, P
PLO5	Evaluate existing and new information in systems engineering field by applying digital and numerical methods.	K, P

	Ability to participate and function as a leader or member in project management and technical project effectively in the systems engineering or multidisciplinary field.	A, K
PLO6		
PLO7	Identify the need for continuous professional development and entrepreneurship in the context of systems engineering.	A, K
PLO8	Plan and perform research undertakings professionally, ethically, and in a socially responsible manner.	A, K

Reference notes:

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

PO Domain

PLO1 Knowledge and Understanding
PLO2 Cognitive Skills
PLO3 Practical Skills
PLO4 Interpersonal and Communication Skills
PLO5 Digital and Numeracy Skills
PLO6 Leadership, Autonomy and Responsibility
PLO7 Personal and Entrepreneurial Skills
PLO8 Ethics and Professionalism.

Taxonomic Category

K   Cognitive
A   Affective
P   Psychomotor

PLANNER FOR MASTER OF SYSTEMS ENGINEERING

COURSE CODE	SEMESTER 1			SEMESTER 2			SEMESTER 3**		
	COURSE CODE		CREDIT	COURSE CODE		CREDIT	COURSE CODE		CREDIT
	Code	Subject		Code	Subject		Code	Subject	
Core Courses	KQX7001	Research Methodology		KQX7002	Project Management		KQC7001	Research Project (P)	
	KQC7015	Machine Learning		KQC7001	Research Project (P)				
	KQC7017	System Analysis and Design		KQC7016	Data Analytics				
	Code	Subject		Code	Subject		Code	Subject	
Elective Courses	KQC70XX	Elective 1		KQC70XX	Elective 4				
	KQC70XX	Elective 2		KQC70XX	Elective 5				
	KQC70XX	Elective 3							

Semester I**			Semester II**		
Code	**Course**	**Credit**	**Code**	**Course**	**Credit**
KQC7018	Smart Power Distribution System	3	**KQC7020**	Power Electronics	3
KQC7019	Green Energy Systems	3	**KQC7022**	Power Quality	3
KQC7021	Electrical Energy Conversion Technologies	3	**KQC7023**	Digital Signal Processing	3
KQC7024	Communication Networks	3	**KQC7027**	Optical Devices	3
KQC7025	Wireless Communication Systems	3	**KQC7029**	Embedded Systems	3
KQC7026	Antenna and Propagation	3	**KQC7031**	Industrial Automation and Robotics	3
KQC7028	MEMS Design	3	**KQC7032**	Human Factor and Work Management	3
KQC7030	IC Design	3	**KQC7034**	Electromagnetic Compatibility and Interference	3
KQC7033	Discrete-time Control Systems	3			

NOTE: **Courses will be offered if there are at least **5** requests.

	PRO FORMA KURSUS *COURSE PRO FORMA*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQX7001	*KQX7001*
Tajuk Kursus* *Course Title**	Metodologi Penyelidikan	*Research Methodology*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisa isu-isu semasa berkaitan dengan masalah kajian. 2. Merekabentuk kaedah kajian untuk menyelesaikan masalah kajian. 3. Menilai kebolehlaksanaan dan kepraktisan kaedah	*At the end of the course, students are able to:* 1. *Analyze the current issues related to the research problem.* 2. *Design research methodology to solve the research problem.* 3. *Evaluate the feasibility and practicality of*

UM-PT01-MQF-BR005-S01

	PRO FORMA KURSUS *COURSE PRO FORMA*	

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
	kajian untuk menyelesaikan masalah kajian. 4. Menyusun maklumat berkaitan kepada laporan teknikal.	*research methodology to solve the research problem.* *4. Compile relevant information into a technical report*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini mendedahkan pelajar kepada teknik – teknik bagaimana untuk menjalankan kajian. Di awal kursus pelajar di ajar dengan pelbagai teknik kajian termasuk, kaedah kajian saintifik. Kemudian, etika kajian, reka bentuk eksperimen dan teknik statistik di terangkan kepada pelajar di ikuti dengan mengenal pasti masalah kajian dan penulisan cadangan. Pelajar akan menguasai kemahiran kajian, penulisan saintifik, komunikasi lisan bagi dapatan kajian.	*This course exposes students to the techniques of how to conduct research. At the beginning of the course students are taught with various research techniques including, scientific research methods. Then, research ethics, experimental design and statistical techniques are explained to students followed by identifying research problems and writing suggestions. Students will master research skills, scientific writing, oral communication for research findings.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 100% Peperiksaan Akhir:-	*Continuous Assessment:100%* *Final Examination: -*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

PRO FORMA KURSUS
COURSE PRO FORMA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQX7002	*KQX7002*
Tajuk Kursus* *Course Title**	Pengurusan Projek	*Project Management*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisa prinsip komponen dan konsep pengurusan projek. 2. Membenarkan pelbagai pemacu perubahan yang boleh menjejaskan projek selama kitaran hidupnya. 3. Menyelesaikan segala cabaran semasa projek secara	*At the end of the course, students are able to:* 1. *Analyze the principle components and concepts of project management.* 2. *Justify the various drivers of change which may impact a project during its life cycle.* 3. *Solve every challenges faced during the project.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	efektif. 4. Mengaplikasikan kemahiran keusahawanan dan kepimpinan dalam pengurusan sesuatu projek.	4. *Apply entrepreneurial and leadership skills in a project management.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini memberikan pengenalan yang sistematik dan menyeluruh untuk semua aspek pengurusan projek. Projek adalah aspek yang semakin penting dalam perniagaan kejuruteraan moden. Oleh itu, kursus ini mengutarakan pentingnya memahami hubungan antara projek dan matlamat strategik organisasi. Kursus ini juga membincangkan kemahiran teknikal, budaya, dan interpersonal yang diperlukan untuk menguruskan projek dengan jayanya dari awal hingga akhir. Ia menekankan bahawa pengurusan projek adalah disiplin profesional yang merangkumi pengetahuan dan kemahirannya yang tersendiri. Konsep diperkukuhkan dengan menggunakan kajian kes yang merangkumi pelbagai jenis projek dan industri.	*This course provides a systematic and thorough introduction to all aspects of project management. Projects are an increasingly important aspect of modern engineering business. Therefore, the course underlines the importance of understanding the relation between projects and the strategic goals of the organisation. The course also discusses the technical, cultural, and interpersonal skills necessary to successfully manage projects from start to finish. It emphasises that project management is a professional discipline with its own tools, body of knowledge, and skills. Concepts are reinforced by case studies covering a wide variety of project types and industries.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Ditampal di papan notis atau dimaklumkan melalui talian.	*Results will be notified through notice board and online*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PRO FORMA KURSUS
COURSE PRO FORMA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7001	*KQC7001*
Tajuk Kursus* *Course Title**	Projek Penyelidikan	*Research Project*
Kredit* *Credit**	12	*12*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	480	*480*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Membina kajian literatur dan kajian teori yang diperlukan untuk penyelidikan. 2. Merekabentuk satu kaedah untuk membuat kajian eksperimen atau teori 3. Menyiasat masalah penyelidikan melalui kaedah yang ditetapkan.	*At the end of the course, students are able to:* *1. Construct literature review and theoretical study required for the research.* *2. Design a methodology to carry out experimental or theoretical research* *3. Investigate the research problem through a defined methodology.*

UM-PT01-MQF-BR005-S01

226

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	4. Membentangkan projek penyelidikan kepada khalayak dari pelbagai latar belakang. 5. Menganalisa data dan dapatan kajian dengan alat analisa eksperimen dan perisian yang sesuai. 6. Menunjukcara penggunaan kemahiran pengurusan projek yang sesuai dalam menyiapkan projek penyelidikan. 7. Menganalisa kesan ekonomi dari hasil penyelidikan. 8. Menganalisa hasil kajian berkenaan dengan kesannya terhadap sosial dan alam sekitar.	4. Present the research project to audience of various background. 5. Analyse the data and findings of the research using the appropriate experimental and software analysis tools. 6. Demonstrate the use of appropriate project management skills in completing the research project. 7. Analyse the economic impacts of the research outcomes. 8. Analyse the outcomes of the research with respect to its impacts on social and environment.
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Projek penyelidikan akan mendedahkan pelajar dalam membuat ulangkaji risalah berkaitan dengan topik kajian spesifik, merancang kaedah kajian, mengumpul data eksperimen dan menghuraikan data, menulis laporan dan membuat pembentangan.	Research project will expose students to carry out literature review on a specific research topic, plan a research methodology, collect experimental data and Interpret data, write a dissertation and carry out a presentation
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 100% Peperiksaan Akhir: 0%	Continuous Assessment: 100% Final Examination: 0%
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas dalam talian	Online feedback
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7015	*KQC7015*
Tajuk Kursus* *Course Title**	Pembelajaran Mesin	*Machine Learning*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Mengaplikasikan pelbagai algoritma pembelajaran mesin. 2. Menyesuaikan pelbagai algoritma pembelajaran terhadap data. 3. Menilai algoritma pembelajaran dan pemilihan model.	*At the end of the course, students are able to:* *1. Apply various machine learning algorithms.* *2. Adapt various learning algorithms to data.* *3. Evaluate various learning algorithms and model selection.*

UM-PT01-MQF-BR005-S01

	UNIVERSITI MALAYA	**PRO FORMA KURSUS** *COURSE PRO FORMA*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Untuk menyediakan pelajar dengan pengenalan mendalam dalam dua bidang Pembelajaran Mesin: diselia dan tidak diselia. Beberapa model dan algoritma utama seperti regresi, pengkelasan, pengelompokan dan proses keputusan Markov akan dibincangkan dan dipelajari. Topik akan termasuk regresi linear dan logistik, regularisasi, MLE, kesimpulan probabilistik (Bayesian), SVM dan kaedah kernel, ANN, pengelompokan, dan pengurangan dimensi	To provide students with an in-depth introduction to two main areas of Machine Learning: supervised and unsupervised. Some of the main models and algorithms for regression, classification, clustering and Markov decision processes will be discussed and studied. Topics will include linear and logistic regression, regularisation, MLE, probabilistic (Bayesian) inference, SVMs and kernel methods, ANNs, clustering, and dimensionality reduction.
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	Continuous Assessment: 50% Final Examination: 50%
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian.	Online feedback.
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019

PRO FORMA KURSUS
COURSE PRO FORMA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7016	*KQC7016*
Tajuk Kursus* *Course Title**	Analitik Data	*Data Analytics*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Merekabentuk kaedah yang sesuai untuk mewakili pelbagai jenis data untuk analisis selanjutnya. 2. Mengesahkan kecekapan pelbagai teknik yang digunakan untuk klasifikasi dan pengelompokan data. 3. Melakukan analisis data yang melibatkan mekanisme untuk regresi data, peraturan persatuan, dan	*At the end of the course, students are able to:* *1. Design the appropriate methods for representing different types of data for further analysis.* *2. Validate the efficiency of various techniques used for data classification and clustering.* *3. Perform data analysis involving mechanisms for data regression, association rules, and map-*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	pengurangan peta dengan mengambil kira isu-isu etika.	*reduced by considering ethical issues.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini bertujuan untuk menyediakan pelajar dengan konsep asas analisis data, dengan tumpuan kepada aplikasi kejuruteraan elektrik. Antara topik yang dibincangkan dalam kursus ini adalah pelbagai teknik untuk penyediaan dan pemodelan data, membuat keputusan, klasifikasi data dan pengelompokan data. Selain itu, alat-alat yang digunakan untuk analisis data juga akan diperkenalkan dalam kursus ini, termasuk Pemrograman Python dan R, dan Hadoop.	*This course aims to provide the students with basic concept of data analytics, focusing on the electrical engineering applications. Among the topics that are covered in this course are various techniques for data preparation and modeling, decision-making, data classification and data clustering. Besides, tools used for data analytics is also introduced in this course, including Python and R Programming, and Hadoop.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian.	Online feedback.
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7017	*KQC7017*
Tajuk Kursus* *Course Title**	Analisa dan Rekabentuk Sistem	*System Analysis and Design*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Mencadangkan penyelesaian rekabentuk bagi keadaan akhir tertakrif dengan menggunakan metodologi rekabentuk kejuruteraan berstruktur. 2. Membangunkan satu penyelesaian kejuruteraan terperinci dengan menggunakan alat-alat rekabentuk	*At the end of the course, students are able to:* *1. Propose design solution for a defined end state using a structured engineering design methodology.* *2. Develop a detailed engineering solution using appropriate design tools for the selected design*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
	yang sesuai bagi penyelesaian rekabentuk terpilih. 3. Menghubungkait penyelesaian kejuruteraan yang direkabentuk dengan data/senario kajian kes awal.	*solution.* 3. *Relate the designed engineering solution with initial case study data/scenario.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini memperkenalkan satu set kemahiran utama yang semua penganalisis perlu tahu tidak kira pendekatan atau metodologi yang digunakan untuk membangunkan sistem yang lebih berkesan dan cekap. Semua projek sistem maklumat dilaksanakan melalui empat fasa iaitu perancangan, analisis, reka bentuk, dan pelaksanaan. Semua projek memerlukan penganalisis untuk mengumpul keperluan, memodelkan keperluan perniagaan, dan membuat pelan tindakan untuk bagaimana sistem itu perlu dibina; dan semua projek memerlukan pemahaman tentang konsep tingkah laku organisasi seperti pengurusan perubahan dan pembinaan pasukan.	*This course introduces a core set of skills that all analysts need to know no matter what approach or methodology is used to develop more effective and efficient systems. All information systems projects move through the four phases of planning, analysis, design, and implementation. All projects require analysts to gather requirements, model the business needs, and create blueprints for how the system should be built; and all projects require an understanding of organizational behavior concepts like change management and team building.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian	*Online feedback*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7018	*KQC7018*
Tajuk Kursus* *Course Title**	Sistem Pengagihan Kuasa Pintar	*Smart Power Distribution System*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisa konsep-konsep sistem kuasa elektrik. 2. Menilai kesan-kesan persepaduan teknologi rendah karbon kepada operasi sistem pengagihan elektrik. 3. Mencadangkan penyelesaian yang sesuai untuk permasalahan perancangan sistem pengagihan elektrik.	*At the end of the course, students are able to:* *1. Analyse the concepts of electrical power system* *2. Assess the effects of low carbon technology. integration to the operation of electrical distribution system.* *3. Propose feasible solutions for electrical distribution system planning problems.*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini memperkenalkan konsep-konsep penting didalam sistem kuasa elektrik. Kursus ini juga menyediakan pengetahuan mendalam tentang penjana agihan dan teknologi rendah karbon serta kesan dan cabaran persepaduan teknologi ini kepada perancangan dan operasi rangkaian pengagihan moden. Pelajar akan mempelajari kaedah-kaedah yang bersesuaian bagi memenuhi keperluan piawaian tempatan dan antarabangsa berkenaan dengan perancangan perkembangan dan operasi sistem pengagihan di dalam menuju konsep grid pintar.	*This course introduces important concepts in power system. The course also provides in-depth knowledge on the distributed generation and low carbon technology as well as the impacts and challenges of its integration into modern distribution networks. Students will learn how to design appropriate solutions for distribution system planning to satisfy national and international electrical distribution standards in anticipation of future smart grid concepts.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian	*Online feedback*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

UNIVERSITI MALAYA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. *Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7019	*KQC7019*
Tajuk Kursus* *Course Title**	Sistem Tenaga Hijau	*Green Energy Systems*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisa sistem penukaran tenaga dan penyimpanan untuk teknologi boleh diperbaharui. 2. Menilai prestasi dan kebolehpercayaan sistem tenaga boleh diperbaharui. 3. Merekabentuk sistem tenaga boleh diperbaharui yang kecil.	*At the end of the course, students are able to:* *1. Analyze energy conversion systems and storage for renewable technologies.* *2. Evaluate the performance and the reliability of renewable energy systems.* *3. Design a small renewable energy system.*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Masyarakat moden bergantung kepada bekalan tenaga stabil sedia ada. Tenaga boleh diperbaharui merupakan komponen yang semakin penting kepada penghasilan tenaga baru. Kursus ini merangkumi penukaran tenaga, penggunaan dan penyimpanan tenaga boleh diperbaharui seperti angin, biojisim, solar, sel bahan api dan sistem hibird. Konsep Termodinamik (termasuk undang-undang pertama dan kedua) akan menjadi asas untuk pemodelan sistem tenaga boleh diperbaharui. Kursus ini juga merangkumi kesan-kesan ke atas alam sekitar akibat daripada penukaran tenaga dan cara-cara tenaga boleh diperbaharui dapat mengurangkan pencemaran alam sekitar dan perubahan iklim global.	*Modern society relies on stable, readily available energy supplies. Renewable energy is an increasingly important component of the new energy mix. The course covers energy conversion, utilization and storage for renewable technologies such as wind, solar, hydro, Oceanic Energy and hybrid systems. Thermodynamics concepts (including the first and second law) will form the basis for modeling the renewable energy systems. The course also touches upon the environmental consequences of energy conversion and how renewable energy can reduce air pollution and global climate change.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian	*Online feedback*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7020	*KQC7020*
Tajuk Kursus* *Course Title**	Elektronik Kuasa	*Power Electronics*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Memilih peranti kuasa untuk penukar elektronik kuasa. 2. Menilai prestasi penukar untuk aplikasi perindustrian. 3. Merekabentuk penukar kuasa yang berkaitan dengan aplikasi perindustrian mengikut piawaian.	*At the end of the course, students are able to:* *1. Select power devices for power electronics converters.* *2. Evaluate the converter performance for industrial applications.* *3. Design power converters related to industrial applications according to standards.*

UM-PT01-MQF-BR005-S01

	PRO FORMA KURSUS	
	COURSE PRO FORMA	

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini membentangkan aplikasi elektronik kuasa, standard EMC, DC-DC-suis mod penukar, teknik PWM, 'buck' tiga-fasa, rangsangan dan 'flyback' penukar, penukar salunan dan penyongsang bertingkat.	*This course presents power electronics applications, EMC standards, DC-DC switch-mode converters, PWM techniques, three-phase buck, boost and flyback converters, resonant converters and multilevel inverters.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian.	*Online feedback.*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

	PRO FORMA KURSUS *COURSE PRO FORMA*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7021	*KQC7021*
Tajuk Kursus* *Course Title**	Teknologi Penukaran Tenaga Elektrik	*Electrical Energy Conversion Technologies*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*None*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganggarkan rekabentuk asas, parameter angkutan dan fungsi peranti penukaran/ penyimpanan tenaga. 2. Membenarkan teknik pencirian dan fabrikasi yang sesuai bagi peranti penukaran/penyimpanan tenaga.	*At the end of the course, students are able to:* 1. *Estimate basic design, transport parameter and function of energy conversion/storage device.* 2. *Justify suitable characterization and fabrication techniques for energy conversion/storage device.*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	3. Merekabentuk peranti penukaran/ penyimpanan tenaga yang mengandungi teknologi bahan dan struktur peranti.	*3. Design energy conversion/storage device employing material and device structure technologies.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Pada masa kini, peranti penukaran/penyimpanan tenaga memainkan peranan yang penting dalam teknologi pengumpulan tenaga elektrik dengan mengitar semula sumber tenaga yang terbuang. Matlamat kursus ini adalah untuk menghasilkan pelajar yang mampu mencadang dan merekabentuk peranti penukaran/penyimpanan tenaga termaju dengan pengetahuan asas yang mencukupi dalam prinsip, bahan, teknik fabrikasi dan pengukuran peranti. Melalui kursus ini, pelajar akan didedahkan dengan teknologi terkini dan asas-asas peranti termoelektrik, ferroelektrik, fotovoltaik dan bateri. Tidak terhad kepada prinsip-prinsip asas dan rekabentuk peranti, pelajar juga akan didedahkan kepada teknik fabrikasi dan pengukuran termaju.	*Nowadays, energy conversion/storage device plays an important role in harvesting electrical energy technology by recycling waste energy resources. The goal of this course is to prepare students to be able to propose or design an advanced energy conversion/storage device with adequate basic in knowledge of device principle, material, fabrication technique and characterization. Throughout the course, students will be exposed with current technologies and fundamentals of thermoelectric, ferroelectric and photovolatic devices, and batteries. Not limited to its principles and device designs, students will also be exposed to its advanced fabrication technique and characterization.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian	*Online feedback*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7022	*KQC7022*
Tajuk Kursus* *Course Title**	Kualiti Kuasa	*Power Quality*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menyiasat fenomena kualiti kuasa dan kepentingannya kepada masyarakat dan industri. 2. Menilai masalah kualiti kuasa. 3. Mencadangkan teknik mengurangkan gangguan kualiti kuasa dengan mengambil kira isu-isu etika.	*At the end of the course, students are able to:* *1. Investigate the power quality phenomenon and its importance to society and industry.* *2. Evaluate power quality problems.* *3. Propose techniques to mitigate power quality disturbances by considering ethical issues.*

