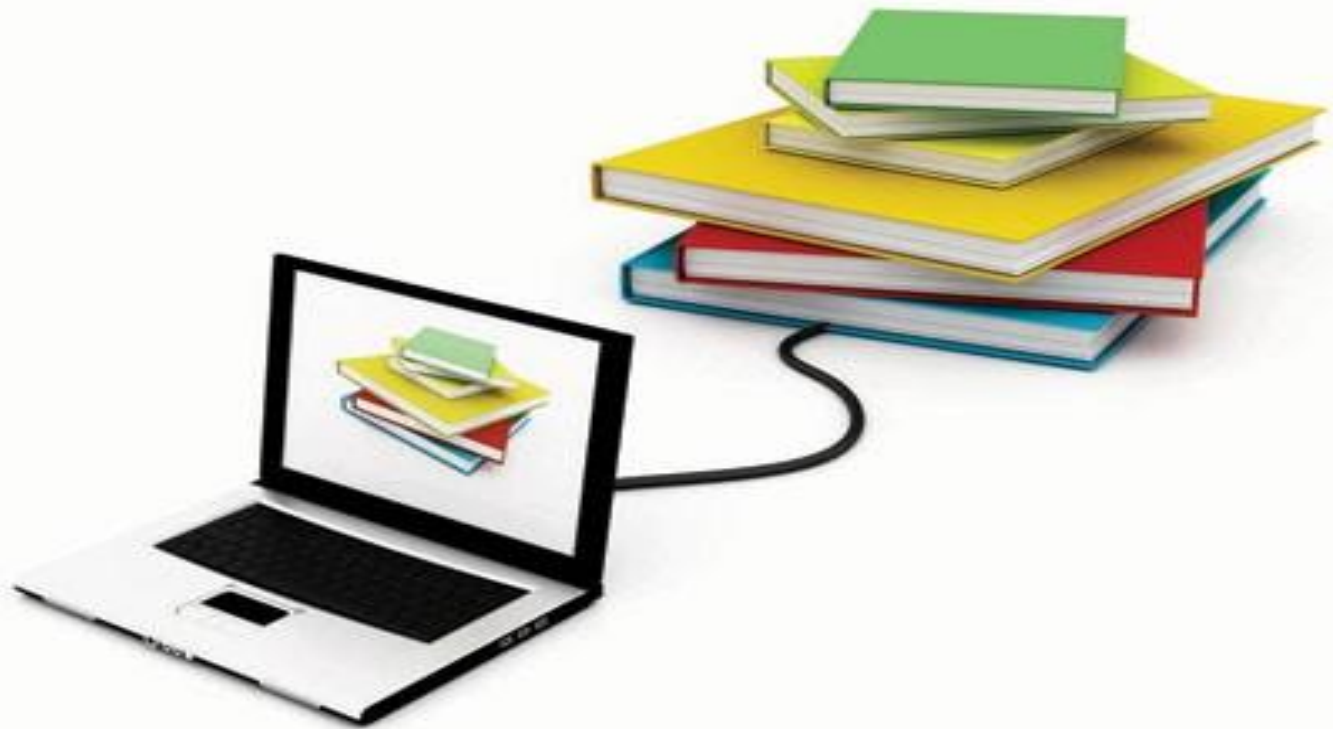


2021

**STANDARD
PROGRAM AKADEMIK
PROFESIONAL UTMSPACE**



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1. PENDAHULUAN / INTRODUCTION

Automation and robotic fields have been progressed rapidly in recent years. They are playing very important roles in the industries to replace human in terms of speed, reliability and high risk works. The important of its roles have been further increased as artificial intelligence surfaces. In other words, a number of machines and robots can be linked up concurrently for better communication, maintenance, monitoring and control. This has portrayed a very efficient manufacturing industries with total transformation towards Industrial Revolution 4.0.

Newest engineering fields such as smart, remote control, wireless, cloud computing, machine learning, deep learning, neural network, voice and facial control have been integrated in addition of conventional mechanical, electronic and electrical fields.

The Professional Degree in Robotic and Mechatronic Technology programme conducted by Teras Teknologi Sdn Bhd has been developed since year 2015 with other universities.

