| Title (Units): | **COMP2035 AI and Data Analytics for Health and Social Innovation I (3,1,2)** |

Course Aims: The aim of this course is to present students the key concepts of existing AI and data analytics technologies and gain hands-on experiences of applying them to deal with problems related to health and social well-being. Students are expected to go through the machine learning process life-cycle, identify the technical and non-technical deficiencies of the existing solutions, and suggest solutions. In parallel, students will get in contact with NGO partners and stakeholders to develop empathy, discover challenges and opportunities, and propose ideas to tackle those challenges, so that they can continue to work on them in COMP2036 AI and Data Analytics for Health and Social Innovation II.

Prerequisite: Nil

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 the critical challenges in healthcare and social well-being.
2	Explain how AI and data analytics technologies acquired can tackle the real-world problems in health and social well-being.
	Professional Skill
3	Apply the AI and data analytics models and platforms for data acquisition and cleaning, data analytics, model development and implementation to solve problems.
4	Analyze systemically the potential deficiencies of current computational solutions and how they can be improved.
5	Apply human-centric design based on the need of targeted groups.

Calendar Description: This interdisciplinary Computer Science course provides an introduction to the present and historical problems in health and social well-being, and shows how to apply computational methodologies to solve them. It encourages and inspires the students to identify the deficiencies of current methodologies and develop empathy towards targeted groups. It offers students opportunities to practice the concept, develop new insights and methods and turn them into practical problem-solving applications in the aimed fields.

Teaching and Learning Activities (TLAs):

CILOs	Type of TLA
1-2	Lectures will be given to introduce 1. the historical and current challenges in healthcare and social well-being; and 2. AI and data analytics technologies and platforms can be potentially used to deal with these problems. Labs will be used to help students identify the new possibilities of the computational technologies to tackle various challenges.
3-4	Lab sessions will be arranged to help the students better understand the implementation of these computational technologies using the available platforms and inspire students to improve the potential deficiencies of current solutions.
5	Visits will be arranged to guide students to develop empathy towards the targeted groups and discuss opportunities.

Assessment:

No.	Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
1	Lab Exercises	50%	1-4	Lab Exercises are used to test whether students acquire computational and software skills.

2	Case Study Projects	30%	1-4	Case Study Projects are used to test how well students understand and apply the concepts and skills to perform analysis on cases.
3	Visit reports and presentations	20%	1,2,5	Visit reports and presentations will test how well students develop empathy towards the targeted groups.

Assessment Rubrics:

Excellent (A)	• Achieve all five CILOs, demonstrating a good mastery of both computational techniques and the related real world problems in the selected themes • Able to develop correct solutions to problems in the selected themes • Demonstrate a thorough understanding and solid knowledge of the selected themes • Able to identify the critical problems of the current solutions and apply a variety of techniques and relevant knowledge to improve them for the selected themes
Good (B)	• Achieve most of the five CILOs, demonstrating a good understanding of both computational techniques and the related real world problems in the selected themes • Able to develop correct solutions to problems in the selected themes • Demonstrate a competent level of knowledge of the selected themes • Able to identify the existing problems of the current solutions and apply appropriate techniques and relevant knowledge to improve them for the selected themes
Satisfactory (C)	• Achieve some of the five CILOs, demonstrating a basic level of understanding of both computational techniques and the related real world problems in the selected themes • Able to develop acceptable solutions to problems in the selected themes • Demonstrate an adequate level of knowledge of the selected themes • Able to recognize the rationale of the current solutions and apply some techniques and relevant knowledge to implement them for the selected themes
Marginal Pass (D)	• Achieve few of the five CILOs, with minimal understanding of both computational techniques and the related real world problems in the selected themes • Able to provide solutions to simple problems in the selected themes • Demonstrate a basic level of knowledge of the selected themes • Able to understand the basic thought of some current solutions and apply some techniques and relevant knowledge to implement them for a limited number of selected themes
Fail (F)	• Achieves less than three of the CILOs, with little understanding of the computational techniques and the related real world problems in the selected themes • Unable to provide solutions to simple problems in the selected themes • Knowledge related to the selected themes falling below the basic minimum level • Unable to apply techniques or knowledge to the selected themes

Course Content and CILOs Mapping:

	Content	CILO No.
I	Introduction to historical and present problems in healthcare and human social well-being	1,4,5
II	Introduction to AI and data analytics methodologies	2-4
III	Theme-based teaching and labs on the current computational methodologies applied on healthcare and human social well-being problems E.g. • How chatbot help diagnose the mental disease and improve the mental health? • AI-based automatic alarm system for seniors living alone. • How AI used to translate text to voice for communicating with blinding people • How the intelligent navigation system help drivers find the best routes	1-5

References:

- Chee-Peng Lim, Ashlesha Vaidya, Kiran Jain, Virag U. Mahorkar, Lakhmi C. Jain. Handbook of Artificial Intelligence in Healthcare. Springer Nature UK, 2021.
- Michael Chui, Martin Harryson, James Manyika, Roger Roberts, Rita Chung, Ashley van Heteren, Pieter Nel. Notes from the AI frontier: Applying AI for social good. Mckinsey Global Institute 2018.

Course Content:

Topic

I.   Introduction to historical and present problems in healthcare and human social well-being
     A. Mental Health
     B. Clinical Image
     C. Disabilities
     D. Environment
     E. Traffic
     F. Education
     G. Aging population

II. Introduction to AI and data analytics methodologies
     A. Deep Learning
     B. Machine Learning
     C. Natural Language Processing
     D. Computer Vision
     E. Data analytics pipeline (including data preprocessing, visualization et al.)

III. Theme-based teaching and labs on the current computational methodologies applied on healthcare and human social well-being problems E.g. • How chatbot help diagnose the mental disease and improve the mental health? • AI-based automatic alarm system for seniors living alone. • How AI used to translate text to voice for communicating with blinding people • How the intelligent navigation system help drivers find the best routes
     A. Natural Language understanding
        Natural Language generation
        Application: Chatbot to interact with clients e.g. people in need

     B. Object detection
        Image classification and Neural Network

Application: garbage classification to recognize recyclable waste

C. Speech Recognition
   Speech Generation
   Application: AI-based instant message apps to translate text to
voice for communicating with blinding people

D. Body posture capture by sensor
   AI-powered posture training
   Application: AI-based automatic alarm system for seniors living
alone