UM-PT01-MQF-BR005-S01

	PRO FORMA KURSUS
UNIVERSITI MALAYA	***COURSE PRO FORMA***

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini memperkenalkan pelbagai jenis isu kualiti kuasa yang berlaku di industri. Sejarah kualiti kuasa, punca-punca dan kesan kepada pengguna elektrik dan pembekal kuasa dibentangkan. Teori di sebalik kejadian kualiti kuasa diberi secara mendalam. Dalam kursus ini, penekanan adalah diberi kepada voltan lendut dan harmonik, yang mana kerap dihadapi oleh pengguna elektrik. Piawaian dan penyelesaian yang sesuai untuk menghadapi masalah kualiti kuasa akan dibentangkan. Beberapa contoh masalah kualiti kuasa di industri akan diberi sebagai kajian kes.	*This course introduces different type of power quality issues that occurs in industry. The history of power quality, its causes and impact to electrical consumers and power provider are presented. Theory behind power quality occurrence is given in details. In this course, emphasis is given to voltage sags and harmonic, which frequent face by electrical consumers. Standard and suitable solutions to mitigate power quality will be presented. Few examples of power quality problems in industry will also give as a study case.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian.	Online feedback.
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7023	*KQC7023*
Tajuk Kursus* *Course Title**	Pemprosesan Isyarat Digit	*Digital Signal Processing*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisa isyarat dalam sistem komunikasi menggunakan teknik pemprosesan isyarat digit. 2. Menilai isyarat komunikasi untuk memenuhi keperluan tertentu. 3. Menerangkan pendekatan penyelesaian masalah	*At the end of the course, students are able to:* *1. Analyse signals in communication systems using digital signal processing technique.* *2. Assess the communication signals to meet a particular requirement.* *3. Explain the problem solving approaches to*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia **Malay Version**	**Versi Bahasa Inggeris** **English Version**
	untuk membuat keputusan menggunakan metodologi kejuruteraan yang baik.	*make decisions using sound engineering methodologies.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini membentangkan pengenalan luas kepada reka bentuk sistem pemprosesan isyarat digital dan asas kukuh dalam teori dan teknik yang boleh digunakan dalam pelbagai aplikasi kejuruteraan. Topik-topik yang diliputi adalah analog untuk proses penukaran digital, penapis digital, jelmaan Laplace, jelmaan-Z, perkakasan dan perisian untuk pemproses isyarat digital, dan aplikasi pemprosesan isyarat digital untuk memproses imej dan isyarat audio.	*This course presents a broad-based introduction to digital signal processing system design and a solid grounding in theory and techniques which can be applied in various engineering applications. Topics covered are analogue to digital conversion process, digital filters, Laplace transform, Z-transform, hardware and software for digital signal processors, and applications of digital signal processing to process image and audio signal.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian dan komen secara lisan semasa kuliah.	*Online feedback and oral comments during lectures.*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PRO FORMA KURSUS
COURSE PRO FORMA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. *Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7024	*KQC7024*
Tajuk Kursus* *Course Title**	Rangkaian Komunikasi	*Communication Networks*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menilai pelbagai jenis rangkaian komunikasi dan isu-isu pelaksanaannya. 2. Membandingkan ciri-ciri protokol penghalaan berkenaan dengan teknologi rangkaian komunikasi masa kini.	*At the end of the course, students are able to:* *1. Evaluate various types of communication networks and their implementation issues.* *2. Compare the characteristics of routing protocols with respect to the current communication technologies.* *3. Propose how a specific user application should*

	Versi Bahasa Malaysia ***Malay Version***	**Versi Bahasa Inggeris** ***English Version***
	3. Mencadangkan bagaimana sesuatu aplikasi pengguna tertentu harus menggunakan rangkaian maju kelajuan tinggi.	*use advanced high speed networks.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini direkabentuk untuk menyediakan pelajaran mendalam dalam bidang rangkaian komunikasi dan teknologi berkaitan. Ia meliputi evolusi dalam teknologi rangkaian daripada rangkaian pensuisan-litar kepada rangkaian pensuisan-paket, dan bagaimana rangkaian ini menyokong berbagai jenis aplikasi seperti VPN dan MPLS. Selain itu, keselamatan rangkaian turut diperkenalkan.	*This course is designed to provide an in-depth study on communication networks and their supporting technologies. It covers the evolution of networking technologies from circuit switching to packet-switching networks, and how these networks are used in supporting various types of applications, such as VPN and MPLS. Besides, network security is also introduced.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian melalui Spectrum.	Online feedback via Spectrum.
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7025	*KQC7025*
Tajuk Kursus* *Course Title**	Sistem Komunikasi Tanpa Wayar	*Wireless Communication Systems*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Membandingkan pelbagai teknologi komunikasi tanpa wayar. 2. Menerangkan operasi rangkaian tanpa wayar bergerak dan aplikasinya. 3. Menilai prestasi sistem komunikasi tanpa wayar.	*At the end of the course, students are able to:* *1. Compare various wireless communication technologies.* *2. Explain the operation of wireless mobile networks and its applications.* *3. Evaluate the performance of wireless communication systems.*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini memberikan teknologi komunikasi tanpa wayar. Kursus ini juga mempamerkan konsep tanpa wayar setempat dan kawasan rangkaian persendirian. Selain itu, rangkaian tanpa wayar bergerak dan aplikasinya juga diterangkan.	This course provides wireless communication technology. This course also presents the concept of wireless local and personal area networks. Besides that, wireless mobile networks and applications is also presented.
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian.	Online feedback.
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PRO FORMA KURSUS
COURSE PRO FORMA

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7026	*KQC7026*
Tajuk Kursus* *Course Title**	Antena dan Perambatan	Antenna and Propagation
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir pembelajaran ini, pelajar mampu untuk : 1. Menilai parameter penting antena. 2. Membandingkan gelombang satah elektromagnetik dan hukum -hukum perambatan gelombang di antara antena pemancar dan penerima dengan menilai impak kepada persekitaran. 3. Mengesahkan pelbagai jenis antena dan konsep	*At the end of this course, students are able to :* *1. Evaluate the important antenna parameters.* *2. Compare the plane electromagnetic wave and the wave propagation law between the transmitter and receiver of the antenna by evaluating the impact to the environment.* *3. Validate various type of antenna and the*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	pengukuran antena.	*concept of antenna measurement.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Pengenalan kepada prinsip asas antena. Bermula dengan gelombang satah elektromagnetik dan hukum-hukum yang berkaitan dengan perambatan gelombang antara antena penghantaran dan penerimaan. Parameter penting antena seperti corak, kearahan, dan gandaan diterangkan. Kursus ini meliputi jenis-jenis antena seperti dwi-kutub elektrik, gelung dan tatasusun lelurus dan termasuk juga konsep asas pengukuran antena.	*Introduce the basic essentials of antenna. Starting with the plane electromagnetic waves and the laws that governs the propagation between the transmitting and receiving antennas, the important antennas parameters such as patterns, directivity and gain is explained. The course covers the antenna family that describes various antenna types, the electric dipoles, the loop antennas, uniform linear arrays and the basic concept of antenna measurements.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian.	Online feedback.
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

	PRO FORMA KURSUS *COURSE PRO FORMA*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7027	*KQC7027*
Tajuk Kursus* *Course Title**	Peranti Optik	*Optical Devices*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menentukan had yang ditetapkan oleh gentian optik dan prinsip kerja penguat and peranti optik yang lain serta had masing-masing. 2. Menentu ukur satu sistem komunikasi optik berdasarkan kepada anggaran kuasa, anggaran	*At the end of the course, students are able to:* *1. Determine the limits imposed by optical fibers and the working principle of optical amplifiers and other optical devices and their limitations.* *2. Validate a detailed engineering solution using appropriate design tools for the selected design*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	pencapahan, dan prestasi BER. 3. Merekabentuk satu sistem WDM dan menganalisa prestasinya disebabkan kesan pencapahan dan tidak linear dengan mengambil kira faktor ekonomi.	*solution.* *3. Design a WDM system and analyze its performance due to dispersion and nonlinear effects by considering the economical factor.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini memperkenalkan asas gentian optik, pengenalan kepada komunikasi optik, pelemahan dalam sistem gentian optik, penguat optik, sumber ketidaksamaan, kesan tidak linear, senibina jaringan optik, peranti optik pasif dan aktif.	*This course presents the fundamental of fiber optic, introduction to optical communication, attenuation in optical fiber systems, optical amplifiers, sources of impairments, nonlinear effects, dispersion management, optical network, passive and active optical devices.*
Pemberatan Penilaian* *Assessment Weightage* *	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian	*Online feedback*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

	PRO FORMA KURSUS *COURSE PRO FORMA*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7028	*KQC7028*
Tajuk Kursus* *Course Title**	Rekabentuk MEMS	*MEMS Design*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Mengaplikasikan prinsip asas dan hukum penskalaan dalam teknologi-teknologi berlainan yang boleh digunakan dalam rekabentuk MEMS. 2. Menyesuaikan teknologi MEMS untuk mikropenderia dan penggerak dengan penekanan terhadap	*At the end of the course, students are able to:* *1. Apply basic principles and scaling laws underlying different technologies applied in MEMS design.* *2. Adapt MEMS technology for microsensors and actuators with an emphasis on usage of smart*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	penggunaan bahan dan struktur pintar. 3. Menilai peluang komersial untuk status semasa teknologi MEMS (dengan contoh kajian kes yang spesifik) dan menyediakan aplikasi berpotensi untuk masa depan.	*materials and structures.* *3. Evaluate commercial opportunities for the current status of MEMS technology (with specific examples or case studies) and provide potential futuristic applications.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	MEMS adalah peranti kecil bersaiz mikro yang berkebolehan untuk menjalankan banyak tugas dan fungsi berhubung dengan isyarat elektrik, mekanik, haba, optik, bendalir dan jenis-jenis isyarat yang lain. Kursus ini akan menyediakan asas daripada disiplin-disiplin yang berkaitan dengan pemahaman dan aplikasi teknologi MEMS (Micro-Electro-Mechanical Systems). Topik rekabentuk akan merangkumi prinsip mekanik, frekuensi radio dan prinsip mikrobendalir. Kaedah fabrikasi akan merangkumi teknik mikropemesinan pukal dan permukaan yang kebanyakannya bergantung kepada pemprosesan VLSI. Kursus ini juga akan memperkenalkan proses integrasi di antara platform peranti sedia ada dan sifat bahan berkaitan dengan rekabentuk dan fabrikasi MEMS.	*MEMS are miniature devices in micron dimensions that are capable of performing many tasks and functions that involve electrical, mechanical, thermal, optical, fluidic, and other types of signals. This course will provide the fundamentals from many disciplines relevant to the understanding and application of Micro-Electro-Mechanical Systems (MEMS) technology. Design topics will include mechanical, RF and microfluidic principles. Fabrication methods will cover bulk and surface micromachining techniques that rely heavily on VLSI processing. Process integration with existing device platforms and materials properties related to MEMS design and fabrication will be discussed.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian	*Online feedback*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7029	*KQC7029*
Tajuk Kursus* *Course Title**	Sistem Terbenam	*Embedded Systems*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Merekabentuk komponen perkakasan seperti mikropemproses, bas dan pengantaramukaan persisian untuk sistem terbenam. 2. Membangun komponen perisian peringkat rendah sistem terbenam.	*At the end of the course, students are able to:* *1. Design hardware components such as microprocessor, bus and peripheral interfacing of an embedded system.* *2. Compose the low-level software components of an embedded system.*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	3. Membina projek reka bentuk sistem terbenam skala kecil.	3. *Construct small embedded system design project.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini menyediakan pengenalan praktikal untuk reka bentuk sistem elektronik berasaskan mikropemproses. Kuliah dan kerja projek akan mendedahkan pelajar kepada pelbagai peringkat dalam projek kejuruteraan (reka bentuk, pelaksanaan, pengujian dan dokumentasi) dan pelbagai konsep sistem terbenam.	*This course provides a practical introduction to the design of microprocessor-based electronic systems. The lectures and project work will expose students to the various stages in an engineering project (design, implementation, testing and documentation) and a range of embedded system concepts.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Gred/markah untuk tugasan, ujian dan/atau pembentangan individu diumumkan dalam kelas dan/atau dipamerkan di papan kenyataan.	*Grades/marks for assignment, test and/or individual presentation announced in class and/or displayed on the notice board.*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. *Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7030	*KQC7030*
Tajuk Kursus* *Course Title**	Rekabentuk IC	*IC Design*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menganalisa konsep teori litar VLSI CMOS analog. 2. Mengintegrasikan litar CMOS analog asas. 3. Menilai prestasi litar terkamil analog CMOS dengan mengadaptasikan perisian komputer canggih.	*At the end of the course, students are able to:* *1. Analyze the theoretical concepts of analog CMOS VLSI circuits.* *2. Integrate basic analog CMOS VLSI circuits.* *3. Evaluate the performance of integrated CMOS analog circuits adapting standardized state of the*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
		art tools
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini berperanan dalam memperkenalkan konsep pemodelan, merekabentuk dan analisis litar CMOS VLSI analog. Pelajar dilengkapkan dengan teori latarbelakang litar terkamil analog yang kukuh dengan penekanan kepada rekabentuk dan analisis. Rekabentuk CMOS berasaskan cermin arus, penguat pembezaan bersepadu, kepersisan rujukan voltan/arus dan litar analog tak lelurus akan dibincangkan dengan mempertimbangkan parameter praktikal, dan mengadaptasi faedah dan batasannya. Pelajar akan didedahkan dalam pengunaan perisian EDA bertahap industri untuk merekabentuk, mempertingkatkan dan simulasi litar terkamil CMOS analog.	*The goal of this course is to introduce the modelling, design and analysis of analog CMOS VLSI circuits. A strong theoretical background of integrated analog circuits design is imparted to the students along with the emphasis on their design and analysis. Design of CMOS based current mirrors, integrated differential amplifiers, precision voltage/current reference and nonlinear analog circuits are discussed considering practical parameters, adapting their advantages and limitations. Students will be exposed to use industry standard EDA tools to design, optimize and simulate analog CMOS integrated circuits.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Gred/markah untuk tugasan, ujian dan/atau pembentangan individu diumumkan dalam kelas dan/atau dipamerkan di papan kenyataan.	*Grades/marks for assignment, test and/or individual presentation announced in class and/or displayed on the notice board.*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7031	*KQC7031*
Tajuk Kursus* *Course Title**	Automasi Industri dan Robotik	*Industrial Automation and Robotics*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Memahami prinsip fungsi penderia dan penggerak perindustrian yang biasa. 2. Merekabentuk aturcara PLC yang dapat menafsirkan maklumat daripada penderia dan menukarkannya ke dalam penggerakkan yang sepadan. 3. Menganalisa masalah robotik yang diberikan dan	*At the end of the course, students are able to:* *1. Understand the functioning principles of the common industrial sensors and actuators.* *2. Design PLC programs that able to interpret the information from sensors and convert it into the corresponding actuation.* *3. Analyse a given robotic problem and select*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	memilih penderia/penggerak yang sesuai untuknya bagi kegunaan komersial.	*appropriate sensors/actuators needed for it for commercial use.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini merangkumi pelbagai topik penting dalam bidang automasi industri dan robotik termasuk penderia dan penggerak, Pengawal Logik Boleh-atur (PLC) dan prinsip robotik dan seni bina kawalannya.	*This course covers a wide range of important topics in industrial automation and robotics including sensors and actuators, Programmable Logic Controller (PLC) and principles of robotics and its control architecture.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara atas talian dan komen secara lisan semasa kuliah.	*Online feedback and oral comments during lectures.*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. *Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7032	*KQC7032*
Tajuk Kursus* *Course Title**	Faktor Manusia dan Pengurusan Kerja	*Human Factor and Work Management*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Membenarkan kepentingan faktor manusia dalam aplikasi alat dan persekitaran pekerjaan. 2. Menganalisa rekabentuk faktor kemanusiaan yang berkaitan dan penting untuk persekitaran kerja dan industri.	*At the end of the course, students are able to:* *1. Justify the importance of human factor in the application of tools and work environment.* *2. Analyze relevant and significant human factor design for work environment in industries.* *3. Design and manage a holistic organisation.*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	3. Merekabentuk dan mengurus organisasi yang holistik.	
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini mengandungi beberapa bahagian penting terutama: mengenalpasti, aplikasi dan analisis rekabentuk untuk persekitaran tempat kerja. Kursus ini juga membincangkan pembangunan kesedaran, tanggungjawab dan kepercayaan diri, serta peranan pengurus, dalam mewujudkan organisasi berprestasi tinggi.	*This course contains topics which include: Identification, application and analysis the importance of ergonomics in the application and design for special population. This course also discusses the awareness building, responsibility and self-belief, as well as roles of manager, in creating a high performance organization.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara dalam talian melalui Spectrum.	Online feedback via Spectrum.
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

*Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7033	*KQC7033*
Tajuk Kursus* *Course Title**	Sistem Kawalan Masa-diskret	*Discrete-time Control Systems*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Membina perwakilan sistem masa-diskret menggunakan persamaan perbezaan, rangkap pindah dan model ruang keadaan. 2. Menganalisa prestasi dan kestabilan bagi sistem masa-diskret. 3. Merekabentuk pengawal digit yang boleh memenuhi	*At the end of the course, students are able to:* *1. Construct discrete-time systems representation using difference equations, transfer function and state space models.* *2. Analyze discrete-time system performance and stability.* *3. Design digital controllers that are able to meet the*

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	spesifikasi yang ditetapkan.	*defined specifications.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini berkaitan dengan teori dan reka bentuk sistem kawalan masa-diskret. Topik utama termasuk jelmaan-Z, pensampelan dan pembinaan semula data, analisa prestasi dan kestabilan sistem masa-diskret dan reka bentuk pengawal digital menggunakan teknik berasaskan sambutan frekuensi dan berasaskan ruang-keadaan.	*This course deals with the theory and the design of discrete-time control systems. Major topics include Z-transform, sampling and data reconstruction, performance and stability analysis of discrete-time systems and design of digital controller using frequency response based and state-space based techniques.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Maklumbalas secara atas talian dan komen secara lisan semasa kuliah.	*Online feedback and oral comments during lectures.*
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

PENTING / *IMPORTANT*:

Kandungan Pro Forma ini tidak boleh diubah tanpa kelulusan Senat bagi perkara-perkara yang telah ditandakan*. Pindaan kepada perkara lain boleh diluluskan di peringkat Akademi/Fakulti/Institut/Pusat.

Contents of this Pro Forma shall not be changed without the Senate's approval for items indicated with *. Changes to the other items can be approved at the Academy/Faculty/Institution/Centre level.

	Versi Bahasa Malaysia *Malay Version*	Versi Bahasa Inggeris *English Version*
Akademi/Fakulti/Institut/Pusat *Academy/Faculty/Institute/Centre*	Fakulti Kejuruteraan	*Faculty of Engineering*
Jabatan *Department*	Jabatan Kejuruteraan Elektrik	*Department of Electrical Engineering*
Nama Program Akademik Name of Academic *Programme*	Sarjana Kejuruteraan Sistem	*Master of System Engineering*
Kod Kursus* *Course Code**	KQC7034	*KQC7034*
Tajuk Kursus* *Course Title**	Keserasian dan Gangguan Elektromagnet	*Electromagnetic Compatibility and Interference*
Kredit* *Credit**	3	*3*
Masa Pembelajaran Pelajar (SLT) *Student Learning Time (SLT)*	120	*120*
Prasyarat/Keperluan Minimum Kursus *Course Pre-requisite(s)/Minimum Requirement(s)*	Tiada	*No*
Hasil Pembelajaran Kursus* *Course Learning Outcomes**	Di akhir kursus ini, pelajar dapat: 1. Menjalankan pengukuran pancaran dan ujian kelalian. 2. Menilai mekanisma gandingan gangguan, konfigurasi peralatan dan pembumian. 3. Merekabentuk litar analog dan digital untuk kawalan pancaran dengan mengambil kira impak kepada	*At the end of the course, students are able to:* *1. Perform emission measurements and immunity tests.* *2. Evaluate interference coupling mechanisms, equipment layout and grounding.* *3. Design analogue and digital circuit for emission*

UM-PT01-MQF-BR005-S01

	Versi Bahasa Malaysia *Malay Version*	**Versi Bahasa Inggeris** *English Version*
	manusia dan persekitaran.	*control by considering the impact to human and environment.*
Sinopsis Kandungan Kursus *Synopsis of Course Contents*	Kursus ini bermula dengan pengenalan kepada subjek inteferens dan provisi untuk direktif EMC serta kaedah dalam mencapai pematuhan. Pelbagai piawaian yang berkaitan akan dibincangkan. Ia termasuk pengenalan kepada peralatan, kaedah ujian dan beberapa punca kesalahan dan ketidakpastian dalam pengujian EMC. Ini termasuk perbincangan berkenaan teknik-teknik untuk mencapai prestasi EMC boleh terima pada tahap rekabentuk. Ia juga meliputi prinsip asas penilaian mekanisma gandingan interferen, pemilihan konfigurasi litar, ciri komponen dan perisian. Pengurusan EMC dan prinsip-prinsip kawalan juga dibincangkan.	*This course starts with the introduction on subject of interference and the provision of the EMC directive and the means of achieving compliance. Various standards which are relevant are discussed. It includes introduction to the equipment, the test methods and some of the causes of error and uncertainty that attend EMC testing. Discussions on techniques for achieving an acceptable EMC performance at the design stage are included. It also covers basic principles involve in coupling electromagnetic interference, as well as choice of circuit configuration, components and software feature. EMC management and control principles are also discussed.*
Pemberatan Penilaian* *Assessment Weightage**	Penilaian Berterusan: 50% Peperiksaan Akhir: 50%	*Continuous Assessment: 50%* *Final Examination: 50%*
Kaedah Maklum Balas Tentang Prestasi *Methodologies for Feedback on Performance*	Perbincangan dalam kelas Gred akhir akan dimaklumkan kepada pelajar	Discussion in class Final grades will be given to students
Kriteria Dalam Penilaian Sumatif *Criteria in Summative Assessment*	Sila rujuk Kaedah-Kaedah Universiti Malaya (Ijazah Sarjana) 2019 dan Peraturan-Peraturan Universiti Malaya (Ijazah Sarjana) 2019	*Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019*

UM-PT01-MQF-BR005-S01

Master of Engineering Science
Faculty of Engineering

Programme Coordinator
Assoc. Prof. Dr. Hendrik Simon Cornelis Metselaar

h.metselaar@um.edu.my   03-79674451

UNIVERSITI MALAYA

MASTER OF ENGINEERING SCIENCE

1. **Programme Type**

    The Master of Engineering Science by research is a programme that consists of one hundred percent (100%) research leading to the submission of a dissertation.

2. **Admission Requirements**

    (1) Qualifications for Admission

    (a)   Bachelor Degree or equivalent with a CGPA > 3.00

    OR

    (b)   CGPA 2.0 to 2.99: Must fulfill few criteria from the following list according to the <u>qualification categories</u> as prescribed by the Senate:
    - (i)   Related working experience
    - (ii)   At least 1 ISI publication published
    - (iii)   Recipients of scholarships
    - (iv)   Government agencies staff
    - (v)   Graduate of University Malaya
    - (vi)   Pass Faculty interview
    - (vii)   Pass Faculty special assessment

    OR

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

(2)   Additional English Language requirement for international students:

A candidate who is not a Malaysian citizen and who possesses a degree or degrees from a university or an institution of higher education where the medium of instruction is not the English language for that degree or degrees must

(a)   obtain a score of 550 for the Test of English as a Foreign Language (TOEFL);

OR

(b)   obtain a band of 5.5 in the International English Language Testing System (IELTS);

OR

(c)   pass any English language test prescribed by the University

3. Duration of Study

Minimum period of candidature : 2 semesters

Maximum period of candidature : 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 VII, University of Malaya Regulations (Master's Degree) 2019.

