COURSE SPECIFICATION DOCUMENT

Academic Department:	Science, Innovation & Technology
Programme:	Software Engineering (AI)
***FHEQ* Level:**	6
Course Title:	Generative AI
Course Code:	SENG 6102
Total Hours	160
Timetabled Hours:	45
Guided Learning Hours:	15
Independent Learning Hours:	100
Credits:	16 UK CATS credits 8 ECTS credits 4 US credits

Course Description:
This course offers a progressive approach to generative AI (Gen AI), starting with essential machine learning and deep learning principles before delving into advanced generative models like GANs and transformer-based architectures. Students will build skills in model design, implementation, and evaluation, equipping them for applications such as image synthesis, language generation, and more. The course utilises Python and libraries like PyTorch and TensorFlow.

Prerequisites:
70 credits + COMP 4101 Introduction to Programming

Aims and Objectives:
The course aims to develop students' comprehensive understanding of Gen AI by building a strong foundation in machine learning and deep learning. By gradually progressing to complex generative models, students gain both the theoretical knowledge and practical skills needed to implement and evaluate Gen AI solutions.

Programme Outcomes:
SWE: AI, AII, BI, BIII, CII, CIII, DIII

A detailed list of the programme outcomes are found in the Programme Specification.

This is located at the archive maintained by Registry and found at:
https://www.richmond.ac.uk/programme-and-course-specifications/

Learning Outcomes:
By the end of this course, successful students should be able to:

- Critically analyse machine learning concepts, including supervised and unsupervised learning.
- Apply deep learning methodologies to complex, real-world problems, selecting and justifying the use of advanced neural network architectures
- Design and implement generative models (e.g., GANs, VAEs, transformers) for various applications.
- Critically assess the ethical and societal implications of generative AI technologies.
- Compare and evaluate the performance of different generative AI models for specific tasks.

Indicative Content:

- Machine Learning
- Advanced Deep Learning Concepts
- Generative AI Models
- Generative Adversarial Networks
- Transformer Models
- Large Language Models
- Application and Ethics of GenAI

Assessment:
This course conforms to the University Assessment Norms approved at Academic Board and located at: https://www.richmond.ac.uk/university-policies/

Teaching Methodology:
This course will be delivered face to face through a combination of lectures and interactive sessions. In addition to classroom activities, there are guided learning elements that are tutor led and arranged through Blackboard. These activities can be asynchronous online sessions, flipped classrooms, set readings with discussion boards or set guest lectures for example. Set activities are monitored by the instructor to ascertain student engagement. Students are encouraged to prepare for class and to play an active part, to raise questions, following-up ideas and interact with a wide range of provided material.

Indicative Text(s):

- Chollet, F., (2021) *Deep Learning with Python*. 2nd edn. Shelter Island: Manning Publications.
- Geron, A., (2022) *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow.* 3rd edn. Sebastopol: O'Reilly Media

- Goodfellow, I., Bengio, Y. and Courville, A. (2017). *Deep Learning.* Cambridge: MIT Press.

Supplementary Reading:

- Liao, S. (2020) *Ethics of Artificial Intelligence.* Oxford: Oxford University Press.
- Russell, S. and Norvig, P. (2020) *Artificial Intelligence: A Modern Approach.* 4th edn. Harlow: Pearson.

Journals/Additional Texts

Kelleher, J., (2019). *Deep Learning*. Boston: MIT Press.
Kulkarni, A., (2021). *Natural Language Processing Projects.* New York: Apress.

Online resources:

Open AI. Available at: https://www.openai.com/blog (Accessed: November 2024).

See syllabus for complete reading list

Change Log for this CSD:

Nature of Change	Date Approved & Approval Body (School or AB)	Change Actioned by Registry Services
First Edition	Nov 2024	