KURIKULUM MTI 2024

SEMESTER	PERIODE	MATA KULIAH KELAS REGULER & ONLINE		SKS
1	1	Internet of Things (IoT)		4
		IT Risk Management and Audit		4
	2	IT Research Methodology		4
		STREAMING: DATA SCIENCE	**STREAMING: INFORMATION SECURITY MANAGEMENT**	
		Machine Learning	Network and Cyber Security	4
2	1	Pre Thesis		2
		STREAMING: DATA SCIENCE	**STREAMING: INFORMATION SECURITY MANAGEMENT**	
		Deep Learning and Its Applications	Enterprise Network	4
	2	Research Writing 1		1
		STREAMING: DATA SCIENCE	**STREAMING: INFORMATION SECURITY MANAGEMENT**	
		Business Intelligence and Analytics	Fundamental of Cyber Security	4
3	1	Research Writing 2		1
		Big Data Analytics / Free Electives		4
	2	Thesis		4
		Research Publication		4
TOTAL SKS				**40**

Semester I Periode 1

1. COMP8041041 - Internet of Things (IoT)

Course Description:
This course gives a foundation about data collection, connectivity, and analysis of information collected by computers everywhere. It will give a fundamental concept and practical application including the components, tools, and analysis in the core of internet of things

Topics:
- Application of IOT
- Cloud Computing
- Microcontroller
- Sensor
- Communication and Network
- Visualization IOT using Things Board.

Learning Outcomes:
On successful completion of this Course, students will be able to:
- LO1: Define concept and application Internet of things in organization, companies and industries.
- LO2: Applied Cloud Computing Service in organization, companies and industries.
- LO3: Applied microcontroller and sensor in system.
- LO4: Design architecture network for internet of thing

2. COMP8042041 - IT Risk Management and Audit

Course Description:
Information technology (IT) is no longer a tucked away department with little impact on day-to-day affairs. It is big business that's involved in almost every sector of the economy, and therefore carries some major risks. IT has become so integrated into our personal and professional lives that it touches upon almost everything we do. Due to its expansive influence, it is essential to talk about risk management and audit in IT. IT risk management is the application of risk management methods to information technology to manage the risks inherent in that space, while IT audit is an examination of the management controls within an IT infrastructure. This course will provide a comprehensive suite of knowledge of assessing IT Risk Management and Audit through policies and procedures development, thorough understanding of basic and applications of IT Risk Management and Audit. Principles and frameworks for risk and audit as part of IT risk management and audit will be discussed. As currently IT infrastructure is strategic for business sustainability and growth, disaster recovery plan is gaining importance in business entity. Beside, business continuity aspects will be discussed as the infrastructure disruption will have severe impact to the operations of the company.

Therefore a strong knowledge of IT risk management and audit should be part of IT professionals and management team.

Topics:
- Introduction to Risk Management
- Risk Concepts
- The Risk Management Structure
- Risk Management Assessment
- Risk Management Simulation
- Computer Forensics – Tools, Acquisitions, Analysis and validation
- Disaster Recovery and Business Continuity – Preparation, Operation and Maintenance
- Introduction to IT Auditing
- IT Auditing Techniques
- Frameworks, Standards, and Regulations in IT Auditing
- Case Study: Business Impact Analysis
- Auditing Controls to Protect Information Assets

Learning Outcomes:

On successful completion of this Course, students will be able to:
- LO1: Describe the fundamental concept of IT Risk Management and Auditing, and know its various frameworks/techniques of them.
- LO2: Describe the characteristics of various techniques of IT Risk Management and Auditing and understand how each of them works.
- LO3: Apply relevant frameworks/ techniques of IT Risk Management and Auditing according to individual cases/problems and perform evaluation.
- LO4: Analyse the results obtained from frameworks/ techniques of IT Risk Management and Auditing from several perspectives and able to provide suggestions to improve the system performance.
- LO5: Propose business continuity plan and IT auditing that can mitigate the IT infrastructure disruptions.