(2)   Candidates are required to fulfill all prescribed requirements of the programme.

5. Determination of Research Area

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

LEARNING OUTCOME FOR MASTER BY RESEARCH

1.   Demonstrate a systematic understanding of knowledge by identifying research problems in the field of engineering related research.

2.   Apply appropriate research methodologies and techniques.

3.   Publish knowledge in the field of research conducted to benefit the community, as well as be sensitive to the roles and responsibilities of supporting the needs of the informed society.

4.   Conduct research with minimal supervision and adhere to legislation, ethics and professional codes of practice.

5.   Publish in peer reviewed academic journals in his/her field of study.

6.   Appraise research findings using scientific methods and critical thinking skills.

7.   Manage information for lifelong learning.

CANDIDATURE REQUIREMENTS
MASTER OF ENGINEERING SCIENCE

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.

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:

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.

COURSE CONTENT OF RESEARCH METHODOLOGY

KQX7001 Research Methodology

Learning Outcomes

At the end of the course, the student is able to:
1. Identify suitable research problem
2. Identify appropriate research technique and experimental design
3. Write research proposal
4. Prepare a review paper

Synopsis of Course Content

Introduction to research techniques. Scientific research methods. Research ethics. Experimental design and statistical techniques. Identifying research problem and proposal writing. Basic research writing skills. Review of basic writing skills. Written communication of research results: thesis writing and scientific paper writing. Oral communication of research results and attending conferences.

Evaluation and Weightage

Continuous Assessment: 100%

Criteria in Summative Assessment:

Please refer to the University of Malaya Rules (Master's Degree) 2019 and University of Malaya Regulations (Master's Degree) 2019

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 course in Upskill Program • Submit Application for Title Approval	• 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.

MKA/AA/NFA (JPPIT 08.10.2015)

Doctor of Philosophy
Faculty of Engineering

Programme Coordinator
Assoc. Prof. Dr. Roslina binti Ahmad

roslina@um.edu.my   03-79674497

UNIVERSITI MALAYA

DOCTOR OF PHILOSOPHY

1. **Programme Type**

   The Doctor of Philosophy programme is by research mode that consists of one hundred percent (100%) research leading to the submission of a dissertation.

2. **Admission Requirements**

   (1) Qualifications for Admission

   (a) Master Degree by research mode (related to Engineering field);

      OR

   (b) Master Degree or equivalent with a CGPA > 3.70 (related to Engineering field);

      OR

   (c) CGPA 2.0 to 3.69: Must fulfill few criteria from the following list according to the qualification categories as prescribed by the Senate:
      (i)   Related working experience
      (ii)   At least 1 ISI publication published
      (iii) Recipients of scholarships
      (iv)   Government agencies staff
      (v)   Graduate of University Malaya
      (vi)   Pass Faculty interview
      (vii) Pass Faculty special assessment

      OR

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

(2)   Additional English Language requirement for international students:

A candidate who is not a Malaysian citizen and who possesses a degree or degrees from a university or an institution of higher education where the medium of instruction is not the English language for that degree or degrees must

(a)   obtain a score of 550 for the Test of English as a Foreign Language (TOEFL);

OR

(b)   obtain a band of 5.5 in the International English Language Testing System (IELTS);

OR

(c)   pass any English language test prescribed by the University

3. Duration of Study

Minimum period of candidature : 4 semesters

Maximum period of candidature : 12 semesters

4. Programme Structure

(1)   This programme shall consist of one hundred percent (100%) research work leading to the submission of a thesis which format shall be stipulated as in Part VII, University of Malaya Regulations (Degree of Doctor of Philosophy) 2019.

(2)   Candidates are required to fulfill all prescribed requirements of the programme.

5. Determination of Research Area

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

LEARNING OUTCOME FOR DOCTOR OF PHILOSOPHY

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 in national and international context based on respective research output.

4. Conduct research with minimal supervision and adhere to legislation, ethics and 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

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. Fulfill the residential requirement of 6 months.

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 **Confirmation Defence** not later than the third (3rd) semester of candidature (**ONLY** applicable to admission through Fast Track candidates).

7. Present your research progress at **Candidature Defence** not later than the third (5th) semester of candidature.

8. Present your research progress at **Thesis Seminar** before the submission of thesis for examination.

The candidates must fulfill the following publication requirement before the Examination Committee (Board) meeting:

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 of the department and/or faculty where the candidate is registered

COURSE CONTENT OF RESEARCH METHODOLOGY

KVX8001 Research Methodology

Learning Outcomes

At the end of the course, the student is able to:
1. Identify suitable research problem
2. Identify appropriate research technique and experimental design
3. Write research proposal based on respective field choose
4. Prepare a review paper

Synopsis of Course Content

This course is designed to give introduction to research techniques, scientific research methods, research ethics, experimental design and statistical techniques. Identifying research problem and proposal writing, literature review, and review of basic writing skills. Written communication of research results: thesis writing and scientific paper writing. Oral communication of research results during presentation and attending conferences.

Evaluation and Weightage

Continuous Assessment**:** 100%

Criteria in Summative Assessment:

Please refer to the University of Malaya Rules (Degree of Doctor of Philosophy) 2019 and University of Malaya Regulations (Degree of Doctor of Philosophy) 2019.

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 (Proposal Defence, Candidature Defence and Thesis Seminar).
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.

5. 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 (Proposal Defence, Candidature Defence and Thesis Seminar).
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 – Conversion from Master)
(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 Conversion 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 • Candidate must have one accepted ISI publication and demonstrate PhD potential
3	• Investigation and development of the proposed solutions. • Data analysis • Conversion Defence report writing • Attend at least 2 courses in Upskill Program • Conversion Defence	• Results of Conversion Defence (if unsatisfactory, continue as a Master student – refer to Master by Research GOT Schedule in Semester 3)	• Conversion 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 (Proposal Defence, Candidature Defence and Thesis Seminar).
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.

MARKING SCHEME AND GRADE POINT AVERAGE

The assessment of examinations for the coursework component shall be based on the following grading scheme:

Marks	Grade	Grade Point	Meaning
90.00 - 100.00	A+	4.00	High Distinction
80.00 - 89.99	A	4.00	Distinction
75.00 - 79.99	A-	3.70	Distinction
70.00 - 74.99	B+	3.30	Pass
65.00 - 69.99	B	3.00	Pass
60.00 - 64.99	B-	2.70	Fail
55.00 - 59.99	C+	2.30	Fail
50.00 - 54.99	C	2.00	Fail
45.00 - 49.99	C-	1.70	Fail
40.00 - 44.99	D+	1.30	Fail
35.00 – 39.99	D	1.00	Fail
00.00 - 34.99	F	0.00	Fail

Note:
Grade 'P' is given every semester for progressive courses which are conducted consecutively until the total credit of the course is completed except for clinical programme. Other than medical reasons, any candidate who does not complete grade P will be given grade F.

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.

Guidelines for submission of Progress Report can be referred from:

https://umsitsguide.um.edu.my

SUPERVISION POLICY OF POSTGRADUATE CANDIDATE, UNIVERSITY OF MALAYA

1. **Introduction**

    The purpose of this supervision policy is to:

    (1) explain the criteria for the appointment of the supervisors as well as the role and responsibilities of the supervisors towards the candidates from all modes of Master's & Doctoral programmes.

    (2) Assist the Responsibility Centre (RC) in making plans for the workload of the academic staff, and the intake of candidates with consideration to the available infrastructure.

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

    (4) Explain the role and responsibilities of the candidates and supervisors throughout their programme of study and research activities as given in Appendix 1.

2. **Qualification Levels of Master's and Doctoral Degree in the Malaysian Qualifications Framework (MQF)**

    (1) Level 7 Master's Degree

    Decription of Level 7 Master's Degree as outlined in the MQF document is as in Attachment 1.

    (2) Level 8 Doctoral Degree / PhD

    Decription of Level 8 Doctoral Degree / PhD as outlined in the MQF document is as in Attachment 1.

3. **Appointment of Supervisor**

    Appointment of Supervisor shall fulfil the following criteria:

    (1) At least two (2) Supervisors are encouraged to supervise a candidate. If only one (1) Supervisor is appointed, the Supervisor must be a full time academic staff and must have experience of supervising until graduation, at least two (2) candidates.

    (2) The minimum qualification for the appointment of a supervisor is as follows:

    Master's Programme

    (a) At least one (1) Supervisor appointed shall have a minimum qualification of one level higher than the degree level enrolled in by the candidate i.e. a doctoral degree.

1

(b) If any of the supervisors appointed is without the required qualification, he must have at least five (5) years' experience:

      (i) in teaching and research; or
      (ii) as a co-supervisor.

(c) *For Clinical Masters' programme at the Faculty of Dentistry, the appointed supervisor must have at least a Clinical Masters qualification in the related field and two (2) years' experience:

      (i) recognized as an expert in the field; and
      (ii) in teaching and research; or
      (iii) as a co-supervisor.

Doctoral Programme

(a) At least one (1) of the Supervisors appointed for a Doctoral candidate must have a minimum qualification of the equivalent degree level enrolled in by the candidate and at least two (2) years' experience:

      (i) in teaching and research; or
      (ii) as a co-supervisor.

(b) *For Clinical Doctoral programme at the Faculty of Dentistry, the appointed supervisor must have at least a Clinical Masters qualification in the related field and three (3) years' experience:

      (i) recognized as an expert in the field; and
      (ii) in teaching and research; or
      (iii) as a co-supervisor.

*Source - Programme Standards: Dental Specialties

(3) Visiting academic staff may be appointed as co-supervisor for Master's and Doctoral candidates.

(4) Appointment of supervisor must be in line or relevant with the field of research/discipline of the candidate. If the candidate's research comprises of different disciplines, a supervisor from the related discipline must also be appointed.

(5) For collaborative programmes in the form of joint degree, dual degree and double degree, a supervisor must be appointed from both institutions. The number of supervisors appointed must be based on an agreement between both institutions.

(6) For doctoral industry programme, besides an academic supervisor, a co-supervisor from industry must also be appointed.

(7) Supervisors suggested by prospective candidates are given priority to supervise, except if the RC feels that other supervisors are more qualified to supervise.

2

(8) Academic staff on sabbatical leave may be allowed to supervise the candidate provided the sabbatical leave does not affect the supervision. However, based on specific reasons, the supervisor may apply to the RC not to supervise the candidate while on sabbatical leave and the approval is at the discretion of the RC.

(9) Supervisors from among the academic staff to be appointed, must have a minimum duration of service of not less than the candidate's minimum duration of study i.e at least twelve (12) months for Master's candidates and twenty-four (24) months for doctoral candidates.

If the duration of service is less than the candidate's minimum duration of study, the appointment of a co-supervisor is compulsory.

(10) Academic staff who have left the service in the University and are still doing academic work elsewhere may be appointed as co-supervisors. The number of candidates supervised must be limited to five (5) persons who are in their final stage of studies i.e have completed the Candidature Defence.

(11) The appointment of an external party (either academician or non academician) as co-supervisor/consultant may be considered if the external party is able to provide research facilities and expertise which will assist the candidate's research.

(12) New academic staff must attend the enhancement courses or supervision training offered by the RC or the University. Existing academic staff are also encouraged to attend these courses.

(13) The appointment of supervisors must be managed by the RC's *Jawatankuasa Ijazah Tinggi (JKIT)* in compliance with all the criteria specified in this policy. Appointment made must take into account expertise and supervision limit as well as infrastucture facilities (laboratory/studio/clinical facility and space) and finance (if related) to support candidates research.

(14) In the event of a conflict of interest between the supervisor and candidate (i.e – threat to the research integrity or relationships), the Head of the RC can terminate the appointment of the academic staff as supervisor.

(15) For any appointment of supervisor that does not meet the criteria as specified in this policy, the RC must submit an application with strong justification to the Deputy Vice Chancellor (Academic & International) for consideration and approval.

4. Supervision Limit

(1) The ratio of actual posts to the weightage of supervision of a postgraduate candidate is as follows:

- Visiting Academic Staff 1:3
- Research Fellow 1:3
- Lecturer 1:5
- Senior Lecturer 1:7
- Associate Professor 1:10

3

- Consultant 1:5
- Jusa C Professor 1:15
- Jusa B Professor 1:20
- Jusa A Professor 1:25

The following table should be used as a guide to determine the supervision weightage:

Mode of Study & Research Weightage (%)	Candidate Supervision Weightage
Coursework (70:30)	1/3
Mixed Mode (50:50) (60:40) (70:30)	2/3
Research (100)	1
Clinical (Medical) (50:50)	1/2
Clinical (Dentistry) (50:50)	1/2

(2) There is no limit on the number of supervision assigned to Emeritus Professor, Adjunct Professor, and Honorary Professor, but appointments must be made alongside permanent academic staff.

(3) The RC may approve a higher number of supervision provided the supervisor has shown excellent supervision performance.

(4) The RC may also determine a different supervision limit from the above to meet the requirements of the RC or related professional bodies.

5. Appointment of Additional or Change of Supervisor

Additional or Change of Supervisor can be implemented as below:

(1) In the event where an additional supervisor or change of supervisor is required, and supported with appropriate justification, the RC with the consent of all parties, may appoint any other academic staff to supervise the candidate.

(2) Applications may be submitted by the supervisor or candidate. A candidate is allowed to apply for a change of supervisor once during his candidature period. For this purpose, the candidate will need to complete the form as outlined in Attachment 2.

(3) Applications must be submitted with strong justification at the beginning of the candidature i.e. before or on the 3rd semester of study. If the application is submitted late, there is a possibility the application will not be approved by the RC.

However, the RC can decide to add or change supervisor at the very latest, one month after Candidature Defence.

4

(4) In the event of a conflict between the supervisor and the candidate, the RC shall take the following actions:

   (a) face-to-face discussions between the Deputy Dean of Postgraduate Studies, the Head of Department, the Supervisor and the candidate should be held to resolve the issue.

   (b) If the problem cannot be resolved, the RC must appoint an Arbitration Committee. Membership of the Committee shall consist of the following:

      (i) the Dean of the RC or any member of the Faculty appointed as Chairman
      (ii) the Deputy Dean of Postgraduate Studies
      (iii) the Head of Department / Program Coordinator
      (iv) Two (2) appointed faculty members.

      The additional appointment of a member outside the University as an independent party may be made by the Dean of the RC (if necessary).

      The terms of reference of the Arbitration Committee are as in Attachment 3.

   (c) If the problem remains unresolved, the RC shall submit this issue to the Office of the Deputy Vice-Chancellor (Academic & International) for further action.

6. Family Links

(1) An appointed supervisor must not have a close family link with the candidate, for example, spouse, parents / in-laws and immediate relatives such as children or siblings.

(2) The supervisors and consultants appointed also must not have any family link.

7. Role and Responsibilities of the Supervisor

The appointed supervisor shall perform his role and responsibilities as outlined in Attachment A.

8. Role and Responsibilities of the Candidate

Candidates must be responsible for their candidature and research throughout their status as a student in the University of Malaya as outlined in Attachment B.

9. Role and Responsibilities of the RC

The RC shall play the role as a coordinator providing research facilities, managing administrative matters and ensuring that the supervision process is implemented in orderly manner. The role and responsibilities of the RC are outlined in Attachment C.

Role and Responsiblities of Supervisor

1. Supervisors should know the regulations with respect to postgraduate programmes including:

    (1) UM (Master's Degree)Rules and Regulations (latest edition); or
        UM (Doctoral Degree)Rules and Regulations (latest edition);
    (2) Code of Research Ethics In the University of Malaya;
    (3) *Kod Etika Universiti Malaya;*
    (4) University of Malaya Policy on Authorship;
    (5) Intellectual Property and Commercialisation Policy (latest edition) and Intellectual Property (IP) and Commercialisation Policy Manual;
    (6) Publication Guidelines for Postgraduate Candidates (Research Mode) In Fulfilment of Graduation Requirements;
    (7) Any other resolutions approved by the Senate from time to time.

2. Supervisors should ensure every research activity of the candidate is planned and conducted according to the specified time frame.

3. Supervisors are responsible for providing relevant and adequate guidance and academic support to candidates to enable the candidate to carry out research and writing. This responsibility includes guidance in careful planning of the research and completing the graduation requirements.

4. Awareness regarding the implication of academic breach of conduct and plagiarism must be explained clearly to the candidate.

5. Supervisors shall meet regularly with the candidate at least twice (2) a month in the first semester and once (1) a month for the following semesters. In the first meeting, the supervisor and candidate shall discuss face-to-face, while the subsequent meetings may be conducted via online.

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

7. Each appointed supervisor shall know his responsibilities and advise to the candidate on the aspects that will be supervised. An effective working relationship must be established and maintained between all parties. Any difference in views, must be discussed and decided together.

8. Supervisors shall ensure candidates have obtained approval from the Universiti Malaya Research Ethics Committee and/or relevant agency before beginning data collection (if applicable).

9. Supervisors should assist candidates in the arrangement and preparation with regards to presentations at conferences, seminars, meetings and workshops.

10. Supervisors should record every meeting and discussion with the candidate about the study and research of the candidate via the online system.

11. The evaluation of progress report must be made latest between week sixteenth until week eighteenth in a semester. Supervisors will receive an online notification and should evaluate the candidate's progress within one (1) week from the date the progress report is received.

    Supervisors should assist the candidate who do not show satisfactory progress during any semester to improve his performance.

12. Supervisors should assist the candidate in academic writing, presentations in conferences and submission of papers for publication. All academic papers submitted for publication, which are written jointly by the supervisor and candidate shall be agreed for joint publications.

13. Supervisors may assist in managing and securing funds for research projects of the candidate (if applicable).

14. Supervisors should ensure that work safety rules are followed during the research and are carried out in accordance with *Garis Panduan Keselamatan dan Kesihatan Pekerjaan Universiti.*

15. Supervisors should provide constructive and critical comments on candidates' thesis/dissertation/research report drafts within a reasonable time and advise the candidates regarding the format of the thesis/dissertation/research report as specified by the University.

16. Determination of title of thesis/dissertation shall be made between the supervisor and candidate within two (2) months before submission of thesis/dissertation. For research reports, the title determined shall be made at the very least one (1) month before submission.

    Supervisor shall propose the name of the Examiner within this duration for RC's approval. The appointment of Examiner shall be made before the candidate submits his thesis/dissertation/research report. Supervisors should also ensure the thesis/dissertation/research report is submitted within the specified duration.

17. Supervisor shall ensure the research of the candidate is original and conducted by the candidate and the thesis/disseration/research report of the candidate is free from plagiarism (refer to *Garis Panduan Menangani Kes Plagiat oleh Pelajar/Calon).*

18. Supervisors are responsible to assist the candidate to prepare for the presentation of the viva voce (if any).

19. Supervisors must ensure that no communication is made with any Examiners during the examination of candidate's thesis/dissertation to avoid conflict of interest.

20. Supervisors are responsible to assist the candidate to understand the comments of the Examiner and ensure all comments are acted upon before final submission is made.

21. Supervisors are responsible to maintain confidentiality of all matters pertaining to this examination.

22. Supervisors must sign the Postgraduate Programme Supervisor-Candidate Undertaking of Responsiblities as in Appendix 1. A copy of the signed document should be kept by all involving parties as record.

Role of the Supervisor in the Committee of Examiners

1. The role of the supervisor in the Committee of Examiners is to give his opinion on matters discussed but is not entitled to participate in the deliberation and decision on the examination result of the candidate's thesis/dissertation.

2. Supervisors are required to provide supervision reports in the required format within a stipulated time to the Postgraduate Office for the Committee of Examiners meeting.

3. Supervisors should also assist the candidate on the corrections to be made based on the comments raised by the Committee of Examiners.

4. Supervisors are responsible to maintain confidentiality of all matters pertaining to this examination.

Role and Responsiblities of Candidate

1. Candidates shall understand and fulfil all of the requirements stated in the offer letter, UM Rules and Regulations for postgraduate programmes and guidelines applicable to it:

   Among the documents related are:
   - (1) UM (Master's Degree)Rules and Regulations (latest edition); or UM (Doctoral Degree)Rules and Regulations (latest edition);
   - (2) Code of Research Ethics in the University of Malaya;
   - (3) *Kod Etika Universiti Malaya;*
   - (4) University of Malaya Policy on Authorship;
   - (5) Intellectual Property and Commercialisation Policy (latest edition) and Intellectual Property(IP) and Commercialisation Policy Manual;
   - (6) Publication Guidelines for Postgraduate Candidates (Research Mode) In Fulfilment of Graduation Requirements;
   - (7) RC's Programme Handbook;
   - (8) Any other resolutions approved by the Senate from time to time.

2. The candidate shall meet regularly with the supervisor at least twice (2) a month in the first semester and once (1) a month for the following semesters. In the first meeting, supervisor and candidate shall discuss face-to-face, while the subsequent meetings may be conducted via online

3. The candidate shall record every meeting and discussions with the supervisor on their study and research every time they meet.

4. The candidate shall establish a good working relationship continuously with the supervisor.

5. The candidate shall plan the project schedule, graduation requirements and comply with the maximum period of study.

6. The candidate shall discuss and agree with the supervisor on time of consultation.

7. The candidate shall discuss and get the supervisor's consent regarding his research scope.

8. The candidate shall obtain approval to conduct data collection or information from any external party through the Supervisor.

9. The candidate shall obtained approval from the Universiti Malaya Research Ethics Committee and/or any relevant agencies before beginning data collection (if applicable).

10. The candidate shall submit the progress report at the very latest from the sixteenth week until the eighteenth week of every semester.

11. The candidate shall notify their supervisor of any problems that may interfere with the research.

12. The candidate shall engage in academic activities organized by the department/RC/University.

13. The candidate must plan and ensure there is sufficient time to conduct their research and write their thesis/dissertation/research report.

14. The candidate shall ensure that their candidature is always active by renewing their registration each semester.

15. The candidate shall obtain approval from the Supervisor to determine the thesis/dissertation title within two (2) months before submission of thesis/dissertation. For the research report, the determination of title shall be made one (1) month before submission.

16. The candidate shall obtain approval and verification from the Supervisor for any publication made based on the research conducted.

17. The candidate is solely responsible for the content, writing of thesis/dissertation/research report, and viva voce presentation (if any).

18. The candidate is responsible for ensuring that all corrections are made within the specified time determined by the Committee of Examiners.

