



# **Faculty of Computer Science and Information Technology Universiti Putra Malaysia**

## **POSTGRADUATE PROGRAMME BY COURSEWORK**

## **MASTER OF COMPUTER SCIENCE**



## **PROGRAMME BY COURSEWORK**

**Programme :        Master of Computer Science**

### **Introduction**

The Master of Computer Science programme is 40 credits postgraduate programme by coursework. It offers an opportunity for advanced studies and career development in the field of computer science. The objective of this programme is to produce graduates with new technology in the field of computer science.

### **Entrance Requirements**

An applicant should have a Bachelor's degree or equivalent, in computing, science and technology or related to computing, with a minimum CGPA 2.75; or

Bachelor's degree or equivalent, in computing, science and technology or related to computing with a CGPA of 2.500 – 2.749 may be considered based on a minimum of 1 year of work experience in the related field; or

Bachelor's degree or equivalent, in computing, science and technology or related to computing with a CGPA of 2.00 – 2.49 may be considered based on a minimum of 5 year of work experience in the related field;

Candidates without a Computing Degree, candidates must take prerequisite courses in computing.

### **English Language Requirement**

International applicants must have obtained a minimum score of 550 for the TOEFL Paper-based Test (Academic Version) or Band 6.0 for IELTS (Academic Training), or 79-80 for TOEFL Internet-based Test (Academic Version) or Level 109 for CIEP at ELS Language Centre.

### **Programme Offered by Semester**

First and Second Semester of every year.

### **Programme Requirements**

## Credits Requirement for Graduation

In order to graduate, students must have achieved at least 40 credits. The minimum cumulative average is 3.00. The minimum credits distribution for this programme is as follows:

Compulsory courses	21 credits
Dissertation	10 credits
Elective courses	9 credits
<b>Total</b>	<b>40 credits</b>

### a) COMPULSORY COURSES

Listed below are the compulsory courses:

Course Code	Course Name	Credit
SSK5090	Research Methods in Computer Science	3 (3+0)
SSK5212	Big Data Technology	3 (3+0)
SSK5210	Empirical Methods in Computer Science	3 (3+0)
SSK5221	Internet of Things	3 (3+0)
SSK5500	Security in Computing	3 (3+0)
SSK5603	Machine Learning	3 (3+0)
SKR5306	Advanced Computer Networks	3 (3+0)

### b) DISERTATION

Course Code	Course Name	Credit
SSK5989	Dissertation	10 (0+10)

### c) ELECTIVE COURSES

Choose three (3) courses only:

Course Code	Course Name	Credit
SKR5302	Advance Distributed Computing	3 (3+0)
SKR5308	Real-Time Systems	3 (3+0)
SKR5501	Performance Modeling of Communication Networks	3 (3+0)
SKM5301	Advanced Computer Graphics	3 (3+0)
SKM5303	Computer Vision	3 (3+0)

SSK5606	Advanced Natural Language Processing	3 (3+0)
SSK5608	Evolutionary Computing	3 (3+0)
SSK5611	Massive Data Mining	3 (3+0)
SSK5251	Data Analysis and Statistical Inference	3 (3+0)
SSK5102	Big Data Computing	3 (3+0)
SSK5220	Cyber-Physical Systems Modeling	3 (3+0)
SSK5223	Pervasive Computing for Cyber-Physical System	3 (3+0)

## Tuition Fees

The fee structure for this programme consists of basic fee and credit-based fee:

### a) Basic Fee

Semester	Local	International
First Semester	RM 1,350.00	RM2,400.00
Second and Subsequent Semesters	RM 1,100.00	RM2,150.00

### b) Credit-based Fee

Student	Amount	Credit	Total Amount
Local	RM250.00 per credit	40	RM10,000.00
International	RM400.00 per credit		RM16,000.00

**NOTE:** The fee amount is subject to change from time to time WITHOUT prior notice by the University. Prospective and current students are advised to check the SGS website for any fee changes not earlier than one (1) month before the start of each semester/new students' registration. All fees must be paid upon registration.