Semester I Periode 2

3. RSCH8079041 - IT Research Methodology

Course Description:
This course introduces the fundamental concept of how to conduct research. The emphasis is on quantitative research. It begins with getting and developing research idea and writing research proposal, which consist of defining research background, statement of problem, objective of the research, and research scope, conducting literature review, and developing research methodology. This course then covers methods of evaluating research results using statistical tools for data analysis, reporting research results through publication and technical presentation, and familiarizing students with plagiarism and fraud in scientific publications. At the end of this course, the student is expected to be able to propose, plan, and manage all research activities including the formulation of research objectives/hypotheses, research questions, literature review, data collection, data analysis, and research report in general.

Topics:
- Introduction to Research
- Getting and Developing Research Idea
- Thesis Guidelines
- Chapter Introduction
- Literature Review
- Choosing Research Design
- Methodology
- Statistical Tools for Data Analysis
- Data Science with R
- Reporting Research Results
- Publication and Technical Presentation
- Plagiarism and Fraud in Scientific Publications

Learning Outcomes:
On successful completion of this Course, students will be able to:
- LO1: Understand various aspects of research activities.
- LO2: Comprehend the importance of research to solve real life problems.
- LO3: Apply appropriate research methodology to achieve research goals
- LO4: Analyze the current advancements in the selected research field
- LO5: Evaluate the merit of the available solutions and discover their research problems
- LO6: Design new approaches that can solve the research problems.

4. COMP8043041 - Machine Learning

Course Description:
In the last decade, Information Technology has evolved rapidly. There are many tasks that required a lot of human intervention back then can currently be performed automatically by a machine. The machine learns to find specific patterns from data by itself. Human only provides an algorithm that is suitable for the task. By executing the algorithm, the machine builds several models representing such patterns. The process of building the models are known as Machine Learning, and it is part of a wider area called Artificial Intelligence. The models are then used to perform some specific tasks. Assisted by a computer, a large amount of data can be processed more easily and quickly. A deep analysis can then be carried out upon the outcome to support decision making in a company/organization. To achieve that purpose, this course will discuss the fundamental concept of machine learning and various machine learning techniques/algorithms covering all aspects from data preprocessing to evaluation and analysis. Understanding this course will help students enormously in preparing themselves for more advanced course offered next term, which is Deep Learning and Its Application.

Topics:
- Introduction to Machine Learning
- Data Exploration and Pre-processing
- Regression
- Classification
- Association Analysis
- Paper Review on Deep Learning
- Artificial Neural Networks (ANN)
- Support Vector Machines (SVM)
- Clustering and Mixture Models
- Recommender Systems
- Model Evaluation and Fusion
- Paper Review on Ensemble Learning

Learning Outcomes:
On successful completion of this Course, students will be able to:
- LO1: Able to explain the fundamental concept of Machine Learning and its various techniques/algorithms.
- LO2: Describe the characteristics of various Machine Learning algorithms and understand how each of them works, including the mathematical principles underlying the algorithms.
- LO3: Apply relevant Machine Learning algorithms according to individual cases/problems and perform evaluation.
- LO4: Analyse the results obtained from Machine Learning experiments from several perspectives.
- LO5: Able to propose suggestions to improve the system performance.

5. CPEN8005041 - Network and Cyber Security

Course Description:
This course is for IT managers, Network practitioners professional. The course is divided into two parts. In the first part, the course introduces the concept of data communication network such as architecture, structure, functions, components, and models of the Internet and other computer networks. It explain the OSI layered models to examine the nature and roles of protocols and services at the application, network, data link, and physical layers. For a network to function effectively, sound planning, design and management are required. In this course, students will examine the design considerations and management aspects of a data network. The second part of this course is designed to understand computer security through experiment. It shows the educational benefit from computer break-ins through capturing ever-changing penetration line of attack such as botnets, worms, and malware. Students install a computer system on a network and observe what happens to it, learn which vulnerabilities adversaries are using. The observed methods of operations by these intruders might even be some of which we are unaware. If the system serves no other purpose, then every attempt to contact it seems suspect. If the system is attacked, the students learned methods of identifying the actors and evaluate their actions that can be of novel techniques. These are further analyzed to exhibit the impact of the incident on the victim organization.

