Subject Description Form

Subject Code	COMP4436
Subject Title	Artificial Intelligence of Things
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	**Pre-requisite**: COMP1011/COMP1012/ENG2002
Objectives	Students will learn the concepts and principles of AI empowered IoT. This subject teaches students the fundamentals and AIoT technology, covering concepts, methods, techniques, systems and applications. Students are expected to have preliminary background in computer programming, and AI. Students will be able to understand the fundamentals of AIoT, develop AIoT systems and apply AIoT to real-world applications.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) Understand the fundamental concepts, technical challenges, and the state-of-the-art technology development and applications of AIoT; (b) Understand the protocols and platforms for sensing, networking and data analytics in IoT systems; (c) Learn and deploy the AI models, algorithms and techniques for IoT operation efficiency, cost reduction, event detection, and predictive maintenance in practice. (d) Discover potential AI-oriented usage scenarios in IoT and apply AIoT methods and techniques to solve various challenging IoT problems for practical applications with innovative solutions.
Subject Synopsis/ Indicative Syllabus	**Fundamentals** • **Introduction to IoT**: IoT applications, sensor systems, IoT sensing techniques, IoT networking, IoT Data analytics, IoT platforms and systems • **Introduction to AIoT**: AIoT concepts and issues, Technologies behind AIoT, AIoT application segments. **Advanced topics** • Technical architecture of AIoT • Smart sensors and devices; Wearables; Smart object and human sensing • Challenges of AI in networks for IoT • AI for IoT data analytics and automation

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- Distributed intelligence at the edge of IoT systems (edge computing; blockchain, etc.)
- Robotics for AIoT

<u>Applications</u>

- Intelligent manufacturing; Smart health; Smart infrastructure and construction.

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<tr><td>Teaching/Learning Methodology</td><td>

The course is comprised of lectures, tutorials, and labs. During lectures, students are taught the important concepts, principles and technologies that drive the development of AIoT.

During tutorials and labs, students will be presented with both theoretical questions and practical scenarios of AIoT, and are required to study, analyze and propose solutions. Small group discussions will be encouraged and students will need to present their results and solutions in the form of reports and presentations.

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<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>

<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Assignments</td><td>10%</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>2. Quizzes</td><td>25%</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>3. Project</td><td>25%</td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>4. Exam</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="4"></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Students will be assessed by their performance in four parts: assignments, quizzes, project, and examination.

Assignments are written homework and/ or programming homework that assess students' abilities for comprehension of concepts and principles, algorithm design, and problem-solving.

Quizzes are conducted in person. These quizzes enhance students' understanding of time bound real-life situations and assess their problem-solving skills.

Projects involve a group of students to design and implement a solution for a practical AIoT application. Students collaboratively work together to apply what they have learned in the class to solve practical problems. The results are to be presented in the form of reports and / or presentations.

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	Exam is designed to assess students for their critical thinking skills and independent problem-solving ability.	
Student Study Effort Expected	Class contact:	
	▪ Lecture	26 Hrs.
	▪ Tutorial / Seminar / Lab	13 Hrs.
	Other student study effort:	
	▪ Self-study & reading, etc.	83 Hrs.
	Total student study effort	122 Hrs.
Reading List and References	**Reference Books:** 1. "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", by Francis DaCosta. Publisher: Apress. 2013. 2. "Internet of Things", by Vlasios Tsiatsis Stamatis Karnouskos Jan Holler David Boyle Catherine Mulligan. Publisher: Elsevier. 2nd edition. 2018. 3. "Big-Data Analytics for Cloud, IoT and Cognitive Computing", by Kai Hwang and Min Chen. Publisher: Wiley. 2017. 4. "Hands-On Artificial Intelligence for IoT: Expert machine learning and deep learning techniques for developing smarter IoT systems", by Amita Kapoor. Publisher: Packt Publishing Ltd. 2018. 5. "AIoT Innovation", ed. Fadi AI-Turjman. Publisher: Springer. 2020 6. "The Future of Artificial Intelligence, the Internet of Things, and Blockchain: From AI to AIoT to AIoTB". By Eugene Chang. Publisher: Amazon. 2019.	