**OTHER COST:** Please refer to School of Graduate Studies website at <http://www.sgs.upm.edu.my>

## Course Synopsis

### **SSE5101      Programming and Computer-Based Problem Solving      3 (3+0)** **(Prerequisite)**

This course covers problem-solving technique using computer programming. Programming elements and algorithms to produce effective program are discussed.

### **SSK5090      Research Methods in Computer Science      3 (3+0)**

This course introduces students to the research methods in computer science and gives ideas on how to plan, organize and use the available resources efficiently in helping them in their research

### **SSK5210      Empirical Methods in Computer Science      3 (3+0)**

The course covers a detailed study of the scientific process using empirical method in experiment. Testing and hypothesis formulation steps based on the selected experimental design are discussed

### **SSK5220      Cyber-Physical Systems Modeling      3 (3+0)**

This course covers the principles of cyber-physical systems and their related components. It focuses on modeling, which includes design and analysis of cyber-physical system. Concepts of hybrid and dynamic systems as well as their effectiveness are discussed

### **SSK5221      Internet of Things      3 (3+0)**

This course covers technical aspects that are used in development, processing and managing Internet of Things paradigm. IoT services and related applications are also discussed

### **SSK5223      Pervasive Computing for Cyber-Physical System      3 (3+0)**

The course covers development techniques of pervasive computing application for cyber-physical system. It consists of software and hardware of the pervasive system platforms, their environments, and development approaches. The trends of pervasive application and its impacts on future computing applications and society are discussed

### **SSK5251      Data Analysis and Statistical Inference      3 (3+0)**

This course covers statistical methods and inference. Methods of effective data usage, collection, analysis and inference for real world phenomena are discussed

### **SSK5212      Big Data Technology      3 (3+0)**

This course covers the technical aspects that are used in processing and managing big data. The big data architecture and technologies for the collection, storage, integration, processing and applications of big data are discussed

**SSK5102      Big Data Computing****3 (3+0)**

This course covers the programming structures and algorithms for large-scale data processing and visualization. It includes the usage of big data eco-system for large-scale data storage and computation. Machine learning algorithm and data analytics are discussed

**SSK5500      Security in Computing****3 (3+0)**

This course covers protection methods against various attacks on legitimate users, including necessary actions to track, document, and prevent the threats. Awareness on security threats and vulnerabilities as well as best practices in computer security are discussed

**SSK5603      Machine Learning****3 (3+0)**

This course covers the concepts and types of machine learning namely supervised, unsupervised and reinforcement learning. Algorithms for pattern recognition, classification, optimization and complex neural network architecture are emphasized

**SSK5606      Advanced Natural Language Processing****3 (3+0)**

This course covers the concept of natural language modeling and processing using formal method. Syntactic and semantic decomposition besides approaches in knowledge and thinking representations are also discussed, including using the latest method, word embedding

**SSK5608      Evolutionary Computing****3 (3+0)**

This course covers theory and techniques in evolutionary computing including the adaptation of biological techniques. Optimization, modeling and simulation using different types of evolutionary algorithms in application domain are discussed

**SSK5611      Massive Data Mining****3 (3+0)**

The course covers knowledge discovery techniques for analyzing complex and massive data. Applications in mining various domain and data format are discussed

**SKR5302      Advanced Distributed Computing****3 (3+0)**

This course covers concept and technical requirements in developing distributed systems based on open system standards. Performance aspects in processing and management of distributed computing are discussed

**SKR5306      Advanced Computer Networks****3 (3+0)**

This course covers the latest and advanced concepts on local area network (LAN) and wide area network (WAN). This course also comprises explanation on computer network technology from several scopes that are wireless network, network security, multimedia network and network management. Network performance evaluation using quantitative model such as queue theory and flow-control mechanism are discussed

**SKR5308      Real-Time Systems****3 (3+0)**

This course covers the advanced topics of real-time systems in latest computing systems. It comprises explanation on the concepts and design for reliability, and fault-tolerance techniques that will be evaluated for its respective effectiveness

**SKR5501      Performance Modeling of Communication Networks****3 (3+0)**

This course covers the various aspects of modeling and simulation of wired and wireless communication networks highlighted for the purpose of performance evaluation comparison. Probability and queuing theories are used to evaluate the network simulation system performance. Concepts and elements for developing simulation system are discussed