Topics:
- Introduction to the Fundamental of Cyber Security
- Application Layer Functionality and Protocols
- Transport Layer
- Network Layer
- Data Link and Physical Layer
- Network and Computer Attack
- Concept of Attacker
- TCP/IP Concept Review
- Internet Security Protocols and Tools
- Cryptography

Learning Outcomes:
On successful completion of this Course, students will be able to:
- LO1: Apply layered communication architectures (OSI and TCP/IP).
- LO2: Explain key networking concepts, principles, design issues and techniques at all protocol layers.
- LO3: Describe the Internet architecture, relevant features of TCP/IP protocols, and unique characteristics of Ethernet and Wireless LANs.
- LO4: Define exploit techniques out of a given vulnerability.
- LO5: Identify web application vulnerabilities.

- LO6: Apply defense methods to web systems using the knowledge of cryptography and network security

Semester II Periode 1

6. RSCH8124041- Pre-Thesis

Course Description:
This course aims to equip students with the skills needed to write and present research proposals effectively. By the end of the course, students are expected to be proficient in writing an introduction, formulating research problems, defining research objectives, and outlining the benefits and scope of their research. Additionally, students will learn to write a theoretical basis and conduct a literature review. Upon completing their proposals, students will also be able to provide a research framework, outline research steps, and create a research schedule.

Streaming : Data Science

7. COMP8044041 - Deep Learning and Its Applications

Course Description:
This course introduces the building blocks of deep learning and provides overview of various deep learning architectures. It also demonstrates how to solve real-world problems using a practical approach. Deep learning has been shown to outperform other machine learning models in a variety of research fields and applications. This course begins with introducing the concept of deep learning and its building blocks. It then addresses some deep learning models and its applications, such as deep learning for computer vision, deep learning with sequential data, generative networks, and modern network architectures in computer vision and text analysis. Through this course, students will explore the application of the deep learning model in solving real-world engineering problems such as computer vision, text analysis, dan audio processing. The students will also be introduced to the latest advancements and research challenges of deep learning. To equip the students with practical experiences, this course is also enriched by hands-on implementations of deep learning models using PyTorch and Jupyter Notebook.

Topics:
- Getting Started with Deep Learning
- Building Blocks of Neural Networks
- Diving Deep into Neural Networks
- Fundamentals of Machine Learning
- Convolutional Neural Networks
- Deep Learning with Sequential Data
- Text Classification • Generative Networks
- Modern Network Architectures in Computer Vision
- Modern Network Architectures in Text Analysis
- Deep Learning for Computer Vision
- A Journey into Soun

Learning Outcomes:
On successful completion of this Course, students will be able to:

- LO1: Identify various building blocks of deep learning.
- LO2: Comprehend the importance of deep learning in solving real life problems.
- LO3: Apply appropriate deep learning architectures for various applications.
- LO4: Analyze the architectures and performances of deep learning models.
- LO5: Evaluate the advancements and challenges in deep learning research.
- LO6: Design new approaches that can improve the deep learning performances.

Streaming: Information Security Management

8. CPEN8006041 - Enterprise Network

Course Description:
For a network to function effectively, sound planning, design and management are required. In this course, students will examine the design considerations and management aspects of a data network. This course is for IT managers, Network practitioners or other professionals, who would like to have a deeper understanding of network design, management, and the associated technologies. Specifically, it is intended for individuals who are preparing for careers in the data network management field, but who do not have prior academic backgrounds in telecommunication studies or technical work experience in the telecommunications field but have some basic knowledge on telecommunications. The basic information presented in this course will enable those individuals to pursue further specialized training in specific technology areas with the eventual goal of qualifying for work as a network management professional.