19. The candidate shall ensure that the research is genuine and conducted by him only, fulfils the requirements of the University and also ensure the thesis/dissertation/research report is free from plagiarism (refer to *Garis Panduan Menangani Kes Plagiat oleh Pelajar/Calon).*

20. Candidates must sign the Postgraduate Programme Supervisor-Candidate Undertaking of Responsiblities as in Appendix 1. A copy of the signed document should be kept by all involving parties as record.

UNIVERSITY OF MALAYA

GUIDELINES
FOR THE PREPARATION OF
RESEARCH PROJECT,
DISSERTATION AND THESIS
2017

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 a research project or dissertation or thesis, depending on the requirements of the specific programme.

The terms "research project", "dissertation" and "thesis" are defined as follows:
- Research project refers to the documentation of the research component prepared and submitted by the candidate for the award of the Master's programme by coursework.
- Dissertation refers to the documentation of the original research prepared and submitted by the candidate for the award of the degree for the Master's programme by research, and by mixed mode as well as Doctoral programme by coursework and by clinical coursework.
- Thesis refers to the documentation of the original research prepared and submitted by the candidate for the award of the degree for the Doctoral programme by research, and mixed mode.

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 projects, 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 project, dissertation or thesis. However, the format may differ in each individual faculty, academy, institute or centre with its own additional requirements.

CHAPTER 1: FORMAT OF WRITING

A research project, dissertation or thesis can be written in one of the following formats:
- Conventional format
- Article style format
- Format of published papers (This option is only available for Doctor of Philosophy candidates)

These formats serve as a generic guideline for the postgraduate candidates in writing a research project, dissertation or thesis. Minor variation of the format as recommended by the faculty is allowed. Candidates are advised to discuss with their supervisors to determine which format is best suited for the nature of their research work.

1.1 Conventional Format

The conventional format follows the traditional monograph structure (Table 1.1). This is the most common form of research project/dissertation/thesis used by most candidates.

Table 1.1: The general structure that follows the conventional format

Preliminary
- Title Page
- Original Literary Work Declaration
- Abstract
- *Abstrak*
- Acknowledgements
- 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: 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 project/dissertation/thesis can also be presented in the chapters that are in the format of journal article (Table 1.2). 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 project/dissertation/thesis in the article style format should be written extensively to elucidate the different aspects of the research work in great details.

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

(a) 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.

(b) Literature Review

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

(c) 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.

(d) 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 project/dissertation/thesis must conform to the general research project/dissertation/thesis requirements as outlined in Chapter 2.

Table 1.2: The general structure that follows the article style format

Preliminary
▪ Title Page
▪ Original Literary Work Declaration
▪ Abstract
▪ *Abstrak*
▪ Acknowledgements
▪ 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 Methodology
3.4 Results
3.5 Discussion
3.6 Conclusion
▪ Chapter 4: Article 2*
4.1 Introduction
4.2 Literature Review
4.3 Methodology
4.4 Results
4.5 Discussion
4.6 Conclusion
▪ Chapter 5: Article 3*
5.1 Introduction
5.2 Literature Review
5.3 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
▪ Appendices
▪ Co-authors Consent

1.3 Format of Published Papers

UM also permits the presentation of thesis for the programme of Doctor of Philosophy (PhD) in the format of published and/or submitted papers, where such papers have been published or accepted by high impact journals (e.g. journals indexed by Web of Science) during the period of candidature (Table 1.3).

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 following aspects should be taken into consideration before opting for this format of writing:

(a) Type of Publications

The thesis may comprise published papers and/or manuscripts accepted for publication by high impact journals (e.g. journals indexed by Web of Science). Publications which have been submitted for other degree conferment purposes are not accepted.

(b) Number of Publications

The minimum number of papers and/or manuscript is at least 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. The papers should be published or accepted for publication during the period of candidature.

For candidates under the programme of **PhD by Prior Publication**, 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.

(c) Authorship

Where the papers have more than one author, the candidate must be the first author of at least two (2) out of three (3) papers.

For candidates under the programme of **PhD by Prior Publication**, the candidate should be the first author of five (5) of the published works submitted.

(d) Co-authors Consent

Candidate must obtain the consent from other co-authors for all papers and/or manuscripts and/or publications used as part of their PhD thesis. The consent can be in the form of a verification from the journal publisher or letter or email communication with the co-authors.

(e) Structure of Thesis

The thesis in the format of published papers shall consist the following:

(i) An **abstract**, 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.

(ii) The **Introduction** chapter should include the following:
- description of research problem investigated;
- objectives of the study;
- list of publications and/or accepted manuscripts;
- the account of research progress linking the publications.
  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.

(iii) 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.

(iv) The **Methodology** chapter (where applicable).

(v) The core chapter of the thesis consist of the published papers or accepted manuscripts in their **original publication format** and should NOT be retyped or reformatted. They must be presented coherently in the thesis according to the requirement of the University of Malaya (Degree of Doctor of Philosophy) Regulations, including any accompanying declarations. The following must be indicated for any jointly written paper:

- Acknowledgment of co-authors and verification of originality.
- A clear statement of the contribution made by each author in any joint published work. For example, a statement of contribution from a 3-author academic research publication is as follows:

  Tang, J.M.Y., Adli, D.S.H., & Belabut, D. (2011). Histological development of selected neural structures of Dark-sided Chorus Frog,

Microhyla heymonsi (Amphibia: Anura). *Malaysian Journal of Science*, *29*(1), 11-18.

Tang, J.M.Y. participated in all experiments, coordinated the data analysis and contributed to the writing of the manuscript. Adli, D.S.H. supervised the development of work and edited the manuscript. Belabut, D. gave technical support and conceptual advice, and helped in data interpretation.

(vi)   The **Discussion** chapter explains the cumulative effect of the papers, the significance of the findings and the knowledge claim in the thesis.

(vii)   The **Conclusion** summarizes the findings in all published works and suggests the future direction for research.

(viii)   The **References** chapter lists all works and sources that are cited in the Introduction, Literature Review and Conclusion chapters.

In general, the examination process for theses in the format of published papers is similar to that for conventional theses. However the aspects of thesis being evaluated by the examiners may slightly differ.

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.

Candidates under the programme of **PhD by Prior Publication** are required to refer to the *Guidelines for Prior Publication* for further details.

Table 1.3: The general structure that follows the format or published papers

Preliminary
▪ Title Page
▪ Original Literary Work Declaration
▪ Abstract
▪ *Abstrak*
▪ Acknowledgements
▪ 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: Methodology *(where applicable)*
▪ Chapter 4: *Published Paper 1
*Published Paper 2
*Published Paper 3 and so on
*Note: Authors' contributions must be indicated for each published paper
▪ Chapter 5: Discussion
▪ Chapter 6: Conclusion
▪ References (List of references for chapters of Introduction, Literature Review and Conclusion)

Supplementary
▪ List of Publications and Papers Presented
▪ Appendices
▪ Co-authors Consent

CHAPTER 2: SEQUENCE OF CONTENTS

The structure of the research project, dissertation or thesis is based on a standard format which contains the three main sections; **Preliminary**, **Main Text** and **Supplementary**.

2.1 Preliminary

This section consists in order of the following:

- Title Page
- Original Literary Work Declaration Form
- Abstract
- Acknowledgements
- 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) A statement according to the mode of programme (Table 2.1);

(d) The year of submission.

Table 2.1: Statement on Title Page according to mode of programme

Master's Degree		
Research project (by Coursework)	**Dissertation (by Mixed mode)**	**Dissertation (by Research)**
RESEARCH PROJECT 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)
Doctoral Degree		
Dissertation (by Coursework or by Clinical Coursework)	**Thesis (by Mixed mode)**	**Thesis (by Research)**
DISSERTATION SUBMITTED IN PARTIAL 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)

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**.

(a)

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

(b)

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

(c)

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

(d)

TITLE OF DISSERTATION

NAME OF CANDIDATE

DISSERTATION SUBMITTED IN PARTIAL
FULFILMENT OF THE REQUIREMENTS FOR
THE DEGREE OF DOCTOR OF MANAGEMENT

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

201x

Figure 2.1, continued

(a) Master's research project by coursework, (b) Master's dissertation by Mixed mode, (c) Master's dissertation by research, (d) Doctoral dissertation by coursework, (e) Doctoral thesis by Mixed mode, and (f) Doctoral thesis by research.

Figure 2.1: Examples of title page.

2.1.2 Original Literary Work Declaration

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

Figure 2.2: Original Literary Work Declaration
(a) English, (b) Bahasa Malaysia

2.1.3 Abstract

An abstract is a short summary of the research project/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.

The Abstract page begins with the title of research project/dissertation/thesis (in uppercase) that is approved by the faculty after the submission of 3 Months' Notice. Candidates are not allowed to change the title without the approval of the faculty.

An abstract must not exceed 500 words, typed in a single paragraph with double-spacing, and written in Bahasa Malaysia and English language. A maximum of five (5) keywords should also be listed below the abstract (Figure 2.3).

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 project/dissertation/thesis written in Bahasa Malaysia, the abstract in Bahasa Malaysia is followed by the English version.
- For research project/dissertation/thesis written in English, the abstract in English is followed by the Bahasa Malaysia version.
- For research project/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.

[TITLE OF RESEARCH PROJECT/DISSERTATION/THESIS]

ABSTRACT

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nulla efficitur risus ac magna malesuada venenatis. Etiam a faucibus metus, at consequat leo. Sed pulvinar suscipit massa, sit amet pulvinar ligula accumsan sed. Nam sed leo mollis, feugiat felis in, porta nunc. Maecenas at erat eu augue tristique vestibulum. Donec ac lobortis nunc. Aliquam laoreet dolor a massa hendrerit, ac bibendum neque semper. Aliquam id nisi magna.Aliquam ligula orci, congue id dapibus at, luctus in magna. Maecenas non nulla ac tortor tristique laoreet. Donec porta neque semper imperdiet pulvinar. Phasellus egestas viverra ornare. Fusce nisi ex, pharetra eu gravida vel, iaculis quis quam. Mauris placerat sapien sapien, ac mollis eros imperdiet vel. Morbi nulla ipsum, commodo sed ex eu, pharetra maximus massa. In et placerat elit. Aliquam porta sem sit amet justo pellentesque consectetur. Quisque aliquet leo nunc, sed porttitor quam ullamcorper at. Suspendisse nunc lorem, tempus a feugiat ac, facilisis eu nisi. Donec feugiat vulputate turpis, at tincidunt ex posuere at. Sed semper ante vitae tincidunt malesuada. Praesent commodo diam non tortor laoreet, ac volutpat dui scelerisque. Maecenas elementum rhoncus placerat. Aliquam mollis vel diam ut imperdiet. Donec in venenatis arcu. Nam pulvinar eros nunc, vel malesuada turpis vestibulum eget. Aliquam erat volutpat. Vivamus ut euismod augue. Nam semper risus nec nibh posuere tincidunt. Pellentesque id imperdiet enim, vitae viverra lectus.

Keywords: proin fringilla, turpis metus, vitae, tincidunt

iii

Figure 2.3: Example of abstract.

13

2.1.4 Acknowledgements

Most research projects, 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 example:

CHAPTER 1: TITLE
1.1 Topic 1
    1.1.1 Sub-topic 1

CHAPTER 2: TITLE
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 Body

Candidates and supervisors should ensure that the text follows the agreed conventions of the individual faculty. The main text in the research project/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 project/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 project/dissertation/thesis will have the following basic structure:

- **INTRODUCTION**
- **LITERATURE REVIEW**
- **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 project/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.

15

2.2.3 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 project/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. The guide can be downloaded at [UM Library website](http://www.umlib.um.edu.my) (*http://www.umlib.um.edu.my).*

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 project/dissertation/thesis are suggested be included in this section. The first page of the article may also be appended as reference.

2.3.2   Appendices

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 project/dissertation/thesis by including materials that can provide additional information. These materials include 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 are suggested to be included in the Appendix section.

Appendices are labelled as APPENDIX A, APPENDIX B, etc. and they should correspond to the List of Appendices of Preliminary section.

2.3.3   Co-authors Consent

Please refer to 1.3 (d).

CHAPTER 3: FORMAT SPECIFICATIONS

3.1   Paper Quality, Printing and Duplicating

The research project/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 project/dissertation/thesis, in soft- and hardcover 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.

3.2   Typing and Printing Quality

Texts in research project/dissertation/thesis should be typed on **one side** of the paper only.

They 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. Those written in Arabic should use font type **Traditional Arabic in font size 16.** Words in a language that is different from the language of the research project/dissertation/thesis must be typed in *italics*. For mathematical texts, the use of Equation Editor or LaTeX is advisable. Script fonts are not permitted.

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 also titled. Titles should be typed in bold without underline.

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

3.3   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.

3.4   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 regarding margin are as follows:
- 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.

19

- 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.

3.5 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 (Figure 3.1).

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, …) should be used in the Preliminary section. The first page of the thesis, the title page, is an unnumbered page 'i'. Numbering begins on the second page with 'ii' for the Original Literary Work Declaration Form.
- Arabic numerals (1, 2, 3, …) are used on the pages of the text (starting with the Introduction page) and Supplementary section.
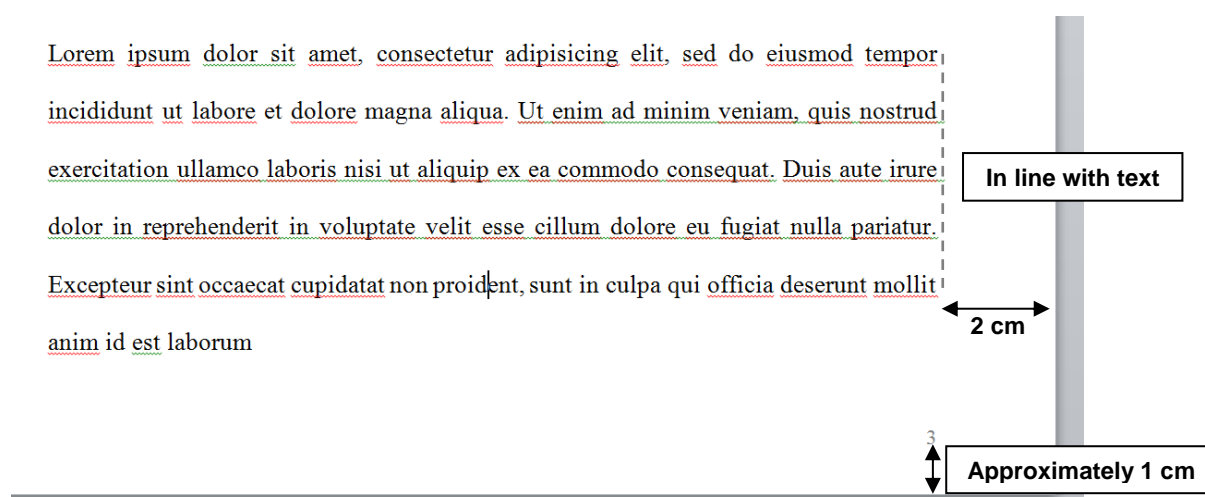
Figure 3.1: Placement of page number

3.6 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)

20

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), and so on.

3.7 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 (Figure 3.2). Please refer to the faculty for the recommended convention for writing of footnotes.

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.
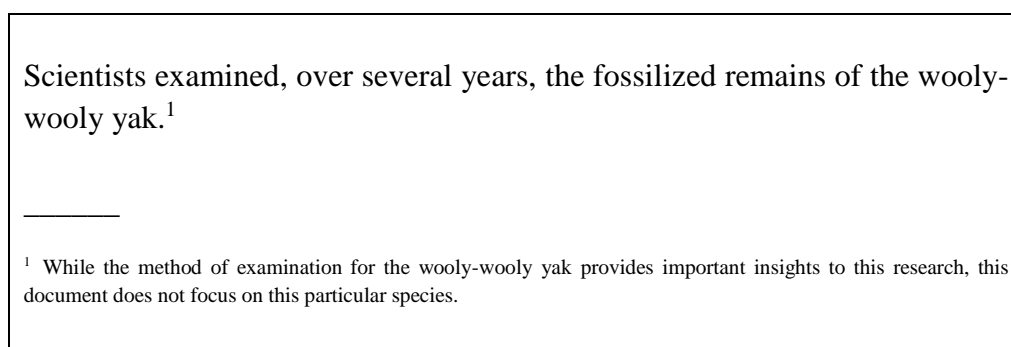
Figure 3.2: Example of footnote

3.8 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 (Table 3.1). If the table contains a citation, the source of the reference should be included in the table caption.

Table 3.1: Example of table

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.

3.9 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 3.3).

Figure 3.3: Example of figure
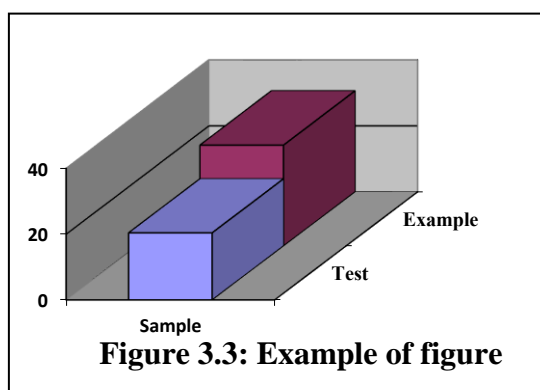
If the figure occupies more than one page, the continued figure on the following page should indicate that it is a continuation: for example: 'Figure 3.7, continued'.

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

3.10   Binding

Each copy of the research project/dissertation/thesis submitted shall be bound in one (1) volume. The thesis cover must be of A4 size (210mm x 297mm).

For the purpose of examination, research project/dissertation/thesis submitted should be **soft cover** bound in rexine with the following colour (Figure 3.4):
- Research project: Navy blue
- Dissertation: Dark red or maroon
- Thesis: Dark red or maroon

For final submission prior to graduation, research project/dissertation/thesis submitted should be **hard cover** bound in rexine with the following colour (Figure 3.5):
- Research project: 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 Project (Navy blue)
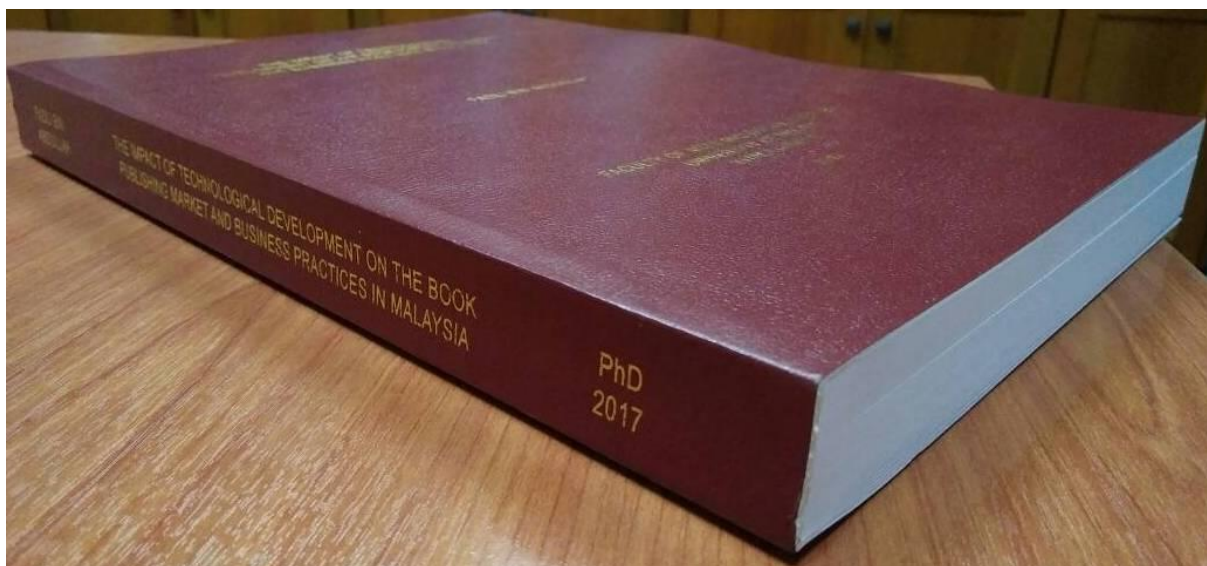
Figure 3.4: Sample of softbound copy for first submission for examination)
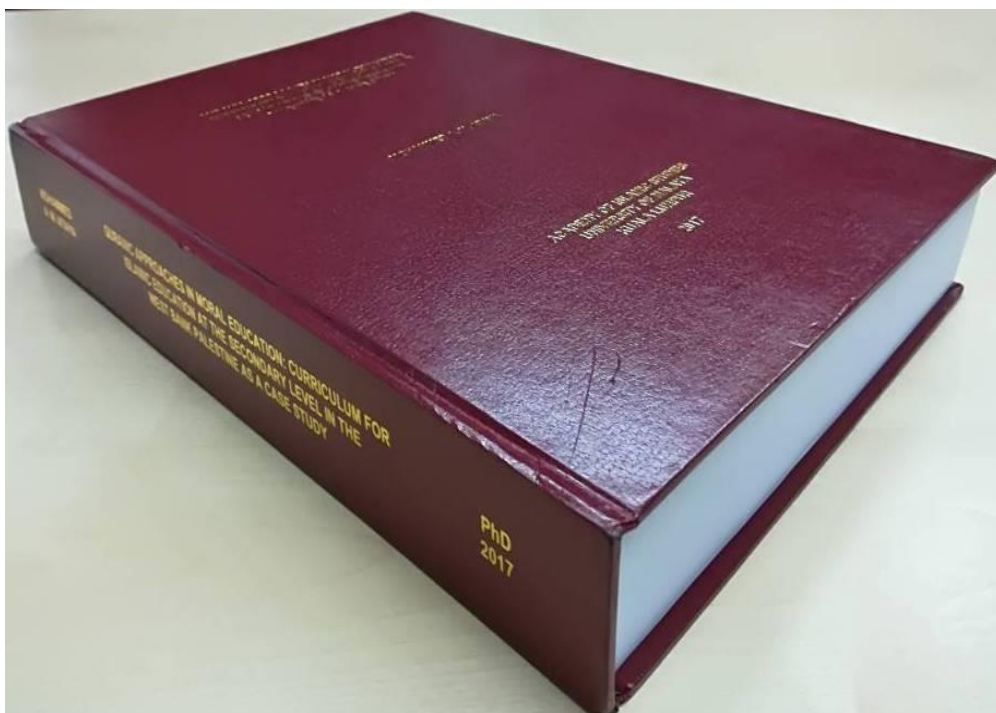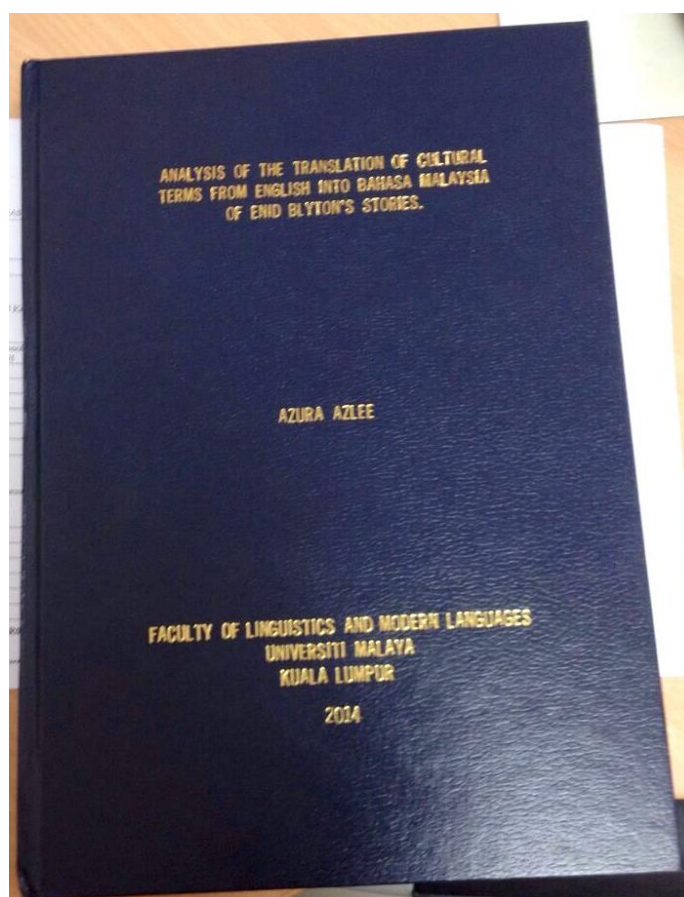
Figure 3.5: Samples of hardbound copy for final submission
(a) Example of hardbound thesis or dissertation (in dark red or maroon);
(b) Example of hardbound research project (in navy blue)