In view of the manpower shortages in recent years, automation and robotic have been playing a pivotal role in the industries. Robot and automation machines incorporating artificial intelligence features will be leveraged widely covering manufacturing, assembly, welding, testing, designing, programming, security, education, construction, transportation, medical, F&B etc.

2. TUJUAN / AIM

The aim of the Programme is identified into two main domains i.e. technical knowledge and competencies, and generic skills as follows:

- (a) To produce quality, competent and versatile graduates who are equipped with the necessary technical knowledge and practical skills to undertake tasks in the field of automation, robotic and AI.

- (b) To equip graduates with all-rounded skills and capabilities necessary to compete in the employment market.

3. DEFINISI PROGRAM / DEFINITION

Many of the government policies and strategies were formulated with the aim of transforming Malaysia into an industrialized country that will eventually become a developed nation. The government has been stressing on the needs to further improve science and technology development and the country's productivity and international competitiveness by further enlarging the country's pool of scientists, engineers, technologists and professionals.

The policies and strategies also stressed on the needs for these valuable resources to continually upgrade their knowledge, skills and competencies by going for more advanced training and/or education.

The programme basically focuses on the 16 main knowledge areas of studies as listed below:

- Automation Software and Hardware
- Robotic Software and Hardware
- Automation Application
- Robotic Application
- Artificial Intelligence
- Software Programming
- Mechanical Design
- Machining and Tooling
- Electronic Engineering
- Electrical Engineering
- Control System
- RF and Wireless
- Test Instrumentation
- Project Management
- Safety & Health Management
- Best manufacturing practices

4. KUMPULAN SASARAN / TARGET STUDENTS

This programme is designed to develop students' knowledge and skills in design, automation, robotics, artificial intelligence, manufacturing practices, technology, creativity in development, and to advance professional career fulfilling the challenge of IR 4.0. The program also inspires younger generation to uplift their skillsets with innovation and creativity in developing new products and projects.

5. HASIL PEMBELAJARAN / PROGRAMME'S OBJECTIVES

Programme Educational Objectives (PEO)

The Programme has 5 programme educational objectives:

	PROGRAMME EDUCATIONAL OBJECTIVES	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11
PEO1	To provide graduates with solid foundation in management and technical knowledge, skills and capabilities in the field of automation, robotics and AI.	/	/	/	/							
PEO2	To produce graduates who are effective problem solver, knowledgeable in applying logical, critical and creative thinking to a range of problems.	/	/	/	/	/	/					
PEO3	To provide graduates with leadership and managerial skills which are necessary for the effective delivery of engineering projects.	/	/	/	/	/	/					

PEO4	To produce graduates capable of executing their responsibilities with professionalism and capable of lifelong learning in the pursuit of personal development and betterment of society.							/	/	/	/	
PEO5	To provide graduates with basic communication skills, lead effectively and able to work collaboratively in a multidisciplinary team.							/	/	/		

PROGRAMME LEARNING OUTCOMES (PLO)

The intended learning outcomes of the Professional Degree in AI Robotic and Mechatronic Engineering programme are:

PLO1	Acquire knowledge and understanding in the field of automation, robotic and AI.
PLO2	Apply theories and practices of hardware setup and software programming.
PLO3	Solve problems related to the field of automation, robotic and AI using an innovative, logical and practical approach.
PLO4	Express ideas and communicate effectively, in writing and orally, for automation, robotic and AI activities and the construction industry community as well as the community at large
PLO5	Think critically to resolve automation, robotic and AI issues and related problems.
PLO6	Engage in self-learning and lifelong learning with the application of information management skills as well as research skills.
PLO7	Function effectively as individuals, members or leaders in various teams to meet the challenges of automation, robotic and AI projects.
PLO8	Work effectively in new environments and be prepared to implement continuous change and improvement.

PLO9	Apply high ethical and moral values in professional practice and able to analyze the global impact and contemporary issues in the field of automation, robotic and AI sustainably.
PLO10	Use entrepreneurial knowledge and skills to identify potential business opportunities as well as resilient and willing to take risks.
PLO11	Apply high ethical and moral values in professional practice and able to analyze contemporary issues in the field of intelligent robotics sustainably.