Topics:
- Analysing Business and Technical Requirements
- Characterizing the Networks
- Designing Network Topology
- Designing Models for Addressing and Naming
- Selecting Switching and Routing Protocols
- Developing Network Security Strategies
- Developing Network Management
- Selecting Technologies and Devices for Enterprise Networks
- Testing the Network Design
- Optimizing the Network Design
- Documenting the Network Design
- Final Project

Learning Outcomes:
On successful completion of this Course, students will be able to:
- LO1: Analyze review of current technical and research literature on a range of networking topics.
- LO2: Establish an organization's networking needs.
- LO3: Elaborate a detailed knowledge of emerging network technologies.
- LO4: Combine detailed skills and knowledge of network design, security and management.

- LO5: Adapt as a professional practitioner and a creative thinker who is able to contribute to the enterprise organization's networking requirements.

Semester II Periode 2

9. RSCH8132041 - Research Writing 1

Course Description:
This course will provide a comprehensive suite of knowledge of technical report. The main purpose of this course is to help students of the sciences in all disciplines to prepare manuscripts that are proper to the standard technical report. The purpose of seminar 1 is to make a technical report which will be used as material for thesis writing. Some of these topics include: write a good technical report, getting results from the implementation, how to get results and discussion from implementation and how to make conclusion and future works.

Topics:
- Write a good technical report.
- Getting results from the implementation.
- How to get results and discussions.
- Make discussion and future works.

Learning Outcomes:
On successful completion of this Course, students will be able to:
- LO 1: Applying how to write a general technical report.
- LO 2: Applying concept of technical report Distinguish between data and signals, and cite the advantages of digital data and signals over analog data and signals
- LO 3: Write a good technical report List the primary function, activities, and application areas of a local area network and distinguish local area networks, metropolitan area networks, and wide area networks from each other
- LO 4: Present the resultsUnderstand management aspects of computer networks and the ways to conduct management activities over communication network.
- LO 5: Evaluate a general technical report

Steaming: Data Science

10. COMP8047041 - Business Intelligence and Analytics

Course Description:
The primary focus of this course is on Data Warehousing and its applications to business intelligence. The course will concentrate on topics like: requirements gathering for data warehousing, data warehouse architecture, dimensional model design for data warehousing, physical database design for data warehousing, extracting, transforming, and loading strategies, introduction to business intelligence, design and development of business intelligence applications, expansion and support of a data warehouse.

Topics:
- Introduction to Data Warehouse
- Basic concepts of Data Warehouse
- Data Warehouse development

- Requirement's collection
- Dimensional modelling
- Designing dimensional model
- Physical database design
- Introduction to ETL (Extract Transform Load)
- ETL design and development
- Business intelligence applications
- Business intelligence dashboard
- Business intelligence application development

Learning Outcomes:
On successful completion of this Course, students will be able to:
- LO1: Explain basic concepts of Data Warehouse, Data Warehouse development, architecture, and business intelligence applications.
- LO2: Design a dimensional and physical model for data warehouse.
- LO3: Comprehend ETL strategies
- LO4: Design and develop business intelligence applications.

Streaming: Information Security Management

11. COMP8046041 - Fundamental of Cyber Security

Course Description:
The course focuses on computer network and cyber security. The course made to embrace new and more agile computing and information security and security of computer network, also cover mobile and online social network. It delivers all material regarding computer network security fundamental, security threat to computer network, and computer network vulnerabilities. It also delivers how to script in computer network security, assess, and analyze the security in computer network. In advance, it talks about computer and network forensics, cybercrimes, security in cloud computing technology and internet of thing (IoT) and also blockchain, and cyber law and cyberwarfare.