The title of research project/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 letterings** of **font size 16, font type Arial Narrow, bold and in uppercase letters** (Figure 3.6 and 3.7).
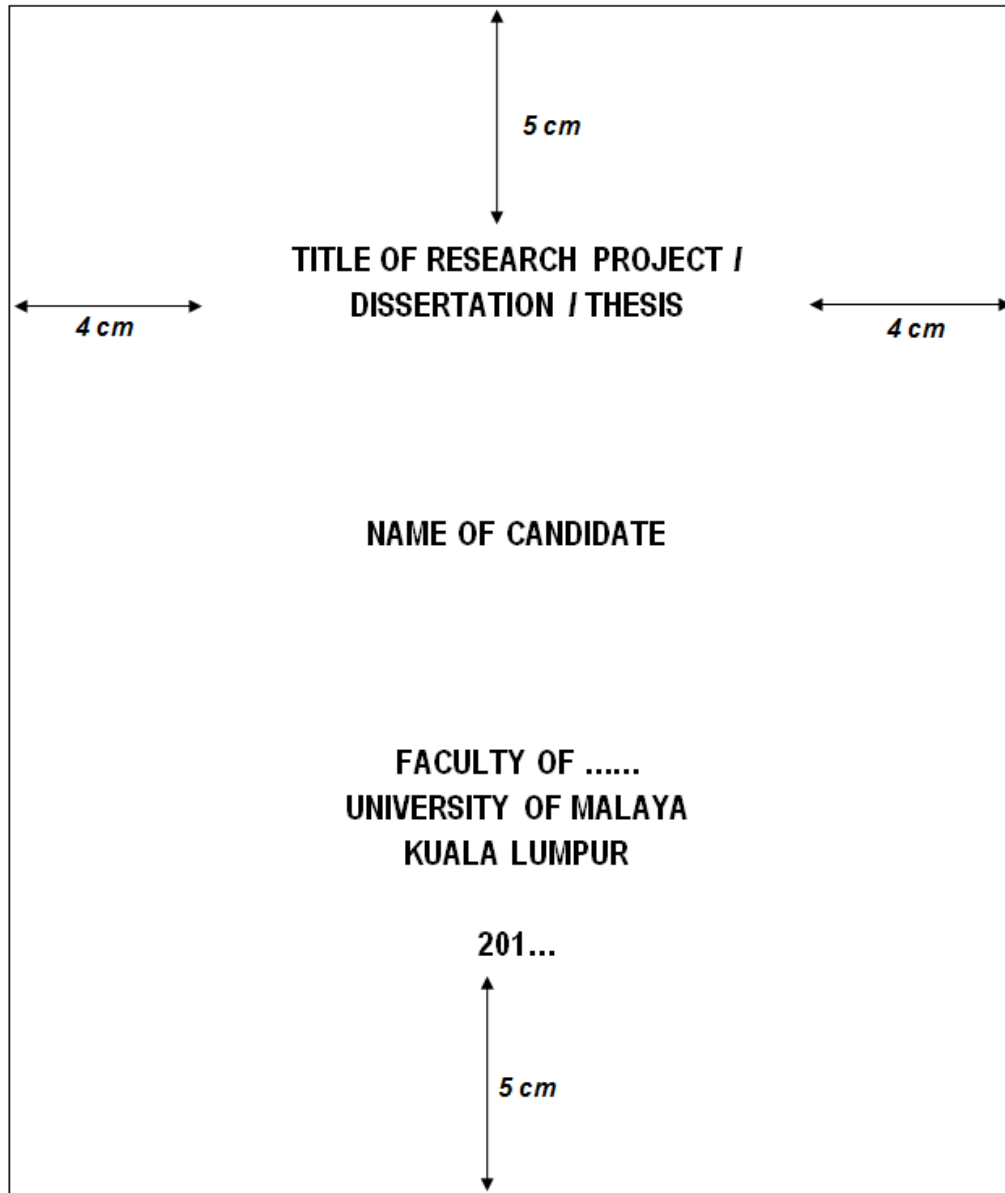
Figure 3.6: Formatting of the front cover of research project/dissertation/thesis

EXPERIENCED TEACHERS' KNOWLEDGE STRUCTURES AND
BELIEFS ABOUT TEACHING AND LEARNING
IN THE ORAL COMMUNICATION CLASSROOM

TITLE OF RESEARCH THAT HAS BEEN APPROVED BY THE FACULTY/SENATE

GOLD LETTERING, FONT ARIAL NARROW, SIZE 16, BOLD, 1.15 PT. LINE SPACING

KOH SOO LING

NAME OF CANDIDATE AS REGISTERED WITH THE UNIVERSITY

INSTITUTE OF GRADUATE STUDIES
UNIVERSITY OF MALAYA
KUALA LUMPUR

FACULTY/ ACADEMY/ INSTITUTE/CENTRE WHERE CANDIDATE IS REGISTERED

2010

YEAR OF SUBMISSION

Figure 3.7: Example of the front cover of research project/dissertation/thesis

The spine of the manuscripts should show the title of research project/dissertation/thesis, name of author, year of submission and name of degree. The year of submission must be in accordance with the year when the research project/dissertation/thesis is submitted (Figure 3.8 and 3.9). If the title of the research project/dissertation/thesis exceeds the space of the spine, a smaller font size can be used (i.e. font size 16 to 14) or alternatively the title can be truncated with ellipses (…) (Figure 3.10).

AMIR GHORBANI	**PRIVATIZATION IN ALGERIA: POLICY AND PERFORMANCE**	**PhD 2017**

Figure 3.8: Spine format

Figure 3.9: Example of spine format

KWONG SIU YEE	**THE EFFECT OF GEOGRAPHICAL REGION ON THE TRANSITION TIME OF CMMI-BASED …**	**PhD 2017**

Figure 3.10: Spine format for long title

3.11   Word Length
The maximum word length for a submission for examination is shown in Table 3.2.

Table 3.2: Maximum word length

Master's Programme		
Research project (by Coursework)	**Dissertation (by Mixed mode)**	**Dissertation (by Research)**
30,000 words	40,000 words	60,000 words
Doctoral Programme		
Dissertation (by Coursework or by Clinical Coursework)	**Thesis (by Mixed mode)**	**Thesis (by Research)**
60,000 words	80,000 words	100,000 words

The minimum word length is determined by the faculty based on the programme standards according to their respective discipline (if any). The maximum length of words excludes footnotes, references, appendices, tables, figures and prefaces.

Candidates who are unable to meet the word length set by the University must seek approval from the faculty before the submission of research project/dissertation/thesis for examination.

3.12   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 project/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 projects/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 Web of Science (WoS) or category A or B refereed journals based on the work during the course of study, and due reference must be made to the University in all such papers.

CHAPTER 4: SUBMISSION

4.1   Prior to Submission

Postgraduate candidates are required to submit the **3 Months' Notice** via MyUM Student Portal at least three (3) months before the actual date of submission. This is to allow timely nomination of examiners and title approval of research project/dissertation/thesis. Details on 3 Months' Notice submission is available on the IGS website (http://ips.um.edu.my > *Students > Current Students > Examination of Thesis/Dissertation).*

Submission of research project/dissertation/thesis for examination has to be done within the candidature period after title approval by the faculty.

Prior to binding and submission, it is recommended for candidates to get the format of their final drafts checked by providing a printed copy to the Thesis Unit, IGS. Also, candidates are strongly advised against copying the formatting done by other candidates as previously submitted research project/dissertation/thesis may not conform to the current formatting requirements. Failure to meet the formatting requirements may result in a thesis/dissertation being rejected at the point of submission.

Once ready, Master's candidates shall submit their research projects/dissertations to the Postgraduate Officer of the respective faculty whereas Doctoral candidates submit their theses to the Thesis Unit, IGS.

4.2   Required Documents for Submission

Documents required for submission for the purpose of examination are as follows:
- at least five (5) printed softbound copies (or such numbers as may be determined by the faculty) of the research project/dissertation/thesis;
- one (1) electronic copy (PDF format); and
- Submission of Research Project/Dissertation/Thesis for Examination/Re-examination form.

Documents required for final submission prior to graduation after completing the corrections (if any), are as follows:
- at least two (2) printed hardbound copies (or such numbers as may be determined by the faculty) of the final research project/dissertation/thesis;
- one (1) electronic copy (PDF format);
- Final Submission for Research Project/Dissertation/Thesis form;
- Repository form; and
- Correction Report form (if applicable).

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

The submitted electronic copy of the research project/dissertation/thesis (in PDF format) in a compact disc (CD) or USB flash drive must be labeled with the following details (Figure 4.1):

- Name
- Matric no.
- Title of research project/dissertation/thesis
- Faculty/Academy/Institute/Centre
- Year of submission (current year)

Name	GHAZALI LEE
Matric No	SHB115021
Title of Thesis	ASSESMENT OF SKEWNESS OF GRAPHS
Faculty	FACULTY OF SCIENCE
Year	2012

Figure 4.1: Printed label format (inside the CD sleeve or case)

CHAPTER 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 regarding the acceptable similarity index percentage.

GUIDELINES IN SUBMITTING THESIS/DISSERTATION
FOR EXAMINATION

The following information shows a step-by-step guide for postgraduate candidates who are submitting their Master's dissertations or Doctoral thesis for examination.

STEP 1 - Submit your **Application of Thesis/Dissertation Title** form to the Faculty at least three months before the actual date of thesis/dissertation submission to allow timely nomination of examiners and approval of thesis/dissertation title.

STEP 2 - Notify your supervisor(s) to verify and endorse your Application of Theses/Dissertation Title form. The following actions will be taken by your supervisor(s):
• Endorse the title of thesis/dissertation
• Nominate the Internal and/or External Examiners

Programme	Examiners involved
Doctoral degree (Research Mode)	Internal Examiner External Examiner (I) External Examiner (II)
Master's degree (Research Mode)	Internal Examiner External Examiner (I)

The nomination of examiners is confidential and **shall not be disclosed** to the candidates. The guideline for nomination of examiners is only accessible to the Supervisor(s) thru **UMPortal**. The nomination of examiners takes time as it requires approval from several levels as follows:

• **Master's dissertation examination**
  Examiners are proposed by the supervisor(s). The nomination is then endorsed by the Department (if applicable) and Committee of Higher Degree before they are approved by Faculty.

• **Doctoral thesis examination**
  Examiners are proposed by the supervisor(s). The nomination is then endorsed by the Department (if applicable) and Committee of Higher Degree before they are approved by Faculty. For External Examiners, the nomination also requires the approval from the University Senate.

STEP 3 - Check with the respective faculty whether the title of thesis/dissertation has been approved.The approval of title takes time as it requires approval from several levels. The proposed title of thesis/dissertation is endorsed by the Department (if applicable) and the Committee of Higher Degree before it is tabled at the Faculty Meeting for approval.

STEP 4 - Make sure the relevant candidature requirements imposed by the University as well as your respective faculty, have been fulfilled prior to submission of thesis/dissertation.

- Postgraduate Candidature Requirements (as listed in the Offer Letter)

    (b) CR - Master by Research
    (c) CR - Doctoral by Research

- Publication Requirement and Publication Guidelines for Postgraduate Candidates by Research

STEP 5 - Finalize your thesis/dissertation according to :

- **Guidelines for the Preparation of Research Reports, Dissertations and Thesis 2017**. *It is also suggested that you refer to your faculty if there is other formatting requirements based on your discipline.*

- UM Library APA Formatting and Style Guide

- 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 thesis/dissertation.

- Thesis/Dissertation MSWord Template

ATTENTION – We strongly advise you against copying the formatting done by other candidates as previously submitted theses/dissertations may not conform to the current formatting requirements. Failure to meet the formatting requirements may result in a thesis/dissertation being rejected at the point of submission.

STEP 6 - Complete the **Submission of Thesis/Dissertation for Examination form with verification of no outstanding fee from the Bursar Department.**

STEP 7 - Upon approval of thesis/dissertation title from the faculty, submit:

- **five (5) soft bound theses/dissertations** and its soft copy (pdf.) together with the completed forms (as is Step 6) to the Deputy Dean (Postgraduate) Office, Level 3, Block L, Faculty of Engineering.

    Hard copies of the candidate's thesis/dissertation are reserved for the use of examiners and the Committee of Examiners, whereas for supervisor(s), they will be given the soft copy as reference.

- Submit softcopy of thesis through maya.um.edu.my. Please refer to umsitsguide.um.edu.my > User Manuals > Research Management > Submission of Thesis/Dissertation

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

However in regards that you have/may exceed the maximum period of candidature in the coming semester, you are required to submit the Application to Extend Maximum Period of Candidature.

Programme	Maximum Period of Candidature
Doctor of Philosophy	12
Master	8

GUIDELINES FOR PUBLICATION IN FULFILMENT OF GRADUATION REQUIREMENTS FOR POSTGRADUATE CANDIDATES

Publication(s) produced by postgraduate candidates in fulfilment of graduation requirements must comply with the following criteria:

CRITERIA	REMARK
1. Type of Publications	(1) Research article or review article in journals indexed in: (a) Web of Science (WoS) Core Collection databases (https:apps.webofknowledge.com) • Science Citation Indec Expanded TM • Social Sciences Citation Index and • Arts & humanities Citation Index (b) *Scopus (https://www.scopus.com/);or (c) *Malaysian Citation Index (MyCite)(http://www.mycite.my/) (2)*Books published by publishers listed in: (a) Web of Science (WoS) Master Book List (http://wokinfo.com.com/mbl/publishers/) (b) Malaysian Scholarly Publishing Council or Majlis Penerbitan Ilmiah Malaysia (MAPIM) (https://www.um.edu.my/research-and-community/information-for-researchers/downloads/myra) (c) Any publishers listed and recognized by Academic Responsible Centre (PTj) *Only applicable to candidate pursuing programmes in the field of Arts and Social Sciences.
2. Authorship	Publications **must be published with the supervisor(s).** The supervisor shall act as the corresponding author. In the event that the candidate has more than one supervisor, one of them shall be the corresponding author. The candidate must be the first author, or either the second or subsequent author after the supervisor(s), or the first student author. In the event, two or more candidates co-author in an article, only one candidate is allowed to use this article to fulfil his/her graduation requirement.
3. Authorship Agreement	Candidate must provide a copy of authorship document that was submitted to the respective publishers (e.g. Authorship Agreement/Form or Statement of Authorship or cover letter of article submission), confirming all the named authors have agreed to publication.
4. Timing	Publications accepted must be within the candidature of the candidate.
5. Topic of publications	Publications must be related and conform to the candidate's research in his/her thesis/dissertation.

6. Affiliation	Publications must carry the affiliation of the department and/or faculty where the candidate is registered.
7. Blacklisted journals	Publications in journals blacklisted by the Malaysian Ministry of Higher Education (MoHE) are not accepted: (1) Academic Journal (www/academicjournals.org); (2) Euro Journal Inc (www.eurojournals.com); (3) Common Ground Publishing (www.commongroundpublishing.com)' (4) Africa World Press Inc. (www.africaworldpressbooks.com) (5) Publications in Probable Predatory Journals according to Beall's List (http://scholarlyoa.com/publishers/) The list of blacklisted journals is subject to change from time to time according to MoHE.
8. Completion Period	Candidates who have completed the examination of their thesis /dissertation must fulfil the publication requirement as set by the University before the expiry of their maximum period of candidature. If the candidates fail to fulfil the publication requirement within the approved period, they will be terminated from the program of study and considered as failed.

Updated Senate: 25.02.2021

HOW TO AVOID PLAGIARISM A HANDBOOK FOR POSTGRADUATE STUDENTS

PROFESSOR DR. AZIRAH HASHIM
(ADVISOR)

ASSOC. PROFESSOR DR. KAREN KOW YIP CHENG
(HEAD OF PROJECT)

DR. JAWAKHIR MIOR JAAFAR
DR. STEFANIE SHARMILA PILLAI
ANNELIESE LUTGEN
BONG MOON YEE
ILARIA CIARAMICOLI
MISAKO TAKADA
NADIA ABDULLAH ZAWAWI
ONG LOK TIK RUTH
SUPRAMANI SHONIAH

FACULTY OF LANGUAGES AND LINGUISTICS
UNIVERSITY OF MALAYA

TABLE OF CONTENTS

1

1.0 INTRODUCTION

Welcome to the University of Malaya.

In registering to be a post-graduate student, you have chosen to study as *a student researcher*. As a post-graduate student, you are bound by a code of academic conduct. This means that you are expected to follow certain rules and regulations as part of the academic/scholarly community of students and staff. *This code of conduct* (**Kaedah-kaedah UM (Tatatertib Pelajar-Pelajar) 1999,**) states clearly what you can or cannot do in research as a post-graduate student of the university.

1.1 Academic Integrity and Conduct

All post-graduate students are expected to have **academic integrity**.

This means that you are expected to produce original academic work. This work must be the result of your own thought, research or self-expression at all times. However, you are also expected to base your work on the text, information and ideas of experts and authorities.

Therefore, it is necessary that you know how to read, research and refer to the work of other people. You are expected to know how to select, organize, summarize, and interpret the body of information obtained, and more importantly, how to acknowledge them as your sources of information.

If you **do not acknowledge** the work of others in your own work (assignments, reports, thesis, dissertations, etc), you are guilty of **plagiarism** – which is a serious form of misconduct in the academic world. The University of Malaya views plagiarism seriously. In the *Universiti dan Kolej Universiti (UM Tatatertib Pelajar 1999) Akta, Kaedah 6, Perkara 1 – 2* states clearly that**:**

1. *A student shall not plagiarize any idea, writing, data, or invention belonging to another person.*
2. *For the purpose of this rule, plagiarism includes:*
   a) *the act of taking an idea, writing, data or invention of another person and claiming that the idea, writing, data or invention is the result of one's own findings or creation; or*
   b) *an attempt to make out or the act of making out, in such a way that one is the original source or the creator of an idea, writing, data or invention which has actually been taken from some other source.*

(For further details of the University's policy on plagiarism, see Appendix A)

1.2   Correct Research Conduct for Students

Research conduct refers to how you carry out your research and what you do with your data and information, as well as how you write up and present your assignments, reports, projects, thesis, dissertation, etc. It also includes your responsibility to the community and issues of confidentiality.

To achieve academic excellence, you should produce original work with appropriate and correct **CITATIONS** of the work, information, ideas that you have taken from any source. This is correct research conduct for all post-graduate students.

Hence, the best way to do this and to avoid plagiarism is to always

a.   take careful notes of where you get your ideas or information from;

b.   acknowledge others' work correctly (phrases, quotations, ideas, graphics, diagrams, charts, tables and figures);

c.   borrow assignments from friends and seniors.

1.3   Your Role and Responsibility in Preventing Plagiarism

As a student, you have a responsibility to prevent plagiarism. You can do this in several ways:

a.   Ensure that you have a sound knowledge of what plagiarism is.

b.   Ask questions to clear any doubts that you may have on plagiarism.

c.   Clarify/check what actions of yours or your peers could be interpreted as plagiarism.

d.   Participate actively in any workshop or seminar on plagiarism organized by your faculty or the University.

e.   Share your understanding and knowledge of the code of ethics on research conduct.

f.   Explain the consequences of plagiarism to your peers who are not aware that plagiarism is a serious academic offence.

2.0   ACADEMIC MISCONDUCT

2.1   Plagiarism

As a postgraduate student, ***you cannot take, use, and pass off as your own (in whatever form) the ideas and words of another, without proper reference***.

Simply stated, plagiarism is ***copying someone else's words, information or even ideas without acknowledging the source (the person and the work).***

There are many ways in which students plagiarize. Below are some instances in which you could be found guilty of plagiarism:

a.   Copying any portion from books, journals and electronic sources without acknowledgement;

b.   Copying other student's work (sentences or paragraphs), without acknowledgement;

c.   Using any part of a previously marked work in a new assignment for the same/another tutor/lecturer.