6. REKA BENTUK KURIKULUM / CURRICULUM DESIGN

The design and structure of the current 2-year programme is considered to be continuity from Professional Diploma program without MQA approval.

Classification of courses

The courses are stackable modules from previous Professional Diploma program with 61 credits. Previous Professional Diploma course is accumulated 39 credits. Professional Degree program is classified into programme core courses and programme elective courses. The percentage breakdown and comparisons of credit hours for the different classifications is shown in Table 6-1.

Table 6-1: Classification of courses

Classification	Total Modules	3-year programme	
		Credit	%
Core courses	25	80	80
Elective courses	10	20	20
Total (graduating credits)	35	100	100

Having completed 12-module Professional Diploma programme will grant students 39 credits and this has reduced total modules in Professional Degree to 23 modules with 61 credits.

CLASSIFICATION	NO. OF COURSE	2 YEAR PROGRAMME	
		CREDIT	%
Programme Core	22	68	68
Programme Electives	12	26	26
Final Project	1	6	6
TOTAL CREDITS	35	100	100.0

Curriculum Structure for the Programme

The courses are categorised by the different levels of study to a defined structure and approach as follows:

Year 1:

Year 1 Part 1 provides a broad knowledge and understanding of the principles of Mechanical, Electronic, Electrical and Automation. The emphasis of the courses focus upon providing the students with the fundamental knowledge on Design, Machining, Tooling, Digital / Analog Electronic, Electrical Wiring and Motor as well as PLC and Pneumatic will provide a strong base for the subsequent courses.

Year 2:

Year 2 of the programme extends the courses in year 1 with the emphasis on various software such as Raspberry, Python and Labview in order to communicate with the hardware. Further to this, various robot development will be introduced as arm or humanoid structure as well as flying robot as drone. Besides, the technology for machines and robot will be enhanced further by integrated artificial intelligence features such as voice and face recognition. Topics such as machine learning, deep learning, neural network and big data management will be touched. Ultimately, students will have to complete their final year project by producing an application product or process based on principles and skills they have acquired throughout the course.

7. KAEDAH PENILAIAN / ASSESSMENT METHODS**Internal Programme Monitoring and Evaluation**

The Programme is monitored and evaluated internally through various mechanisms as follows:

a. Vetting of course outlines, exam questions and assignments

The course outlines which include the learning outcomes, synopsis, weekly schedule, modes and composition of assessment prepared by course lecturers at the beginning of the semester will be vetted and approved by the UTMSPACE panel before distributing to students. All assignments, courseworks, test and examination questions will also be vetted and approved by the panel before they are implemented. This is to ensure that the courses are conducted in accordance with the syllabus and the framework approved by the UTMSPACE.

b. Course assessments reports

The course assessment reports for all the courses are compiled and formed part of the programme assessment report. The programme assessment report is prepared at the end of every semester and reflects the overall performance of the programme and measured against the achievement of the various programme outcomes. The outcome of the programme assessment report is presented to the UTMSPACE Examination Committee.

c. Students' evaluation of teaching

The delivery of individual courses is also monitored by students' evaluation of teaching system online. The main themes for the evaluation are teaching, delivery, assessment, student-lecturer relationship, inculcation of generic skills, and questions inviting comments. General feedback to lecturers regarding the results of the evaluation is given at the end of the semester and where necessary, action plans are formulated to improve the course delivery.

d. Exit survey

An exit survey is conducted by the UTMSPACE with all final year students before graduating. Questionnaires will be distributed to graduating students and their feedbacks on the Programme are sought. Their Feedbacks will be analysed and taken into consideration wherever appropriate in improving the Programmes.

ASSESSMENT METHODS

The aim of the assessment is to judge students against standards commensurate with the requirements of the programme in order to ensure that students reach a level of attainment appropriate for progression, and in the final stage, for the award of the degree. Assessments will also provide students with an indication of their strengths and weaknesses across the curriculum and other areas of personal development so that they can improve their performance. UTMSPACE provides a

general guideline for the assessment of courses. The pass mark for all courses is 40%. Assessment consists of coursework and final examination. Coursework comprise a series of assessment components which include tests, assignments, quiz and mini project. Attendance of the students will be considered also. The final examination is undertaken at the end of each course module. The duration of examination is between 2 to 4 hours depending on the credit of the courses and the modes of assessment.