**SKM5301      Advanced Computer Graphics****3 (3+0)**

This course covers graphics computer techniques, analyzing and shows the problem solving characteristics of developing the computer graphics. The solution can be done using algorithm as well as advanced modeling techniques

**SKM5303      Computer Vision****3 (3+0)**

This course covers computer vision concepts, image processing and pattern recognition. Analysis and decision making methods in solving problems related to computer vision are discussed

**SSK5989      Dissertation****10 (0+10)**

The course covers the preparation of proposal, implementation, development and writing of research dissertation related to computer science

## Suggested Study Scheme

### A) Three Semesters of Study:

#### YEAR 1

First Semester			Second Semester		
Code	Course Name	Credit/Status	Code	Course Name	Credit/Status
SSK 5090	Research Methods in Computer Science	3 YW	SSK5221	Internet of Things	3 YW
SSK5210	Empirical Methods in Computer Science	3 YW	SSK5212	Big Data Technology	3 YW
SSK5500	Security in Computing	3 YW	SKR5306	Advance Computer Network	3 YW
SSK5603	Machine Learning Elective I	3 YW 3 ELF	SSK5989	Elective II Dissertation	3 ELF 2(0+2)YW
<b>Total Credits</b>		<b>15</b>	<b>Total Credits</b>		<b>12</b>

*Note: SSK5989 Dissertation, 2 credit hours at semester-2 is for registration purposes only and does not count as total credit.*

#### YEAR 2

First Semester		
Code	Course Name	Credit/Status
	Elective III	3 ELF
SSK5989	Dissertation	8(0+8) YW
<b>Total Credits</b>		<b>13</b>



**B) Four Semesters of Study:****YEAR 1**

First Semester			Second Semester		
Code	Course Name	Credit/Status	Code	Course Name	Credit/Status
SSK5090	Research Methods in Computer Science	3 YW	SSK5212	Big Data Technology	3 YW
SSK5210	Empirical Methods in Computer Science	3 YW	SSK5221	Internet of Things	3 YW
SSK5603	Machine Learning	3 YW	SKR 5306	Advance Computer Network	3 YW
	Elective I	3 ELF			
	<b>Total Credits</b>	<b>12</b>		<b>Total Credits</b>	<b>9</b>

**YEAR 2**

First Semester			Second Semester		
Code	Course Name	Credit/Status	Code	Course Name	Credit/Status
SSK5500	Security in Computing	3 YW	SSK5989	Dissertation	8(0+8) YW
	Elective II	3 ELF			
	Elective III	3 ELF			
SSK5989	Dissertation	2(0+2) YW			
	<b>Total Credits</b>	<b>9</b>		<b>Total Credits</b>	<b>10</b>

*Note: SSK5989 Dissertation, 2 credit hours at semester-3 is for registration purposes only and does not count as total credit.*

**International students** may be required to register for the following courses in their first semester:

LPM2100 MALAY LANGUAGE COMMUNICATION (2 credits) and English course/PIE (12 credits)

Course registration: Maximum of 20 credits per semester and Minimum 6 credits

Course registration status: YW= Compulsory, ELF= Elective

Fees: - must be paid within TWO (2 weeks) of registration

- Late payment fees will prevent the student's access to course lecture notes and academic records. Also, the student's study status will change to DROPPED status.

## **CONTACT LIST**

### **Application for Admission:**

School of Graduate Studies  
Zone 4, Off Jalan Stadium  
Universiti Putra Malaysia  
43400 UPM Serdang  
Selangor Darul Ehsan  
MALAYSIA  
Tel: (603) 9769 4218 / 4223 / 4165 / 4169 / 4225  
Website: <http://www.sgs.upm.edu.my>

### **For further information on academic programmes, please contact:**

Faculty of Computer Science and Information Technology  
Universiti Putra Malaysia  
43400 UPM Serdang  
Selangor Darul Ehsan  
MALAYSIA  
Tel: (603) 9769 1742/ 1744/ 3091/3071  
Website: <http://www.fsktm.upm.edu.my>

Master Programme Coordinator  
(by coursework)  
Faculty of Computer Science and Information Technology  
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