(For further details and examples of the types of actions can constitute plagiarism, please refer to the Appendix B)

2.2   Penalties for Plagiarism

Plagiarism is a very serious academic offence, and can result in serious consequences for you as a student including:

a.   A "Fail" grade for your work (assignment, project, thesis, course).

b.   Suspension of one semester or one academic session.

c.   Expulsion from the University.

d.   Withdrawal of your degree.

3.0   INTEGRATION OF RESEARCHED INFORMATION INTO YOUR WORK

When you use the words/texts of another person without acknowledging them, it is wrong. It is also wrong if you present someone else's program codes, formulas, concepts, creative works such as choreography, lyrics, musical scores, scripts, paintings, designs, illustrations, etc. as your own, without giving appropriate credit to the original author or source.

3.1 Acts of Plagiarism

You can be accused of plagiarism if you do not acknowledge the sources of information.

DON'T

- take someone else's idea.
- cut and paste from websites.
- insert phrases and parts of an original text into your ownwork.
- present as new and original an idea or product derived from an existing work.
- copy information or ideas from books, dictionaries, journals, magazines, newspapers, textbooks, TV and radio programmes, movies and videos, photographs and drawings, charts and graphs, etc.
- translate an original text or parts of it.

(For a more comprehensive list of plagiarism offences, refer to Appendix C)

3.2 Techniques for Integrating Researched Information

You need to know how to include the information you have taken from other works into your own work. You can do this through the use of techniques such as **quotation**, **paraphrase, summarize** and **citation.**

3.2.1 Quotation

A quotation is
- a word for word presentation of what is said or written in someone else's work.
- presented by using quotation marks ("…").
- the source of the quote must be cited in the text and reference list.
- sometimes referred to as a "direct quote".

What to do:
- Quote only when necessary – the quoted part should only be supplementary to your own work.
- Copy the sentence(s) exactly the same as the original.

- Use quotation marks ("… .") at the beginning and end of the quote (For a long quote, use an indented block set off from the main text).
- Identify every source of the quote; write its author, title of article/ journal/ book, volume number, year and place of publication, publisher, page number, website address, etc.

Example:

Original	Quotation
The Institute of Postgraduate Studies acts as the administration centre for the University's postgraduate programmes.	"*The Institute of Postgraduate Studies acts as the administration centre for the University's postgraduate programmes.*" (UM, 2007)
Example of a long quote With more than a thousand international students from nearly 70 countries, IPS proudly upholds the traditions and standards of excellence in teaching, research and scholarships, by providing effective and efficient student services, opportunities and a platform for the sharing & shaping of ideas.	According to the management of the University of Malaya, *With more than a thousand international students from nearly 70 countries, IPS proudly upholds the traditions and standards of excellence in teaching, research and scholarships, by providing effective and efficient student services, opportunities and a platform for the sharing & shaping of ideas.* (UM, 2007)

http://www.um.edu.my/professionalsindex_professionals.php?intPref
LangID=1&

What NOT to do:
- Substituting just a few words in the original text and passing it off as your own.
- Borrowing large portions of the original work.

3.2.2 Paraphrase

A paraphrase is
- a restatement of what someone else wrote or said (in your own words).

What to do:
- Use your own words.
- Your paraphrased text can be shorter or longer than the source.
- The source of the paraphrase must be cited in the text and reference list.

Example:

Original	Paraphrase
The Institute of Postgraduate Studies acts as the administration centre for the University's postgraduate programmes.	The centre for administration of programmes for post-graduate studies is the Institute of Postgraduate Studies.

What NOT to do:
- Use the original words, phrases, and expression.
- Omit details of the original source.
- Lose the original sense of the source.
- Replace only a few words in the original.
- Rearrange the order of words/or sentences.

3.2.3 Summary

A summary is
- a shortened version of the original source without changing the meaning.

What to do:
- Clearly identify the main points.
- Leave out details and examples.
- The source of the summary must be cited.

Example

Original	Summary
The Institute of Postgraduate Studies acts as the administration centre for the University's postgraduate programmes. Drawing on the strengths of the Faculties and Research Centres, as well as on the individual expertise available in the University, IPS hopes to help postgraduate students achieve excellence in multidisciplinary research, postgraduate education and training to meet the growing demands of the worlds of academia, economics, politics, science and technology and the arts.	This institute administrates the University's postgraduate programmes. In cooperation with academic staff and institutions in the University, IPS aims to assist research, education and training in various fields for postgraduate students.

What NOT to do:
- Change the original meaning of the text

3.2.4 Citation

A citation is
- an identification of the source of a quote, paraphrase or summary.

Academic and professional writing requires a full citation:
a. in text;
b. in a bibliography at the end of the text;
c. includes author and title of article/ journal/ book, volume number, year and place of publication, publisher, page number, website address, etc.

(For an explanation on when and how to cite, refer to 4.0 Citation Methodology)

4.0 CITATION METHODOLOGY

As a research student, you will refer to original sources in your academic work. It is important that you give credit to the authors of these sources for their work. Therefore accurate acknowledgement of the sources used in your academic work is necessary. This acknowledgement is known as citing or referencing.

The following sections present how you can cite or reference in your text (in-text citation) as well as in the reference list/bibliography.

4.1 Types of Citations

To cite is to quote a passage, book or author. You need to collect the details of your source and mention them in your text, and in a reference list (bibliography) at the end of your work which gives all details of the works that you have   referred to.

4.1.1 In-text citation

When you refer to ideas or information that you have found and intend to use in your work, you indicate each reference by mentioning the author and date of the publication you have referred to or cited.

In-text citation may be done in various ways:

Quotation / Citation

In order to support your argument, you can refer to the author's words but do not want to quote directly. Such citations are inserted in paragraphs and/or sentences to make it clear whose information you have cited and what information you have used.   This is also done to enable the readers to easily locate the source of the information in the reference list. This is "In-text citation". The in-text citation states the author's last name and the year of publication in parentheses.

In-text Citations (Based on the APA style):

Single author

Author's last name, year of publication:

Example:

> One recent study finds a generic link to alcoholism **(Jones, 1997).**
>
> If the author's last name is mentioned in the citation, only the year is stated:

Example:

> Jones finds a genetic link to alcoholism **(1997).**
>
> Two authors
>
> Both authors' last names in parentheses:

Example:

> … **(Cortez & Jones, 1997).**
>
> If the names are mentioned in the citation,

Example:

> Cortez and Jones **(1997***)* found that ….

(For in-text citation of more than 2 authors and other types of sources, refer to Appendix D)

4.1.2. Direct Quote / Citation

> Direct quoting refers to when you copy the exact words of another author; the page number must be provided.

Example:

> As one writer put it "the darkest days were still ahead" **(Weston, 1988, p. 45).**
>
> If the name appears in the text:

Example:

> Weston **(1988)** argued that "the darkest days were still ahead" **(p. 45).**

4.1.3. Paraphrase

> Paraphrasing is to state another author's ideas into your own words. You need to mention the author, year of publication and page in your in-text reference. Providing

page numbers for a paraphrase is encouraged by the APA format, but it is optional.

Example:

According to Jones **(1998),** APA style is a difficult citation format for first- time learners.

APA style is a difficult citation format for first-time learners **(Jones, 1998, p. 199).**

(Adapted from APA Format: In-text Citation,www.english.uiuc.edu_resources/citation_styles/apa/intext_...)

4.2   Different Citation Styles

There are many accepted styles in which to present your references. Each style is a system with consistent rules about how to display a citation including punctuation, font, capitalization etc.) within your text, as an endnote, and in your bibliography.

The following styles are commonly used:

APA   American Psychological Association. (2001). *Publication manual of the American Psychological Association* (5th ed.). Washington, DC: American Psychological Association. www.apastyle.org/aboutstyle.html

Harvard   Nicholson I Dr., 2000, "Harvard Referencing 3rd edn"., [online]. Available from: www.home/gil.com.au/~jandi/Harvard_3.00.pdf[date sourced].

www.library.uq.edu.au/training/citation/harvard_5.pdf

MLA   *MLA Handbook for Writers of Research Papers*, 6th ed. Modern Language Society, 2003. www.mla.org

Turabian Turabian, Kate L. *A Manual for Writers of Term Papers, Theses, and Dissertations,* 6th ed.,   Chicago: University of Chicago Press, 1996. www.libs.uga.edu/ref/turabian.html

If you are unsure which style to use, please check with your tutor / lecturer / supervisor. If you are unable to get instructions on which style is the most appropriate to use, you should choose any style

relevant to your faculty or discipline and use it consistently in all your assignments / work / research.

(For examples of the different styles of citation conventions for arts (humanities) and science - based disciplines, refer to Appendix G)

4.3   Reference List / Bibliography

At the end of your work, you need to acknowledge the information that you have referred to in your text by providing a list of all your sources.

This Reference List or Bibliography should be based on whichever particular style your faculty uses.

(To write a proper reference list based on the APA style, refer to Appendix E)

Once you are familiar with the reference style, you need to note that:

- all references in the reference list must be cited in the text;
- all references cited in the text must be included in the reference list;
- the reference list should start with a new page;
- the title of this list should be "References/Bibliography", centred at the top of the page;
- references are listed in alphabetical order by author's surname;
- the reference list should be double spaced with a hanging indent for the second and subsequent lines.

(For an example of a reference page based on the APA style, refer to Appendix F)

There are different reference styles and each style presents the same information about a particular source in different ways. There are two tables available to help you understand and recognize the different styles of bibliography entries. Table 1 features entries for the Arts/ Humanities while Table 2 features entries for the Sciences.

(For Tables 1 and 2, refer to Appendix G.)

Finally, we welcome you once again, as a post-graduate student, to the academic research community of the University of Malaya. Happy working.

APPENDIX A

KAEDAH-KAEDAH UM
(TATATERTIB PELAJAR-PELAJAR) 1999

Akta Universiti dan Kolej Universiti 1971
Seksyen 16C Akta Universiti dan Kolej Universiti 1971 (Akta 30)
Bahagian II Tatatertib Am
Larangan terhadap Plagiarisme 6 (1), 6 (2) a,b, 6 (3) a-h

A) *Kaedah 6, Perkara 1 – 3 Akta Universiti dan Kolej Universiti (UM Tatatertib Pelajar 1999)*:

3.   A student shall not plagiarize any idea, writing, data, or invention belonging to another person.
4.   For the purpose of this rule, plagiarism includes:
     a)   the act of taking an idea, writing, data or invention of another person and claiming that the idea, writing, data or invention is the result of one's own findings or creation; or
     b)   an attempt to make out or the act of making out, in such a way that one is the original source or the creator of an idea, writing, data or invention which has actually been taken from some other source.
5.   Without prejudice to the generality of sub-rule (2) a student plagiarizes when he:
     a)   publishes, with himself as the author, an abstract, article, scientific or academic paper, or book which is wholly or partly written by some other person;
     b)   incorporates himself or allows himself to be incorporated as a co-author of an abstract, article, scientific or academic paper or book, when he has nor made any written contribution to the abstract, article, scientific or academic paper, or book;
     c)   forces another person to include his name in the list of co-researchers for a particular research project or in the list of co-authors for a publication when he has not made any contribution which may qualify him as a co-researcher or co-author;
     d)   extracts academic data which are results of research undertaken by some other person, such as laboratory findings of field work findings or data obtained through library research, whether published or unpublished, and incorporate

University of Malaya is committed to the fight against plagiarism

those data as part of his academic research without giving due acknowledgement to the actual source;

e)   uses research data obtained through collaborative work with some other person, whether or not that other person is a staff member or a student of the University, as part of another distinct personal academic research of his, or for a publication in his own name as sole author, without obtaining the consent of his co-researchers prior to embarking on his personal research or prior to publishing the data;

f)   transcribes the ideas or creations of another kept in whatever form, whether written, printed or available in electronic form, or in slide form, or in whatever form of teaching or research apparatus, or in other form, and claims whether directly or indirectly that he is the creator of that idea or creation;

g)   translates the writing or creation of another person from one language to another whether or not wholly or partly, and subsequently presents the translation in whatever from or manner as his own writing or creation; or

h)   extracts ideas from another person's writing or creation and makes certain modifications without due reference to the original source and rearranges them in such a way that it appears as if he is the creator of those ideas.

As already indicated above, the University sees plagiarism as a serious academic offence and the University reserves the right to deal with this offence as it deems appropriate. For the investigating procedure of cases of plagiarism, possible penalties and avenues for appeal, see **Procedures and Mechanism** (web-site reference???)

APPENDIX B

TYPES OF PLAGIARISM

Here are instances of how you could be plagiarizing in the way you use your referenced information.

1. Total / Partial Copying

A.   When you submit an assignment, report or project that you have copied totally or partially from a website, a friend's work, or some other sources, without acknowledgement, this is plagiarism because:
   i.   You did not do any original research or writing.
   ii. The work is created by someone else, and yet you put your name on it.

Example:
Suppose you have been given an assignment on the topic - "Qualitative Research". You do a search on the Internet and discover information on the Wikipedia website. It gives a clear and interesting explanation about qualitative research at the following address http://en.wikipedia.org/wiki/Qualitative_research

If you were to copy this text, paste it into your document and hand it in as your assignment, you would be plagiarizing.

Original Text
Qualitative research is one of the two major approaches to research methodology in social sciences. Qualitative research involves an indepth understanding of human behaviour and the reasons that govern human behaviour. Unlike quantitative research, qualitative research relies on reasons behind various aspects of behaviour.

B.   If you were to change a few words, or substitute some words/ phrases in the original text with your own, you would still be plagiarizing.

Plagiarized Text with word changes *(red, italicized)*
Qualitative research is **an approach** to research methodology in social sciences. Qualitative research involves **a deep** understanding

University of Malaya is committed to the fight against plagiarism

of human behaviour and the reasons that **control** human. **It** relies on reasons behind various aspects of behaviour.

2. Cut and Paste

Another type of plagiarism involves copying large chunks of text from one or more original sources and inserting them into the assignment.

For example, suppose you are doing the above assignment on "Qualitative Research" and you include a few sentences from the Wikipedia website. Unless you present the sentences as a quote with full citation, you are committing plagiarism.

Original text

Simply put, it investigates the why and how of decision making, as compared to what, where, and when of quantitative research. Hence, the need is for smaller but focused samples rather than large random samples. From which, qualitative research categorizes data into patterns as the primary basis for organizing and reporting results.

Plagiarized Text *(red, italicized)* = "inserted text' with no acknowledge of source

There are two ways in which a researcher can do research - qualitative and quantitative. However, in the social sciences, the qualitative method allows in-depth study of the subject or area of research. This method of research allows investigation of reasons behind various aspects of behaviour. *Simply put, it investigates the why and how of decision making, as compared to what, where, and when of quantitative research. Hence, the need is for smaller but focused samples rather than large random samples.* It is from these samples of data that patterns can be drawn. *These patterns are the primary basis for organizing and reporting results.*

NOTE:

If you turn in a paper which contains all quotes, mostly quotes, you will still be cheating even if you properly cite them all.

First, any academic assignment **should include original work,** such as an original evaluation of sources or an original comparison of texts. Second, if you quote too much of any one text, you could also be **violating copyright laws** in addition to plagiarizing.

### 3.	Inappropriate Paraphrase

A more subtle type of plagiarism is the "inappropriate paraphrase". In this form of plagiarism, the quoted text is

i.	altered only slightly from the original and no acknowledgment of the original author is given, or
ii.	extensively paraphrased but with acknowledgement of the original author/s.

NOTE:

If you turn in a paper which contains these types of paraphrases, you will still be cheating even if you properly cite them all.

You cannot submit a paper which merely paraphrases one or two sources even if you acknowledge them. You do have to provide original input in order for your work to be considered authentic and original.

APPENDIX C

LIST OF PLAGIARISM OFFENCES

You are plagiarizing if you do any of the following without acknowledging the source or rightful owner/s:

• Choose topic/title for your report/ coursework/ essay/ dissertation/ thesis same as some other completed work
• Use someone else's work even with verbal consent of its rightful author
• Submit as your own someone else's unpublished work, either with or without permission
• Use even if unpublished work (such as another student's dissertation/ course work)
• Use graphs, diagrams, charts of others
• Use visual images – drawings, models, pictures, photographs, movies, etc - of others
• Present graphics based on data/ table of others
• Extract/ incorporate someone else's academic data
• Use research data obtained through collaborative work without obtaining the consent of co-researchers
• Publish an abstract, article, scientific or academic paper, or book which is wholly or partly written by some other person as its author or co-author
• Ask someone else to write or revise a report/ dissertation/ thesis for you
• Purchase a pre-written paper (either by mail or electronically) or downloading a paper from a free site
• Purchase someone else's report/ dissertation/ thesis
•· Force others to include your name as co-researcher/ co-author without contribution
• Attempt to make out to be original/ sole author
• Do a course work, write an article, answer examination questions for other people
• Submit one's own previous work again (multi-posting)
• Turn in the same paper for more than one class without the permission of both lecturers
• Fabricate references or using incorrect references
• Rewrite a plagiarized text
• Fabricate results of survey/statistics/tables/graphs.

APPENDIX D

IN-TEXT CITATIONS (BASED ON APA STYLE)

Three, four, or five authors
In the first citation, cite all names and publication year:

Example:
> … (Cortez, Jones, Gold, & Hammond, 1998).

If the names are mentioned in the text:

Example:
> Cortez, Jones, Gold, and Hammond (1998) found that….

Subsequent citations of the same authors:

Example:
> … (Cortez et al., 1998)

If the names appear in the text:

Example:
> Cortez et al. (1998) found that…

Six or more authors
Use the first author's surname followed by et al. and the year of publication from the first citation:

Example:
> … (Cortez et al., 1998)

Mention the names of all six authors (with et al. if there are more authors) in the reference list.

Different authors with the same surname
Use their first and middle initials:

Example:
> …(B.A. Jones, 1998); (R.F. Jones, 1998)

More than one work by the same author
When you cite the works together, use the author's surname once
and then the years of each publication:

Example:
>   … (Stairs, 1992, 1993).
> If the name appears in the text:

Example:
>   Stairs (1992, 1993) said…

Multiple authors cited together

Example:
>   … (Jones, 1998; Heckels, 1996; Stolotsky, 1992)

Group or corporate authors
If the name of the organisation is an abbreviation, write the full
name in the first citation, and use the short form in subsequent
citations:

First citation:

Example:
>   … (National Institute of Mental Health [NIMH], 1999)
> Subsequent citation:

Example :
>   … (NIMH, 1999)

If no name of author is available

> If author is unknown, use a short form of the title.

> If the title is "The Effects of Aspirin on Heart Attack
> Victims", use the following format:

Example
>   ("The Effects," 1995)
> If the author is mentioned as "Anonymous", then use

Example:

> … (Anonymous, 1999)

Personal communication
As personal communications are not cited in the reference list in APA style, they need clear in-text citation:

Example:

> (H. J. Simpson, personal communication, September 29, 1999)

Citation of a secondary source
That is, a source is referred to in another publication:

Example:

> …(Farrow, 1968, as cited in Ward & Decan, 1988)

If the name appears in the text:

Example:

> Farrow (1968, as cited in Ward & Decan, 1988) finds….

Citation from an electronic source
Use paragraph numbers where page numbers are not provided:

Example:

> …(Sturt, 2001, para. 2)
> …(Sturt, 2001, ¶ 2)   where ¶ stands for paragraph.

APPENDIX E

EXAMPLES OF TYPES OF REFERENCES
FOR A REFERENCE LIST (APA STYLE)

BOOKS	APA
Book (no author or editor)	*Merriam-Webster's collegiate dictionary* (10th ed.). (1993). Springfield, MA: Merriam Webster.
Book (one author)	Baddeley, A. D. (1999). *Essentials of human memory.* Hove, England: Psychology Press.
Book (two authors)	Beck, C. A. J., & Sales, B. D. (2001). *Family mediation: Facts, myths, and future prospects.* Washington, DC: American Psychological Association.
Corporate author, author as publisher	Australian Bureau of Statistics. (1991). *Estimated resident population by age and s ex in statistical local areas.* New South Wales, June 1990 (no. 3209.1). Canberra, Australian Capital Territory; Author.
Edited book	Gibbs, J. T., & Huang, L. N. (Eds.). (1991). *Children of color: Psychological interventions with minority youth.* San Francisco: Jossey-Bass.
ESSAYS OR CHAPTERS IN EDITED BOOKS	
One author, Two editors	Bjork, R. A. (1989). Retrieval inhibition as an adaptive mechanism in human memory. In H. L. Roediger III & F. I. M. Craik (Eds.), *Varieties of memory & consciousness* (pp. 309-330). Hillsdale, NJ: Erlbaum.
ENCYCLOPEDIAS OR DICTIONARIES AND ENTRIES IN AN ENCYCLOPEDIA	

Encyclopedia set or *dictionary*	Sadie, S. (Ed.). (1990). *The new Grove dictionary of music and musicians* (6th ed., Vols. 1-20). London: Macmillan.
Encyclopedia article	Bergman, P. G. (1993). Relativity. In *The new encyclopedia Britannica* (Vol. 26, pp. 501-508). Chicago: Encyclopedia Britannica.
JOURNALS, MAGAZINES, AND NEWSPAPERS	
Journal article, one author	Mellers, B. A. (2000). Choice and the relative pleasure of consequences. Psychological Bulletin, 126, 910-924.
Journal article, two authors	Klimoski, R., & Palmer, S. (1993). The ADA and the hiring process in organizations. *Consulting Psychology Journal: Practice and Research*, 45 (2), 10-36.
Journal article, more than two authors	Saywitz, K. J., Mannarion, A. P., Berliner, L., & Cohen, J. A. (2000). Treatment for sexually abused children and adolescents. *American Psychologist*, 55, 1040-1049.
Magazine article	Kandel, E. R., & Squire, L. R. (2000, November 10). Neuroscience: Breaking down scientific barriers to the study of brain and mind. *Science*, 290, 1113-1120.
Newspaper article, no author	New drug appears to sharply cut risk of death from heart failure. (1993, July 15). *The Washington Post*, p. A12.
Newspaper article, one author, discontinuous pages	Schwartz, J. (1993, September 30). Obesity affects economic, social status. *The Washington Post*, pp. A1, A4.
AUDIO - VISUAL MEDIA	

Videocassette	Garmon, L. (Producer and Director), & Apsell, P. (Executive Producer). (1994). *Secret of the wild child* [Videocassette]. Boston, MA: WGBH Educational Foundation.
Audio recording	Costa, P. T., Jr. (Speaker). (1998). *Personality, continuity, and changes of adult life* (Cassette Recording No. 207-433-88A-B). Washington, DC: American Psychological Association.
Motion picture	Scorsese, M. (Producer), & Lonergan, K. (Writer/Director). (2000). *You can count on me* [Motion Picture]. United States: Paramount Pictures.
Television broadcast	Crystal, L. (Executive Producer). (1993, October 11). *The MacNeil/Lehrer news hour* [Television broadcast]. New York and Washington, DC: Public Broadcasting Service.
Television series	Miller, R. (Producer). (1989). *The mind* [Television series]. New York: WNET.
Music recording	Schocked, M. (1992). *Over the waterfall.* On *Arkansas traveller* [CD]. New York: PolyGram Music.
ELECTRONIC MEDIA AND ONLINE SOURCES	
Internet articles based on a print source (exists in print and online)	VandenBos, G., Knapp, S., & Doe, J. (2001).Role of reference elements in theselection of resources by psychology undergraduates [Electronic version]. *Journal of Bibliographic Research*, 5, 117-123.