Topics:
- Computer network security fundamental
- Security threat and threat motives to computer networks and computer network vulnerabilities
- Scripting and security in computer networks and web browser
- Security assessment, analysis, and assurance
- Access control, authorization, authentication, and cryptography
- Computer and network forensics
- Cybercrimes and hackers
- Virtualization and cloud computing technology security
- Internet of things (IoT) security •
- Blockchains, cryptocurrency, and security consideration
- Cyber law and cyberwarfare

Learning Outcomes:

On successful completion of this Course, students will be able to:
- LO1: Identify a network vulnerabilities and cyber security
- LO2: Propose a conceptual mitigation for cyber security
- LO3: Apply the cyber security and report the investigation result
- LO4: Design a method for mitigating the cyber security based on investigation result
- LO5: Evaluate a cyber-based secure business opportunity

Semester III Periode 1

12. RSCH8133041 - Research Writing 2

Course Description:
This course will provide a comprehensive suite of knowledge of writing a scientific article. The main purpose of this course is to help students, scientists, and researcher of the sciences in all disciplines to prepare manuscripts that will have a high probability of being accepted for publication and of being completely understood when they are published. The goal of scientific research is publication and the other hand, the requirements of journals vary widely from discipline to other discipline, therefore, in this course present certain basic principles that are accepted in most disciplines. Some of the topics include introduction to write and publish paper including how to write title, abstract and keywords, how to write introduction & related works, how to prepare research framework, theory background, methods & proposed methods, how to prepare good results & discussion and how to make good conclusion & future works, acknowledgement, references & citation and supplementary material. In addition, this course also covers how to select and publish to Journal.

Topics:
- Introduction To Write and Publish a Paper
- Introduction & Related Works and Research Framework: Theory & Methods and Proposed Method
- Results & Discussion
- Conclusion & Future Works, Acknowledgement, References & citation, and Supplementary Material
- Selecting and Publish to Journal

Learning Outcomes:
On successful completion of this Course, students will be able to:
- LO 1: Apply concept of scientific
- LO 2: Write a general academic paper and publication.
- LO 3: Write a good scientific article
- LO 4: Present the results research
- LO 5: Evaluate general scientific research and publication.

13. COMP8035041 - Big Data Analytics

Course Description:
Study underlying principles of storage and processing massive collections of data, typical of today's Big Data systems. The topics covered will inlcude techiques and paradigms for querying and processing massive data sets (MapReduce, Hadoop, SQL for data analytics, stream processing), fundamentals of scalable data storage (NoSQL data bases such as MongoDB, Cassandra, HBase), working with dynamic web data (data acquisition, data formats), elements of cloud computing, and applications to real world data analytics and data mining problems (sentiment analysis, social network mining).

Topics:
- Introduction to Big Data
- Data Science: Getting Value out of Big Data
- Big Data Foundation
- Big Data Modeling
- Big Data Management Systems
- Big Data Integration
- Big Data Processing
- Spark Machine Learning Library
- Introduction to Graphs
- Graph Analytics for Big Data

Learning Outcomes:
On successful completion of this Course, students will be able to:
- LO 1: understand market and business drivers for big data, big data landscape, characteristics, and how it will impact to business
- LO 2: identify big data issue to analyze, explain how to collect, store, and organize data using big data solution and recognize different data elements in everyday life problems also select the right data model and operation to suit data characteristics
- LO 3: design, develop, and evaluate an end-to-end analytics solution combining large-scale data storage and processing frameworks
- LO 4: design an approach to leverage data using the steps in the machine learning process and analyze big data problem using scalable machine learning algorithm
- LO 5: design model for a problem into graph database and perform analytical over the graph in scallable manner
- LO 6: build effective visual representation to provide better insight from big data

Semester III Periode 2

14. RSCH8125041 - Thesis

Course Description:
This course aims to guide students in completing their thesis. After finishing their thesis proposal, students must work on the results, discussions, conclusions, and future work sections. Once their thesis is complete, students will present their research findings to a board of examiners.

15. RSCH8168041 - Research Publication

Course Description:
In this course, students are required to submit their research papers to Scopus-indexed journals, Sinta 1, or Sinta 2. Grades will be assigned by the course lecturers or the SCC. Upon acceptance of their research papers, students will be eligible for graduation.