Title (Units): **ITEC2025 AI and Data Analytics for Humanities (3,1,2)**

Course Aims: This course introduces students to AI and data analytics technologies, focusing on practical applications to enhance well-being and quality of life in social and healthcare domains. Students will engage in the machine learning lifecycle, utilize modern AI platforms and tools, and explore relevant models. The course incorporates fundamental mathematical concepts to strengthen technical understanding. Through hands-on coding tasks and assessments, students will develop practical skills, identify deficiencies in existing solutions, and propose innovative, data-driven ideas to foster flourishing lives.

Prerequisite: COMP1007 Introduction to Python and its Applications, OR
COMP1025 Coding for Humanists, OR
ITEC1017 Coding for Creatives

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 key challenges in fostering well-being and quality of life, such as in social and health domains.
2	Explain how AI, data analytics, and fundmental mathematical concepts contribute to data-driven solutions for flourishing lives.
	Professional Skill
3	Apply AI and data analytics models and platforms for data acquisition, cleaning, analytics, and model development to address real-world challenges (such as those in the social and healthcare domains).
4	Analyze opportunities in current computational solutions and propose improvements using appropriate techniques.

Calendar Description: This course introduces students to AI and data analytics technologies, focusing on practical applications to enhance well-being and quality of life in social and health domains. Students will engage in the machine learning lifecycle, utilize modern AI platforms and tools, and explore relevant models. The course incorporates fundamental mathematical concepts to strengthen technical understanding. Through hands-on coding tasks and assessments, students will develop practical skills, identify deficiencies in existing solutions, and propose innovative, data-driven ideas to foster flourishing lives.

Teaching and Learning Activities (TLAs):

CILOs	Type of TLA
1-2	Lectures: introduce challenges in fostering well-being and quality of life, foundations of AI/data analytics methodologies, and mathematical concepts (e.g., linear algebra).
3-4	Lab sessions: focus on implementing AI models, data tools, and applying mathematical concepts to real-world challenges.

Assessment:

No.	Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
1	Coding Lab Exercises	40%	1-4	Coding tasks to test proficiency in AI/data analytics tools and mathematical applications.
2	Case Study Projects	20%	1-4	Projects to evaluate students' ability to apply AI concepts and tools to analyze and solve real-world challenges.
3	Final Examination	40%	1-4	A written exam to assess understanding of AI, data analytics, mathematical concepts, and their applications to social and health challenges.

Assessment Rubrics:

Excellent (A)

- Achieve all five CILOs, demonstrating mastery of AI tools, mathematical concepts, and domain-specific challenges.
- Develop robust, data-driven solutions to complex problems using modern AI platforms and tools.
- Show thorough understanding and innovative improvements to existing solutions.

Good (B)

- Achieve most CILOs, demonstrating competent use of AI tools and understanding of domain challenges.
- Develop correct solutions to problems with appropriate techniques.
- Identify deficiencies in current solutions and suggest relevant improvements.

Satisfactory (C)

- Achieve some CILOs, showing basic proficiency in AI tools and domain knowledge.
- Develop acceptable solutions to simpler problems.
- Recognize the rationale behind current solutions and apply basic techniques.

Marginal Pass (D)

- Achieve few CILOs, with minimal understanding of AI tools and domain challenges.
- Provide basic solutions to simple problems.
- Show limited ability to apply techniques or improve solutions.

Fail (F)

- Achieve fewer than three CILOs, with little understanding of AI tools or domain challenges.
- Unable to provide solutions to problems.
- Lack basic knowledge and application skills.

Course Content and CILOs Mapping:

Content		**CILO No.**
I	Fundamental Mathematical Concepts	2-4
II	Core AI and Data Analytics Methodologies	2-4
III	Applications of AI	2-4
IV	Theme-based Labs	1-4

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.

• Goodfellow, Ian, Yoshua Bengio, and Aaron Courville. Deep Learning. MIT Press, 2016 (selected chapters for deep learning concepts).

Course Content:

<u>Topic</u>

I. Fundamental Mathematical Concepts
   A. Linear Algebra Concepts for AI

II. Core AI and Data Analytics Methodologies
   A. Machine Learning
   B. Deep Learning
   C. Data Analytics Pipeline (data preprocessing, visualization)

III. Applications of AI
   A. Fundamental Computer Vision (e.g., CNNs)
   B. Fundamental Natural Language Processing (e.g., RNNs)

IV. Theme-based Labs
   A. Basic chatbots for mental health support
   B. Image classification for healthcare and/or medical applications (e.g., using CNNs)
   C. Interactive dashboards for education (Streamlit)
   D. AI-driven applications for social good and/or human floruishing