Article in an Internet-online journal	Frederickson, B. L. (2000, March 7). Cultivating positive emotions to optimize health and well-being. *Prevention & Treatment*, 3, Article 0001a. Retrieved November 20, 2000, from http://journals.apa.org/prevention/volume3/pre0030001a.html
Article from an online encyclopedia	Bergman, P. G. & Editors of Encyclopedia Britannica Online. (1994-1999). Relativity. *Encyclopedia Britannica Online*. Retrieved August 4, 1999, from Encyclopedia Britannica Online on the World Wide Web: http://search.eb.com/bol/topic/eu=117376&sctn=1
Professional website	American Psychological Association. (1999, June 1). Electronic preference formats recommended by the American Psychological Association. Retrieved July 18, 1999, from the World Wide Web: http://www.apa.org/journals/webref.html
Document available on university program or department site	Chou, L., McClintock, R., Moretti, F., & Nix, D. H. (1993). *Technology and education*: *New wine in new bottles*: *Choosing pasts and imagining educational futures*. Retrieved August 24, 2000, from Columbia University, Institute for Learning Technologies Web site: http://www.ilt.columbia.edu/publications/papers/newwine1.html
Content of lecture / class	Takada, Misako, *Penterjemahan Amali Dua Hala, Bahasa Jepun.* February 2, 2007, University Malaya, Faculty of Languages and Linguistics.

APPENDIX F

EXAMPLE OF A REFERENCE PAGE (APA STYLE)

References

Aerobic exercise. (2000). American Academy of Orthopaedic Surgeons. Retrieved January 17, 2006, from http://orthoinfo.aaos.org/

Bryce, J. (Producer/Director), & Gault, M. (Director). (1989). *Sports Clinic Soccer* [Motion picture]. (Available from Best Film and Video Corporation, Great Neck, NY 11021)

Bynum, M. (2004, August). Paving the way. *Athletic Business*, *28*, 40-42.

Capozzi, C.K. (2005). My first collaborative unit-lessons learned. *Library Media Connection*, *24*(2), 38-39. Retrieved October 15, 2005 from Academic Search Premier database.

Crafts, V.R. & Scott, P.M. (1964). *Track and field for girls and women: Strategies for success.* New York: Meredith Publishing Company.

Foster, M. (2004, Sept 3). Two quarterbacks still in mix at LSU. *The Greenville News*, p. C6.

Gamble, P. (2004). Physical preparation for elite-level rugby union football. *Strength and Conditioning Journal*, *4,* 10-23.

The Harper Collins dictionary of biology (1ˢᵗ ed.). (1991). New York: Harper Perennial.

Menke, F.G. (Ed.). (1969). *The encyclopedia of sports* (5ᵗʰ ed., Vols. 1-3). South Brunswick, NJ: A.S. Barnes.

Yoder, D.G. (1996) Commercialization. *In D. Levinson & K. Christensen (Eds.), Encyclopedia of world sport: From ancient times to the present* (Vol.1, pp. 191-195). Santa Barbara, CA: ABC-CLIO.

Source: www.apastyle.org/aboutstyle.html

APPENDIX G

DIFFERENT STYLES OF BIBLIOGRAPHY ENTRIES

TABLE 1 (ARTS / HUMANITIES)

	APA	HARVARD	MLA	TURABIAN
Book (one author)	Scott, J. C. (1985). *Weapons of the weak: everyday forms of peasant resistance.* New Haven and London: Yale University Press.	Scott, J. C. 1985, *Weapons of the Weak: Everyday Forms of Peasant Resistance,* Yale University Press, New Haven and London.	Scott, J. C. Weapons of the Weak: Everyday Forms of Peasant Resistance. New Haven and London: Yale University Press, 1985.	Scott, J. C. *Weapons of the Weak: Everyday Forms of Peasant Resistance,* New Haven and London: Yale University Press, 1985.
Book (two authors)	Samover, L. A. & Porter, R. E. (1991). *Communication between cultures.* Belmont CA: Wadsworth Publishing Co.	Samover, L. A. & Porter, R. E. 1991 *Communication Between Cultures,* Wadsworth Publishing Co., Belmont CA.	Samover, L. A. and Porter, R. E. Communication Between Cultures, Belmont CA: Wadsworth Publishing Co., 1991. Samover,	L. A. and Porter, R. E. *Communication Between Cultures,* Belmont CA: Wadsworth Publishing Co., 1991.
Internet sources (journal on website)	Capozzi, C. K. (2005). My first collaborative unit-lesson learned. *Library Media Connection,* 24(2), 38-39. Retrieved October 15, 2005 from Academic Search Premier database. Capozzi,	C. K. My first collaborative unit-lesson learned, *Library Media Connection,* 24(2) pp.38-39, viewed 15 Oct., 2005, Academic Search Premier database.	Capozzi, C. K. "My first collaborative unit-lesson learned." Library Media Connection, 24(2) (2005): 38-39, 15 October 2005. Academic Search Premier database.	C. K. 2005. My first collaborative unit-lesson learned. *Library Media Connection,* 24(2) 38-39. Internet. Available from Academic Search Premier database; accessed 15 October 2005.

University of Malaya is committed to the fight against plagiarism

Journal			
Triandis, H. C. et. al. (1986). The measure of the ethic aspects of individualism and collectivism across cultures. *Australian Journal of Psychology*, 38, 257-267.	Triandis, H. C. et al. 1986, 'The measure of the ethic aspects of individualism and collectivism across cultures.' *Australian Journal of Psychology, vol* 38, pp. 257-267.	Triandis, H. C. et al. The measure of the ethic aspects of individualism and collectivism across cultures. *Australian Journal of Psychology* 38 (1986): 257-267.	Triandis, H. C. et al. "The measure of the ethic aspects of individualism and collectivism across cultures." *Australian Journal of Psychology* 38 257-267, 1986.

LEGEND

BOOK:

Scott, J. C   - name of author
(1985)   - year of publication
Weapons of the weak   - title of book
Everyday forms of
peasant resistance
New Haven and London   - place of publication

Yale University Press.   - publisher
                               - issue number

JOURNAL : Triandis, H. C. et al   - name of author
           (1986)   - year of publication
           The measure of the ethic   - title of article
           aspects of individualism and
           collectivism across cultures
           Australian Journal of   - title of Journal
           Psychology
           38
           257-267   - page numbers

TABLE 2 (SCIENCE)

	APA	HARVARD	MLA	TURABIAN
Book (single author)	Horber, J. K. H. (2002) *Atomic force microscopy in cell biology.* San Diego: Academic.	Horber, J. K. H. 2002, *Atomic Force Microscopy in Cell Biology,* Academic, New York.	Horber, J.K. H. Atomic Force Microscopy in Cell Biology. San Diego: Academic, 2002.	Horber, J. K. H. 2002. *Atomic Force Microscopy in Cell Biology.* San Diego: Academic.
Book (two authors)	Wilson, J. & Hunt, T. (2002). *Molecular biology of the cell, Fourth Edition: A problems approach.* New York: Garland Science.	Wilson, J. & Hunt T. 2002, *Molecular Biology of the Cell, Fourth Edition: A Problems Approach,* Garland Science, New York.	Wilson, J. and T. Hunt. Molecular Biology of the Cell, Fourth Edition: A Problems Approach. New York: Garland Science, 2002.	Wilson, J., and T. Hunt. 2002. *Molecular Biology of the Cell. Fourth Edition: A Problems Approach.* New York: Garland Science.
Internet sources (Journal on website)	Baker J. C. (1995, October), Revealing the effects of orientation in composite quasar spectra. *Astrophysical Journal* , 452. Retrieved September 29, 1995, from http://www.aas.org/ApJ/v452n2/5309/5309.html	Baker, J. C. Revealing the effects of orientation in composite quasar spectra, *Astrophysical Journal* , October 452, pp. 232-245, viewed 29 Sept 1995, http:/ / w w w . a a s . o r g / A p J / v452n2/5309/5309.html	Baker, Joanne. "Revealing theeffects of orientation in compositequasar spectra." Astrophysical Journal 452 (1995) : 232-245 pars.29 September 1995http:// w w w . a a s . o r g / A P . J / v452n2/5309/5309.html	Baker, Joanne C. 1995. Revealing the effects of orientation in composite quasar spectra. *Astrophysical Journal* 452 (October). Internet. Available from http:// www.aas.org/ApJ/v452n2/5309/5309.html; accessed 29 September 1995.

University of Malaya is committed to the fight against plagiarism

TABLE 2 (SCIENCE) Continued

Journal		
Parikh, Mihir (2002), Utilizing Internet Technologies to Support Learning: An Empirical Analysis. *International Journal of Information Management, 22,* 27-46.	Parikh, M. & Verma, S 2002, 'Utilizing Internet Technologies to Support Learning: an empirical analysis.' *International Journal of Information Management,* vol. 22, no. 1, pp. 27-46.	Parikh, Mihir. Utilizing internet Technologies to Support Learning: An Empirical Analysis. International Journal of Information Management, 22 (2002) :27-46.

LEGEND

BOOK: Horber, J. K. H.   - name of author
(2002)   - year of publication
Atomic force microscopy :   - title of book
in cell biology

San Diego   - place of publication
Academic   - publisher

JOURNAL : Parikh, Mihir   - name of author
(2002)   - year of publication
Utilizing internet technologies   - title of article
to support learning: An empirical
analysis

International Journal of   - title of journal
Information Management

22   - issue number
27-46   - page numbers

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 Universiti Malaya.

LABORATORY REGULATIONS

General Safety Rules and Housekeeping in Laboratories & Workshops

General Safety Rules

1. Students are not permitted to enter any laboratory, workshop and store area without permission.

2. Students are only permitted in laboratories for official research or during practical classes.

3. Running in the corridors, laboratories, and workshops or on the staircases should be avoided.

4. Coats, bags and other personal belongings must NOT be taken into laboratories or workshops. From a security point of view, it is not advisable to leave valuables, laptops or other personal belongings on walkways, staircases or landings.

5. Lab coats should not be worn outside the laboratory or workshop.

6. At the end of a practical class, all electronic and electrical equipment should be switched off (unless otherwise instructed).

7. All hazardous materials or apparatus must be rendered safe, or disposed off, in the manner indicated by the academic or technical staff on duty or by established procedures before leaving the laboratory.

8. Eating, drinking, storing of food, and applying cosmetics are strictly prohibited inside any laboratory or workshop

Housekeeping

1. All laboratory benches must be cleaned and kept clear of trash, spills, debris, apparatus, glassware and/or chemicals not currently in use.

2. At the end of the workday in any laboratory or workshop, all work areas, benches and sinks must be left in a clean and tidy condition. It is the user's responsibility to clear up any mess after using the laboratory or workshop. Dust should be removed using an appropriate vacuum cleaner. The use of brooms is not recommended.

3. All hazardous materials or apparatus must be rendered safe, or disposed off, in the manner indicated by the academic or technical staff in charge or by established procedures before leaving the laboratory

4. Stacked materials should be in stable condition.

5. The space in between two machines should be at least 60 cm wide and kept clear of any materials.

6. No bottles, plastic containers or experiment materials are allowed to be kept under the benches, on the floor or less than 15 cm from the edge of the bench top.

7. Laboratory benches should not be used as a general storage area. Apparatus, glassware and/or chemicals not in use should be kept in the proper storage area.

8. Fume hoods and biosafety cabinets should not be used as a storage area.

9. Disposal of waste should be done safely and promptly using the designated bins/containers. The technician/staff in-charge should provide the necessary guidance to dispose waste

10. All radioactive, chemical and biological materials must be properly labelled and stored inside its designated cabinets.

11. Proper inventory of the materials have to be kept updated at all the times. The inventory level of hazardous and combustible materials should be as minimal as possible.

12. The storage of chemicals must be in accordance with the recommendations of the relevant Safety Data Sheet (SDS). Incompatible chemicals and/or materials must not be stored together. Combustible chemicals cannot be kept near heat or ignition source. Chemicals with low ignition point should be kept in the appropriate temperature.

13. All chemical bottles or containers must be capped with proper cap or seal except when being used.

LIST OF LABORATORIES

DEPARTMENT OF CIVIL ENGINEERING

NO	Laboratory's Name	Location		Staff In-Charge
		Block	Level	
1.	Soil & Rock Mechanics Laboratory	F	G	Name : Mohammad Termizi Mohamed Kassim E-mail : mohdtermizi@um.edu.my No Tel : 03-79672753
2.	Geotechnic & Advanced Soil Mechanics Laboratory	F	G	Name : Mohammad Termizi Mohamed Kassim E-mail : mohdtermizi@um.edu.my No Tel : 03-79672753
3.	Concrete Technology Laboratory	F	G	Name: Zulkafli Muhammad E-mail : zulkafli@um.edu.my No Tel : 03-79675273 Name :Noor Syakira Sulaiman Email : syakirasulaiman@um.edu.my No Tel : 03-79675273
4.	Strength of Materials Laboratory	F	G	Name : Shahrul Rafiq Arifin Email : shahrulr@um.edu.my No Tel : 03-79675273
5.	Engineering Survey & GIS Laboratory	F	G	Name : Nurfazeeha Omar Zainal Email : nurfazee@um.edu.my No Tel : 03-79675362
6.	Timber Workshop	G	G	Name: Zulkafli Muhammad E-mail : zulkafli@um.edu.my No Tel : 03-79675273 Name :Noor Syakira Sulaiman Email : syakirasulaiman@um.edu.my No Tel : 03-79675273
7.	Concrete Materials Laboratory	G	G	Name :Sreedharan VK Raman Email : sree@um.edu.my No Tel : 03-79672757
8.	Heavy Structures Laboratory 1	G	G	Name :Sreedharan VK Raman Email : sree@um.edu.my No Tel : 03-79672757

| NO | Laboratory's Name | Location | | Staff In-Charge |
		Block	Level	
9.	Advanced Water & Environmental Engineering Laboratory	N	2	Name :Alya Farhana Shaffiee Email : alyafarhana@um.edu.my No Tel : 03-79672750
10.	Environmental Laboratory	N	4	Name:Mohd Faiz Ibrahim Email : faiz8821@um.edu.my No Tel : 03-79672756
11.	Wastewater Laboratory	N	4	Name :Mohd Faiz Ibrahim Email : faiz8821@um.edu.my No Tel : 03-79672756
12.	Fluid Mechanics Laboratory	N	4	Name :Rozita Yusop Email : roy69@um.edu.my No Tel : 03-79672756
13.	Analysis, Fieldwork Apparatus & Sampling Laboratory	N	4	Name :Rozita Yusop Email : roy69@um.edu.my No Tel : 03-79672756
14.	Hydraulics Laboratory	N	G	Name: Suhaimi Jusoh Email : soaimi@um.edu.my No Tel : 03-79672754
15.	Highway Engineering Laboratory	N	3	Muhamad Izzat Zaki Email : izzat_zaki@um.edu.my No Tel : 03-79672754
16.	Traffic Engineering Laboratory	N	3	Muhamad Izzat Zaki Email : izzat_zaki@um.edu.my No Tel : 03-79672754
17.	Heavy Structures Laboratory 2	N	G	Name: Suhaimi Jusoh Email : soaimi@um.edu.my No Tel : 03-79672754
18.	Light Structures Laboratory	N	1	Alfi Sahrina Mohd Masyumudin Email : alfisahrina@um.edu.my No Tel : 03-79672162
19.	Timber Laboratory	N	1	Alfi Sahrina Mohd Masyumudin Email : alfisahrina@um.edu.my No Tel : 03-79672162
20.	River Engineering Laboratory	P	1	Name :Rozita Yusop Email : roy69@um.edu.my No Tel : 03-79672756

DEPARTMENT OF BIOMEDICAL ENGINEERING

TEACHING LAB

NO	Laboratory's Name	Location		Staff In-Charge
		Block	Level	
1.	Clinical Engineering Laboratory	A	G	Name : Yuslialif Mohd Yusup Email : yuslialifyusup@um.edu.my No Tel : 03-79672785
2.	Medical Device Laboratory	A	G	Name : Yuslialif Mohd Yusup Email : yuslialifyusup@um.edu.my No Tel : 03-79672785
3.	Medical Electronics Laboratory	A	2	Name : Fairus Hanum binti Mohammad Email : f_hanum@um.edu.my No Tel : 03-79672780
4.	Neuro Engineering Laboratory	A	2	Name : Fairus Hanum binti Mohammad Email : f_hanum@um.edu.my No Tel : 03-79672780
5.	Body Performance and Motion Analysis Laboratory	C	G	Name : Adhli Iskandar Putera Hamzah Email : aiputera@um.edu.my No Tel : 03-79672826
6.	Centre for Prosthetic and Orthotic Engineering (1)	C	1	Name : Razalee Rahimi Abd Manaf Email : razalee_zali@um.edu.my No Tel : 03-79672778
7.	Centre for Prosthetic and Orthotic Engineering (2)	C	2	Name : Azuan bin Othman Email : azone75@um.edu.my No Tel : 03-79672819
8.	BioMEMS Engineering Laboratory	C	4	Name : Yuslialif Mohd Yusup Email : yuslialifyusup@um.edu.my No Tel : 03-79672785
9.	Biosensors and Embedded System Laboratory	C	4	Name : Mohd Khairul Amran Email : khairulamran@um.edu.my No Tel : 03-79674580
10.	Biomechanics and Sports Injury Laboratory	C	4	Name : Mohd Khairul Amran Email : khairulamran@um.edu.my No Tel : 03-79674580
11.	Biomechatronics & Neuroprosthesis Laboratory	C	4	Name : Mohd Khairul Amran Email : khairulamran@um.edu.my No Tel : 03-79674580

12.	Cellular Engineering Laboratory	C	4	Name : Muhairizam Manan Email : muhairizam@um.edu.my No Tel : 03-79672754
13.	Human Centric Design Laboratory	D	G	Name : Mohd Khairul Amran Email : khairulamran@um.edu.my No Tel : 03-79674580
14.	Biomaterials Laboratory	M	2	Name : Mohamad Zaki bin Jaafar Email : j_zaki@um.edu.my No Tel : 03-79672779
15.	Artificial Organ Laboratory	M	4	Name : Azuan bin Othman Email : azone75@um.edu.my No Tel : 03-79672819
16.	Tissue Engineering Laboratory	U	G	Name : Liyana Abu Email : liyana_9068@um.edu.my No Tel : 03-79672781

RESEARCH LAB

NO	Laboratory's Name	Location		Staff In-Charge
		Block	Level	
1.	Human Informatics Design Laboratory	C	4	Name : Muhairizam Manan Email : muhairizam@um.edu.my No Tel : 03-79672754
2.	Medical Imaging Laboratory	M	4	Name : Mohamad Zaki bin Jaafar Email : j_zaki@um.edu.my No Tel : 03-79672779
3.	Medical Computing Laboratory	M	4	Name : Mohamad Zaki bin Jaafar Email : j_zaki@um.edu.my No Tel : 03-79672779
4.	Electromagnetic Laboratory	M	4	Name : Fairus Hanum binti Mohammad Email : f_hanum@um.edu.my No Tel : 03-79672780
5.	Asian Cardiac Engineering Laboratory	M	5	Name : Liyana Abu Email : liyana_9068@um.edu.my No Tel : 03-79672781

DEPARTMENT OF ELECTRICAL ENGINEERING

TEACHING LAB

NO	Laboratory's Name	Location		Staff In-Charge
		Block	Level	
1.	Machine Lab	Y	G	Name :Syuib Bin Samsir Email : johncena@um.edu.my No Tel: 03-79672748
2.	Control Lab	Y	G	Name:Mohd Akmal Rizuan Bin Abd Rahman Email :mohdakmalrizuan@um.edu.my No Tel : 03-79675315
3.	Power Electronic Lab	Y	G	Name:Mohd Akmal Rizuan Bin Abd Rahman Email :mohdakmalrizuan@um.edu.my No Tel : 03-79675315
4.	Power System Lab	Y	G	Name :Syuib Bin Samsir Email : johncena@um.edu.my No Tel: 03-79672748
5.	High Voltage Lab	Y	G	Name :Syuib Bin Samsir Email : johncena@um.edu.my No Tel: 03-79672748
6	Huawei Lab	Y	G	Name:Mohd Akmal Rizuan Bin Abd Rahman Email :mohdakmalrizuan@um.edu.my No Tel : 03-79675315
7..	Signal System Lab	Y	G	Name:Mohd Akmal Rizuan Bin Abd Rahman Email :mohdakmalrizuan@um.edu.my No Tel : 03-79675315
8.	Design Lab 1	Y	1	Name : Mohd Zailani Bin Ab Aziz Email : jai5683@um.edu.my No Tel : 03-79672717
9.	Design Lab 2	Y	1	Name : Mohd Zailani Bin Ab Aziz Email : jai5683@um.edu.my No Tel : 03-79672717
10.	Electronics Lab	Y	2	Name : Mohd Zailani Bin Ab Aziz Email : jai5683@um.edu.my No Tel : 03-79672717
11.	Electrical Lab	Y	2	Name:Wan Nur Murnizawati Bt Wan Mohamad Email : murni_1711@um.edu.my No Tel : 03-79677644

| NO | Laboratory's Name | Location | | Staff In-Charge |
		Block	Level	
12.	Optic Lab	Y	2	Name:Wan Nur Murnizawati Bt Wan Mohamad Email : murni_1711@um.edu.my No Tel : 03-79677644
13.	Wireless Communication Lab	Y	2	Name:Wan Nur Murnizawati Bt Wan Mohamad Email : murni_1711@um.edu.my No Tel : 03-79677644
14..	RF VNA Lab	Y	2	Name : Mohd Zailani Bin Ab Aziz Email : jai5683@um.edu.my No Tel : 03-79672717
15.	VLSI Lab	Y	2	Name : Mohd Zailani Bin Ab Aziz Email : jai5683@um.edu.my No Tel : 03-79672717
16.	Digital Lab	Y	3	Mohd Isa Bin Mohd Hamdan Email : isa86@um.edu.my No Tel : 03-79677684
17.	Pestech Lab	Y	3	Mohd Isa Bin Mohd Hamdan Email : isa86@um.edu.my No Tel : 03-79677684
18.	Electromagnetic Lab	Y	3	Mohd Isa Bin Mohd Hamdan Email : isa86@um.edu.my No Tel : 03-79677684
19.	Communication Lab	Y	4	Name : Mohammad Bin Said Email : mohdsaid@um.edu.my No Tel : 03-79672724
20.	Data Communication Lab	Y	4	Name : Mohammad Bin Said Email : mohdsaid@um.edu.my No Tel : 03-79672724
21.	Microprocessor Lab	Y	4	Name : Mohammad Bin Said Email : mohdsaid@um.edu.my No Tel : 03-79672724
22.	Satelite Lab	Y	4	Name : Mohammad Bin Said Email : mohdsaid@um.edu.my No Tel : 03-79672724
23.	PCB Lab	Y	4	Name : Mohammad Bin Said Email : mohdsaid@um.edu.my No Tel : 03-79672724

