Title (Units): **COMP3065 AI Application Development (3,2,2)**

Course Aims: This course aims to equip students with knowledge and skills in the design and development of AI applications to foster innovation using up-to-date software development tools and cloud platforms. Students will go through the whole AI application development cycle through group projects.

Prerequisite: COMP3057 Introduction to AI & ML

Course Intended Learning Outcomes (CILOs):
Upon successful completion of this course, students should be able to:

No.	Course Intended Learning Outcomes (CILOs)
	Knowledge
1	Describe various machine learning algorithms for AI applications
2	Describe the development lifecycle of AI applications
3	Explain the principles of AI for IoT applications
	Professional Skill
4	Collect data from Internet and perform data preprocessing
5	Identify suitable machine learning models for AI applications
6	Develop software programs to effectively train machine learning models for AI applications
7	Deploy trained machine learning models for AI applications

Calendar Description: This course aims to equip students with knowledge and skills in the design and development of AI applications using up-to-date software development tools and cloud platforms. Students will go through the whole AI application development cycle through group projects.

Teaching and Learning Activities (TLAs):

CILOs	Type of TLA
1, 2, 3	Students will attend lectures to learn the knowledge of AI application development.
1 - 7	Students will attend laboratory sessions and work on programming assignments to consolidate and apply what they have learnt.
4, 5, 6, 7	Students will work on group projects to go through the lifecycle of AI application development.

Assessment:

No.	Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
1	Continuous Assignments	40%	1 - 7	Assignments and lab exercises are designed to measure how well students have learned the fundamental skills in AI application development.
2	Group project of AI application design and development	60%	1 - 7	Group project to evaluate students' creativity and practical skills of AI application development. Both individual assessment and group assessment will be included.

Assessment Rubrics:

Excellent (A)	• Achieve all CILOs, demonstrating proficiency in modern AI and machine learning techniques • Able to design and implement effective AI solutions to various applications, conduct proper evaluations, and refine the AI solutions

	• Able to effectively train various machine learning models with modern hardware and software platforms • Able to effectively deploy various machine learning models for different user platforms
Good (B)	• Achieve most of the CILOs, demonstrating a good mastery of modern AI and machine learning techniques • Able to design and implement good AI solutions to various applications and conduct proper evaluations • Able to correctly train many types of machine learning models with modern hardware and software platforms • Able to correctly deploy many types of machine learning models for different user platforms
Satisfactory (C)	• Achieve some of the CILOs, demonstrating a basic level of understanding of modern AI and machine learning techniques • Able to design and implement reasonable AI solutions to various applications and conduct proper evaluations • Able to correctly train some types of machine learning models with modern hardware and software platforms • Able to correctly deploy some types of machine learning models for some user platforms
Marginal Pass (D)	• Achieve few of the CILOs, with minimal understanding of modern AI and machine learning techniques • Able to design and implement acceptable AI solutions to some simple problems and conduct simple evaluations • Able to correctly train a few types of machine learning models with some hardware and software platforms • Able to correctly deploy a few types of machine learning models for some user platforms
Fail (F)	• Achieve none of the CILOs, with little understanding of modern AI and machine learning techniques • Unable to design and implement proper AI solutions to simple problems • Unable to correctly train simple machine learning models • Unable to correctly deploy simple machine learning models

Course Content and CILOs Mapping:

Content		**CILO No.**
I	Programming for AI Applications	1, 4, 5, 6, 7
II	AI Software Engineering	2, 4, 5, 6, 7
III	AI for IoT	3, 4, 5, 6, 7
IV	AI Group Project with one or more of the following selected topics:	1, 2, 4, 5, 6, 7

References:

- Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition, 2019
- Eli Stevens, Luca Antiga, and Thomas Viehmann, Deep Learning with PyTorch, Manning Publications, 2020
- Amita Kapoor, Hands-on Artificial Intelligence for IoT: Expert Machine Learning and Deep Learning Techniques for Developing Smarter IoT Systems, Packt Publishing, 2019
- V Kishore Ayyadevara, Yeshwanth Reddy, Modern Computer Vision with PyTorch, Packt Publishing, 2020

- Sowmya Vajjala, Bodhisattwa Majumder, Anuj Gupta, Harshit Surana, Practical Natural Language Processing, O′ Reilly, 2020
- Arjun Panesar, Machine Learning and AI for Healthcare, 2nd Edition, Apress, 2020

Course Content:

Topic

I. Programming for AI Applications
   A. Data Collection and Preprocessing
   B. Training of Machine Learning Models
   C. Evaluation of Machine Learning Models
   D. Deployment of Machine Learning Models
   E. GPU Computing and Distributed Computing for AI

II. AI Software Engineering
   A. AI Software Development Lifecycle
   B. Data Management for AI
   C. Cloud and Edge Computing for AI

III. AI for IoT
   A. Foundations of IoT
   B. AI for Industrial IoT
   C. AI for Smart Cities IoT

IV. AI Group Project with one or more of the following selected topics:
   A. Computer Vision
   B. Natural Language Processing
   C. AI in Healthcare