There are two modes of assessment:

Coursework and final examination - where a course is assessed by coursework and examination, the marks distribution are as follows:

Assessment Methods for Course Work	Marks (%)
Attendance	10
Quiz/Class test	20
Group Project Assignment/ Presentation	30

Assessment Methods	Marks (%)
Final Examination	40

8. KAEDAH PENGENDALIAN / PROGRAMME MANAGEMENT

All the programs mode will be conducted in Teras Teknologi Sdn Bhd premise at Kuala Lumpur. Students will acquire as much skills and knowledge from the industry experts. They will have ample hands-on opportunity during industrial visit and also the actual projects delivery such as robot and automation machines to the smart café setup by Teras Teknologi Sdn Bhd. There are visiting professors from other institutions also. All the trainers are well qualified from universities and CIAST.

9. KAEDAH PENGAJARAN DAN PEMBELAJARAN / *TEACHING AND LEARNING*

NALI ELEMENTS		COURSE NAME	DESCRIPTION
1	Project Based Learning	a. SPRM 2244 Industrial Automation Control with PLC b. SPRM 2344 Machine Learning	<ul style="list-style-type: none"> Felo Industri sebagai Mentor dan Refleksi untuk tugasan dan kajian kes Melaksanakan 'technology collaboration tools'
2	Teaching Research Nexus (TRN)	a. SPRM 2134 Control System (Scilab) b. SPRM 2314 Robotic Kinematic & Dynamic	<ul style="list-style-type: none"> Integrasi dapatan kajian penyelidikan dalam pengajaran Input pengajaran berkaitan teknik, kaedah dan skil penyelidikan
3	Site Visit	a. SPRM 3244 Occupational Safety & Health b. SPRM 3344 Total Productive Maintenance (TPM)	<ul style="list-style-type: none"> Lawatan Tapak Industri & Seminar TPM
4	Work Based Learning	a. SPRM 3214 LEAN Six Sigma Green Belt	<ul style="list-style-type: none"> Input industri berkaitan amalan LEAN Six Sigma
5	Technical Seminar & Internet		<ul style="list-style-type: none"> Lawatan Teknikal ke fasiliti industry Kaedah 'blended' training melalui bersemuka dan atas talian. Kawalan jarak jauh dan simulasi

Activities	Duration (weeks)	Total (weeks)
Semester 1		16
1. SPRM 1113 Design Drawing (Solidworks)		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
2. SPRM 1123 Computer Numerically Control (CNC)		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
3. SPRM 1133 Electronic Engineering		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
4. SPRM 1143 Electrical Engineering		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
Semester 2		16
5. SPRM 1163 Automation Control Programming		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
6. SPRM 1173 Industrial Automation Application		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
7. SPRM 1183 Microcontroller Arduino		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
8. SPRM 1193 Robot Development		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	

Activities	Duration (weeks)	Total (weeks)
Final Exam	1	
Semester 3		16
9. SPRM 1153 Test & Measurement Software Application (LabVIEW)		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
10. SPRM 1213 Artificial Intelligence		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
11. SPRM 1223 Industrial Internet of Thing		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
12. SPRM 1236 Final Year Project I		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
Semester 4		16
1. SPRM 2144 Mechanical Design		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
2. SPRM 3334 Presentation Skills		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
3. SPRM 2114 Electronic Circuit Device		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	

Activities	Duration (weeks)	Total (weeks)
4. SPRM 2234 Microcontroller Raspberry Pi		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
Semester 5		16
5. SPRM 2124 Electrical Machine Devices		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
6. SPRM 2244 Industrial Automation Control with PLC		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
7. SPRM 2224 Pneumatic & Hydraulic		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
8. SPRM 3344 Total Productive Maintenance (TPM)		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
Semester 6		16
9. SPRM 2223 Software Programming in Labview		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
10. SPRM 3224 Labview DAQ		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
11. SPRM 3314 Properties of Materials		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	