NO	Laboratory's Name	Location		Staff In-Charge
		Block	Level	
24.	Expert System and Optimization Lab	R	4	Name : Mohammad Bin Said Email : mohdsaid@um.edu.my No Tel : 03-79672724 Name:Mohd Akmal Rizuan Bin Abd Rahman Email :mohdakmalrizuan@um.edu.my No Tel : 03-79675315
25.	MEMS Lab	R	4	Name : Mohammad Bin Said Email : mohdsaid@um.edu.my No Tel : 03-79672724 Name:Mohd Akmal Rizuan Bin Abd Rahman Email :mohdakmalrizuan@um.edu.my No Tel : 03-79675315
26.	Microelectronics Reliability Lab	R	4	Name : Mohammad Bin Said Email : mohdsaid@um.edu.my No Tel : 03-79672724 Name:Mohd Akmal Rizuan Bin Abd Rahman Email :mohdakmalrizuan@um.edu.my No Tel : 03-79675315
27.	Mobile Computing Lab	R	4	Name : Mohammad Bin Said Email : mohdsaid@um.edu.my No Tel : 03-79672724 Name:Mohd Akmal Rizuan Bin Abd Rahman Email :mohdakmalrizuan@um.edu.my No Tel : 03-79675315
28.	Analog, Digital and RF Lab	R	4	Name : Mohammad Bin Said Email : mohdsaid@um.edu.my No Tel : 03-79672724 Name:Mohd Akmal Rizuan Bin Abd Rahman Email :mohdakmalrizuan@um.edu.my No Tel : 03-79675315

NO	Laboratory's Name	Location		Staff In-Charge
		Block	Level	
29.	Multi-Dimensional Micro-Nano System & Functional Device	R	6	Name : Mohammad Bin Said Email : mohdsaid@um.edu.my No Tel : 03-79672724 Name:Mohd Akmal Rizuan Bin Abd Rahman Email :mohdakmalrizuan@um.edu.my No Tel : 03-79675315
30.	Wireless Networks Lab	R	6	Name : Mohammad Bin Said Email : mohdsaid@um.edu.my No Tel : 03-79672724 Name:Mohd Akmal Rizuan Bin Abd Rahman Email :mohdakmalrizuan@um.edu.my No Tel : 03-79675315
31.	Solid State Nanodevices Lab	E	G	Name :Syuib Bin Samsir Email : johncena@um.edu.my No Tel: 03-79672748 Name : Mohd Zailani Bin Ab Aziz Email : jai5683@um.edu.my No Tel : 03-79672717
32.	CISIP Lab	E	G	Name :Syuib Bin Samsir Email : johncena@um.edu.my No Tel: 03-79672748 Name : Mohd Zailani Bin Ab Aziz Email : jai5683@um.edu.my No Tel : 03-79672717
33.	EMRD Lab	E	G	Name :Syuib Bin Samsir Email : johncena@um.edu.my No Tel: 03-79672748 Name : Mohd Zailani Bin Ab Aziz Email : jai5683@um.edu.my No Tel : 03-79672717

| NO | Laboratory's Name | Location | | Staff In-Charge |
		Block	Level	
34.	Applied Signal & System Lab	E	G	Name :Syuib Bin Samsir Email : johncena@um.edu.my No Tel: 03-79672748 Name : Mohd Zailani Bin Ab Aziz Email : jai5683@um.edu.my No Tel : 03-79672717
35.	UMPES Lab	E	G	Name :Syuib Bin Samsir Email : johncena@um.edu.my No Tel: 03-79672748 Name : Mohd Zailani Bin Ab Aziz Email : jai5683@um.edu.my No Tel : 03-79672717
36.	VIP Lab	E	G	Name :Syuib Bin Samsir Email : johncena@um.edu.my No Tel: 03-79672748 Name : Mohd Zailani Bin Ab Aziz Email : jai5683@um.edu.my No Tel : 03-79672717
37.	Photonics Engineering Lab 1	E	G	Name :Syuib Bin Samsir Email : johncena@um.edu.my No Tel: 03-79672748 Name : Mohd Zailani Bin Ab Aziz Email : jai5683@um.edu.my No Tel : 03-79672717
38.	Photonics Engineering Lab 2	E	G	Name :Syuib Bin Samsir Email : johncena@um.edu.my No Tel: 03-79672748 Name : Mohd Zailani Bin Ab Aziz Email : jai5683@um.edu.my No Tel : 03-79672717

| NO | Laboratory's Name | Location | | Staff In-Charge |
		Block	Level	
39.	Flat Fibre Lab	N	G	Name:Wan Nur Murnizawati Bt Wan Mohamad Email : murni_1711@um.edu.my No Tel : 03-79677644 Mohd Isa Bin Mohd Hamdan Email : isa86@um.edu.my No Tel : 03-79677684
40.	ILRG Lab 1	M	4	Name:Wan Nur Murnizawati Bt Wan Mohamad Email : murni_1711@um.edu.my No Tel : 03-79677644 Mohd Isa Bin Mohd Hamdan Email : isa86@um.edu.my No Tel : 03-79677684
41	ILRG Lab 2	M	4	Name:Wan Nur Murnizawati Bt Wan Mohamad Email : murni_1711@um.edu.my No Tel : 03-79677644 Mohd Isa Bin Mohd Hamdan Email : isa86@um.edu.my No Tel : 03-79677684
42	ACR Lab	M	4	Name:Wan Nur Murnizawati Bt Wan Mohamad Email : murni_1711@um.edu.my No Tel : 03-79677644 Mohd Isa Bin Mohd Hamdan Email : isa86@um.edu.my No Tel : 03-79677684
43.	CRAE Lab	M	5	Name:Wan Nur Murnizawati Bt Wan Mohamad Email : murni_1711@um.edu.my No Tel : 03-79677644 Mohd Isa Bin Mohd Hamdan Email : isa86@um.edu.my No Tel : 03-79677684

NO	Laboratory's Name	Location		Staff In-Charge
		Block	Level	
44.	PEARL Lab	M	5	Name:Wan Nur Murnizawati Bt Wan Mohamad Email : murni_1711@um.edu.my No Tel : 03-79677644 Mohd Isa Bin Mohd Hamdan Email : isa86@um.edu.my No Tel : 03-79677684
45.	UM High Voltage Group (HVRG) Lab	Y	1	Name : Mohammad Bin Said Email : mohdsaid@um.edu.my No Tel : 03-79672724 Name:Mohd Akmal Rizuan Bin Abd Rahman Email :mohdakmalrizuan@um.edu.my No Tel : 03-79675315
46.	Motorola Solutions Lab	C	3	Name :Syuib Bin Samsir Email : johncena@um.edu.my No Tel: 03-79672748 Name : Mohd Zailani Bin Ab Aziz Email : jai5683@um.edu.my No Tel : 03-79672717

DEPARTMENT OF CHEMICAL ENGINEERING

TEACHING LAB

NO	Laboratory's Name	Location		Staff In-Charge
		Block	Level	
1.	Plastic Testing Lab	V	G	Name : Ismail Hakim Nasirin Email : ismile@um.edu.my No Tel : 03-79672772
2.	Pilot Plant Lab	V	G	Name: Rustam Ramlan Email : ras64@um.edu.my No Tel : 03-79672775
3.	Fluids Lab	V	1	Name: Rizman bin A.Lateff Email : rizman2009@um.edu.my No Tel : 03-79672773
4.	Polymer Processing Lab.	V	G	Name :Sazali Mohd Sapie Email : sazly@um.edu.my No Tel : 03-79672773
5.	Workshop	V	G	Name: Kamarudin bin Hasan Email : kdin@um.edu.my No Tel : 03-79672773
6.	Physical Chemistry Lab 1	P	1	Name : Muhammad Syarafi bin Mohd Syarif Email : syarafi@um.edu.my No Tel : 03-79672774
7.	Chemical Engineering Lab 1	W	G	Name : Muhammad Syarafi bin Mohd Syarif Email : syarafi@um.edu.my No Tel : 03-79672774
8.	Integrated Lab	P	G	Name: Rustam Ramlan Email : ras64@um.edu.my No Tel : 03-79672775

DEPARTMENT OF CHEMICAL ENGINEERING

RESEARCH LAB

NO	Laboratory's Name	Location		Staff In-Charge
		Block	Level	
1.	Mass Transfer Lab	V	1	Name : Azaruddin Ibrahim Email : azrdin@um.edu.my No Tel : 03-79672773
2.	Bioprocess Lab	V	1	Azira binti Idris Email : azira@um.edu.my No Tel : 03-79675286
3..	Thermodynamic Lab	V	1	Fazizah bt Abdullah Email : fazizah@um.edu.my No Tel : 03-79672770
4.	Postgraduate Lab	W	1	Name :Muhammad Kamalrul Ariffin Bin Mohd Shariffuddin Email : kamalrul@um.edu.my No Tel : 03-79675206
5.	Instrumentation Lab	V	G	Name :Muhammad Norhadi bin Mohammad Email : hadi.mohammad@um.edu.my No Tel : 03-79672771
6.	Analytical Lab	V	G	Name :Muhammad Norhadi bin Mohammad Email : hadi.mohammad@um.edu.my No Tel : 03-79672771
7.	Membrane Technology Lab	V	G	Name :Muhammad Norhadi bin Mohammad Email : hadi.mohammad@um.edu.my No Tel : 03-79672771
8.	Operation Unit Lab	V	1	Name : Fazizah bt Abdullah Email : fazizah@um.edu.my No Tel : 03-79672770
9.	Environmental Lab	W	1	Name :Muhammad Kamalrul Ariffin Bin Mohd Shariffuddin Email : kamalrul@um.edu.my No Tel : 03-79675206

DEPARTMENT OF MECHANICAL ENGINEERING

TEACHING LAB

NO	Laboratory's Name	Location		Staff In-Charge
		Block	Level	
1.	Statics Lab	C	5	Name : Muhammad Khlaid bin Hashim Email : khlaid@um.edu.my No Tel : 03-79676865 Name : Sarimaniza Hj Salleh Email : sarima@um.edu.my No Tel : 03-79672762
2.	Dynamics Lab	C	5	Name : Muhammad Khlaid bin Hashim Email : khlaid@um.edu.my No Tel : 03-79676865 Name : Sarimaniza Hj Salleh Email : sarima@um.edu.my No Tel : 03-79672762
3.	Mechanics of Materials Lab	C	5	Name : Sarimaniza Hj Salleh Email : sarima@um.edu.my No Tel : 03-79672762 Name :Hartini Bt Baharum Email: tin420@um.edu.my No Tel : 03-79672765
4.	Advanced Cutting Process Lab	C	B	Name : Nasarizam Bin Mohamed Email : nasarizam@um.edu.my No Tel : 03-79672764 Name :Mohd Fauzi Bakri @ Hashim Email : mohd.fauzi@um.edu.my No Tel : 03-79672764
5.	Fluid Mechanics Lab	J	G	Name : Zainul Jamal Bin Ghiasuddin Email : zainulj@um.edu.my No Tel : 03-79672828 Name :Mohd Nasrul Bin Mohd Yusof Email: nasrul@um.edu.my No Tel : 03-79672769
6.	Student Workshop	K	G	Name :Mohd Nasrul Bin Mohd Yusof Email: nasrul@um.edu.my No Tel : 03-79672769 Name :Afendi bin Ayob Email : afendi@um.edu.my No Tel : -

7.	Heat Engine Lab	M	1	Name :Mohd Fauzi Bakri @ Hashim Email : mohd.fauzi@um.edu.my No Tel : 03-79672764 Name : Nasarizam Bin Mohamed Email : nasarizam@um.edu.my No Tel : 03-79672764
8.	Fundamental of Materials Lab	M	3	Name : Mohd Nazarul zaman bin Mohd Nazir Email : mnzman@um.edu.my No Tel : 03-79672827 Name : Siti Rohaya Binti Ahmad Email : s.rohaya_a@um.edu.my No Tel : 03-79672658
9.	Metallurgy Lab	Q	1.5	Name :Afendi bin Ayob Email : afendi@um.edu.my No Tel : - Name : Mohd Nazarul zaman bin Mohd Nazir Email : mnzman@um.edu.my No Tel : 03-79672827
10.	Thermodynamic and Heat Transfer Lab	R	1	Name :Norzirah Hasan Email : norzirah@um.edu.my No Tel : 03-79672165 Name : Mohd Asri Ismail Email : adi123@um.edu.my No Tel : 03-79675261
11.	Vibration Lab	R	5	Name : Mohd Taufiq Md Yusof Email : taufiqm@um.edu.my No Tel : 03-79674595 Zulkarnain @ Khayree Faisal bin Ishak Email: khayree_faisal@um.edu.my No Tel : 03-79672764
12.	Electric Lab	R	6	Zulkarnain @ Khayree Faisal bin Ishak Email: khayree_faisal@um.edu.my No Tel : 03-79672764 Name : Mohd Taufiq Md Yusof Email : taufiqm@um.edu.my No Tel : 03-79674595

DEPARTMENT OF MECHANICAL ENGINEERING

RESEARCH LAB

| NO | Laboratory's Name | Location | | Staff In-Charge |
		Block	Level	
1.	Precision Engineering Lab	C	4	Name : Sarimaniza Hj Salleh Email : sarima@um.edu.my No Tel : 03-79672762
2.	Virtual Reality Lab	C	5	Name : Muhammad Khlaid bin Hashim Email : khlaid@um.edu.my No Tel : 03-79676865
3.	Metrology Lab	C	5	Name : Sarimaniza Hj Salleh Email : sarima@um.edu.my No Tel : 03-79672762
4.	Furnace Lab	J	G	Name :Mohd Nasrul Bin Mohd Yusof Email: nasrul@um.edu.my No Tel : 03-79672769
5.	Powder Metallurgy Lab	K	1	Name : Zainul Jamal Bin Ghiasuddin Email : zainulj@um.edu.my No Tel : 03-79672828
6.	Micro & High Speed Machining Lab	K	G	Name : Nasarizam Bin Mohamed Email : nasarizam@um.edu.my No Tel : 03-79672764
7.	Motoring Enjin Test Bed Lab	M	1	Name :Mohd Fauzi Bakri @ Hashim Email : mohd.fauzi@um.edu.my No Tel : 03-79672764
8.	Packaging Materials Lab	M	1	Name : Mohd Asri Ismail Email : adi123@um.edu.my No Tel : 03-79675261
9.	Composite Lab	M	1	Name : Mohd Asri Ismail Email : adi123@um.edu.my No Tel : 03-79675261
10.	Energy Efficiency Lab 1	M	2	Name :Hartini Bt Baharum Email: tin420@um.edu.my No Tel : 03-79672765

11.	Surface Engineering Lab	M	2	Name :Hartini Bt Baharum Email: tin420@um.edu.my No Tel : 03-79672765
12.	Tribology Lab	M	2	Zulkarnain @ Khayree Faisal bin Ishak Email: khayree_faisal@um.edu.my No Tel : 03-79672764
13.	Polymer Fiber Lab	M	2	Name :Hartini Bt Baharum Email: tin420@um.edu.my No Tel : 03-79672765
14.	Coating Technology Lab	M	3	Name : Siti Rohaya Binti Ahmad Email : s.rohaya_a@um.edu.my No Tel : 03-79672658
15.	Biofuel Lab	M	3	Name : Mohd Nazarul zaman bin Mohd Nazir Email : mnzman@um.edu.my No Tel : 03-79672827
16.	Nano Micro Engineering Lab	M	3	Name : Mohd Nazarul zaman bin Mohd Nazir Email : mnzman@um.edu.my No Tel : 03-79672827
17.	Powder Lab	M	3	Name : Siti Rohaya Binti Ahmad Email : s.rohaya_a@um.edu.my No Tel : 03-79672658
18.	Corrosion Lab	M	3	Name : Siti Rohaya Binti Ahmad Email : s.rohaya_a@um.edu.my No Tel : 03-79672658
19.	Engine tribology Lab 1	Q	G	Zulkarnain @ Khayree Faisal bin Ishak Email: khayree_faisal@um.edu.my No Tel : 03-79672764
20.	Advanced Materials Lab	R	1	Name :Norzirah Hasan Email : norzirah@um.edu.my No Tel : 03-79672165
21.	Energy Lab 2	R	3	Name :Norzirah Hasan Email : norzirah@um.edu.my No Tel : 03-79672165
22.	Ceramic Processing Lab	R	3	Name : Mohd Taufiq Md Yusof Email : taufiqm@um.edu.my No Tel : 03-79674595
23.	Thermal-Hydraulics Lab	X	G	Name : Mohd Asri Ismail Email : adi123@um.edu.my No Tel : 03-79675261

DEPUTY DEAN DEVELOPMENT

RESEARCH LAB

NO	Laboratory's Name	Location		Staff In-Charge
		Block	Level	
1.	Central Advance Research Enabler Facility (Caref)	M	2	Name: Nur Kamisah Binti Mohd Ishak Email: nkamisah@um.edu.my No Tel: 03-79676865
2.	Field Emission Scanning Electron Microscope (Fesem)	M	1	Name: Mohamad Shukri Bin Abdul Jamil Email: shukri@um.edu.my No Tel: 03-79676865 Name: Nik Fasihah Binti Ismail Email: nikfasihah@um.edu.my No Tel: 03-79676865
3.	Idea Realization Cube (Ir Cube)	D	1	Name: Dehis Bin Mastik Email: dehis@um.edu.my No Tel: 03-79676865
4.	Student Workshop Blok U	U	G	Name: Mohamad Shukri Bin Abdul Jamil Email: shukri@um.edu.my No Tel: 03-79676865

OTHER FACILITIES

Bil	Room	Level	Block
1	Engineering Computing Centre 1	1	J
2	Engineering Computing Centre 2	2	J
3	Engineering Computing Centre 3	5	R
4	Engineering Computing Centre 4	2	V
5	Engineering Computing Centre 5	2	V
6	Engineering Computing Centre 6	3	Y
7	Engineering Computing Centre 7	3	Y
8	Engineering Library	6	M
9	Cafeteria (Ariff Sport Center Café)	G	L
10	Cafeteria (Clove Café)	4	L
11	Musolla for Male	G	K
12	Musolla for Female	2	L
13	Staff's Meeting Room (The Cube)	2	L
14	Staff's Meeting Room (C onference Room)	4	L
15	Staff's Meeting Room (Dean's Meeting Room)	4	L
16	Staff's Meeting Room (Alumni Room)	4	L
17	Study Room (Infineon Corner)	2	L
18	Auditorium 1	4	U
19	Auditorium 2	1	Y
20	Lecture Hall 1 (DK1)	1	B
21	Lecture Hall 2 (DK2)	1	U
22	Lecture Hall 3 (DK3)	1	U
23	Lecture Hall 4 (DK4)	2	L
24	Lecture Hall 5 (DK5	2	L
25	Lecture Hall 6 (DK6)	4	L
26	Lecture Hall 7 (DK7)	1	Y
27	Lecture Hall 8 (DK8)	1	Y
28	Lecture Hall 9 (DK9)	1	Y

Bil	Room	Level	Block
29	Lecture Room 101 (BK101)	2	U
30	Lecture Room 102 (BK102)	2	U
31	Lecture Room 103 (BK103)	2	U
32	Lecture Room 104 (BK104)	2	U
33	Lecture Room 105 (BK105)	2	U
34	Lecture Room 201 (BK201)	3	U
35	Lecture Room 202 (BK202)	3	U
36	Lecture Room 203 (BK203)	3	U
37	Lecture Room 204 (BK204)	3	U
38	Lecture Room 205 (BK205)	3	U
39	Lecture Room 301 (BK301)	3	U
40	Study Room	3	U
41	Study Room	3	U
42	Red Cube 1 (RC1)	1	D
43	Orange Cube 1 (OC1)	1	D
44	Green Cube 1 (GC1)	1	D
45	Purple Cube 1 (PC1)	1	D
46	Red Cube 2 (RC2)	2	D
47	Orange Cube 2 (OC2)	2	D
48	Green Cube 2 (GC2)	2	D
49	Lecture Room 204 (BP204)	2	D
50	IR Cube (Idea realization Cube)	G	D
51	Purple Cube (Block V)	2	V
52	BKK 3	2	V
53	BKK 4	2	V
54	The Cube 2	G	Y
55	Musollah (Prayer Room) Block U	4	U
56	Musollah (Prayer Room) Block V	G	V
57	Musollah (Prayer Room) Block Y	G	Y

GENERAL ENQUIRIES

FOR GENERAL ENQUIRIES ON FACILITIES

PLEASE CONTACT:

Mr. Lee Kok Yuen

Science Officer

Deputy Dean (Development)

Faculty Of Engineering

Universiti Malaya

No. Tel: 03-79675323

Email: patrick@um.edu.my

OPERATING HOURS: 8.30am - 5.00pm