Activities	Duration (weeks)	Total (weeks)
Final Exam	1	
12. SPRM 3324 Project Management		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
Semester 7		16
13. SPRM 2344 Machine Learning		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
14. SPRM 2134 Control System		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
15. SPRM 2314 Robotic Kinematic & Dynamic		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
16. SPRM 3244 Occupational Safety & Health Management Systems - OSHMS		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
Semester 8		16
17. SPRM 3354 Mobile Application Development		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
18. SPRM 3254 Vision & Imaging System (LabVIEW or Raspberry Pi)		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	

Activities	Duration (weeks)	Total (weeks)
19. SPRM 3234 RF & Wireless		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
20. SPRM 3214 LEAN Six Sigma Green Belt		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
Semester 9		12
21. SPRM 2324 Smart Robotic & Automation		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
22. SPRM 2345 Neural Network		
Lectures, Lab Exercise	2	
Assignments, Quiz, Mini Project	1	
Final Exam	1	
23. SPRM 2356 Final Year Project II		
Lectures, Lab Exercise	1	
Final Project	3	
TOTAL		140

10. KELAYAKAN MASUK / ENTRY REQUIREMENTS

Minimum qualifications

The academic requirements are monitored periodically, taking into account the educational framework of the UTMSPACE. The qualifications for admission to the Professional Degree in Robotic and Mechatronic Technology.

Candidates	Minimum Qualifications
For candidates with a diploma qualification or higher	Possess MQA Diploma OR non-MQA Diploma (Professional Diploma, Diploma Kemahiran Malaysia, C&G, any Diploma) in any engineering field.
For candidates without Diploma	a. Technical Certificate/SKM or STPM with more than 5 years relevant working experience b. SPM with more than 10 years relevant working experience. The open entry requirements will be subject to UTMSPACE approval.

11. JUMLAH KREDIT BERGRADUAT / GRADUATING CREDITS

Duration of the program is 6 semesters by stackable basis. Credit transfer and open entry application will be based on case by case basis. The total credits for the award of degree for the Programme is 100.

12. PENJAJARAN PROGRAM AKADEMIK UTMSPACE DENGAN KELAYAKAN DAN LALUAN PEMBELAJARAN DALAM MQF / ALIGNMENT OF UTMSPACE ACADEMIC PROGRAMME TO MQF LEARNING FRAMEWORK

Candidates who wish to qualify for this programme are candidates who possess the Ministry of Education's *Sijil Pelajaran Malaysia* Certificate (or equivalent as approved by the Ministry) or the *Sijil Tinggi Persekolahan Malaysia* (STPM) or the *Sijil Tinggi Agama Malaysia* (STAM) or a recognised diploma/professional diploma and subjected to working experience.

Credit Transfer

Candidates will be given credit transfer based on the subjects previously taken. According to UTMSPACE regulations, the total credit exemptions should not

exceed 30% of the total credits required for graduation. The minimum grade for transfer is Grade C according to the UTMSPACE grading system.

The credit transfer for admission to the Professional Degree in Robotics and Mechatronic Technology Programme are tabulated in Table 1.

Table 1: Credit Transfers

Course	Professional Diploma Robotics UTMSPACE
1. DPRM 1112 Robotics Technology I	3
2. DPRM 1123 Construction Technology II	3
3. DPRM 1213 Introduction to AI	3
4. DPRM 1413 Principles of Law, Contract & Tort	3
5. DPRM 1513 Professional Practice I	3
6. DPRM 1813 AutoCAD	3
7. DPRM 1833 Mathematics for Business	3
8. DPRM 1843 Principles of Economics	3
9. DPRM 2123 Engineering Services I	3
10. DPRM 2133 Engineering Services II	3
11. DPRM 2813 Principles of Mechatronics	3
12. DPRM 2843 Engineering Survey	3
13. DPRM 2853 Programming Language	3
TOTAL	39

**13. PEMBERI PENDIDIKAN TINGGI YANG LAYAK MENAWARKAN PROGRAM
AKADEMIK PROFESIONAL UTMSPACE**

Smart partner who have been approved to undertake Professional Academic Program from UTMSPACE is Teras Teknologi Sdn Bhd as per MoA dated 20 October 2020.