Module Descriptor

Title	Generative AI: Theory and Applications		
Session	2025/26	**Status**	Published
Code	COMP11138	**SCQF Level**	11
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	Jacob Koenig		

Summary of Module

The primary objective of this module is to provide a comprehensive understanding of Generative Artificial Intelligence (AI) by blending theoretical concepts with hands-on practical skills. Students will explore the fundamentals of generative models, gaining insights into key technologies such as neural networks, variational autoencoders (VAEs), generative adversarial networks (GANs), transformers, and large language models (LLMs).

Throughout the module, students will learn how Generative AI works, how to design and develop AI-generated content, and how to deploy applications using cloud platforms and open-source tools. Practical sessions will focus on text, image, audio, and video generation, as well as the fine-tuning of models for domain-specific tasks.

Beyond technical proficiency, this module will address the ethical, societal, and regulatory challenges associated with Generative AI, including bias, misinformation, intellectual property concerns, and responsible AI practices. Students will also develop communication, presentation, and critical thinking skills, enabling them to effectively integrate Generative AI into real-world applications while adhering to compliance and ethical standards.

By the end of the module, students will be equipped with the knowledge and skills to leverage Generative AI for innovation across industries, from creative content generation to AI-driven automation and beyond.

An indicative outline of the topics that will be covered follows:

- Introduction to Generative AI
- Fundamentals of Generative Models
- Deep Generative Models
- Large Language Models (LLMs) and the Transformers
- Reinforcement Learning and LLMs
- Generative AI use cases and applications

Module Delivery Method	On-Campus[1] ☒	Hybrid[2] ☒	Online[3] ☐	Work -Based Learning[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries	☐ Lanarkshire ☐ London ☒ Paisley	☐ Online / Distance Learning ☐ Other (specify)	

Terms for Module Delivery	Term 1	☒	Term 2	☐	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

Learning Outcomes	
L1	Gain deep knowledge and comprehensive understanding of the main methods and tools available for Generative AI, including the underlying theoretical concepts.
L2	Apply and evaluate different Generative AI tecnhiques to real problems and make an informed decision on their suitability for specific situations.
L3	Design Generative AI methodologies for specific problems including effective communication of main findings to relevant audiences, and critically appraise the results.
L4	
L5	

Employability Skills and Personal Development Planning (PDP) Skills	
SCQF Headings	**During completion of this module, there will be an opportunity to achieve core skills in:**
Knowledge and Understanding (K and U)	**SCQF 11** Comprehensive knowledge and understanding of the main methods and tools employed for Generative AI including the underlying theory and principles.
Practice: Applied Knowledge and Understanding	**SCQF 11** Apply a variety of Generative AI techniques to real situations and communicate the results using available visualisation tools.
Generic Cognitive skills	**SCQF 11**

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

	Critical knowledge of the state-of-the-art in Generative AI. Identify most suitable methods/tools to make informed decisions in a real situation. Design a complete AI methodology and communicate findings in real problems
Communication, ICT and Numeracy Skills	**SCQF 11** Effectively communicate the information extracted from Generative AI applications using a variety of available tools, both from report writing and presentations. Critically appraise numerical results gathered from the analysed data.
Autonomy, Accountability and Working with Others	**SCQF 11** Initiative and autonomy working in lab assignments. Students will also work as part of a team in project assignments and must develop a sense of accountability to others.

Prerequisites	**Module Code**	**Module Title**
	Other	
Co-requisites	**Module Code**	**Module Title**

Learning and Teaching	
In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours. The module will be delivered by means of lectures and supervised hands-on lab work. Lectures will cover the theoretical background and practical applicability in real life problems.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture / Core Content Delivery	16
Tutorial / Synchronous Support Activity	4
Laboratory / Practical Demonstration / Workshop	20
Asynchronous Class Activity	40
Independent Study	120
Please select	
TOTAL	200

Indicative Resources
The following materials form essential underpinning for the module content and ultimately for the learning outcomes: Speech and Language Processing. Daniel Jurafsky & James H. Martin. See: https://web.stanford.edu/~jurafsky/slp3/

(N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements
In line with the Student Attendance and Engagement Procedure, Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time. **For the purposes of this module, academic engagement equates to the following:** It is expected that students will attend all scheduled classes or participate with all delivered elements as part of their engagement with their programme of study. Please refer to UWS Regulation 5.7.

Equality and Diversity
The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code.
(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	**Computing**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☐ **Yes** ☒ **No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
School Assessment Board	
Moderator	Dr Tahir Mahmood
External Examiner	
Accreditation Details	
Module Appears in CPD catalogue	☒ **Yes** ☐ **No**
Changes / Version Number	1.0

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Class Test (30%). Students will be required to take a class test. The class test will both contain theoretical and practical questions aiming at assessing the achievement of LO1 and LO2.
Assessment 2

Coursework(70%). Students will work in groups to develop a specific Generative AI application. Coursework will assess achievement of LO2 and LO3 by means of a written report justifying the selection of methods, detailing the analysis, and presenting the results. Lab implementations will also be submitted and the main findings presented to the class.
Assessment 3
(N.B. (i) Assessment Outcomes Grids for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed. (ii) An indicative schedule listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Class Test	☒	☒	☐	☐	☐	30	3

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Coursework	☐	☒	☒	☐	☐	70	3

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
	☐	☐	☐	☐	☐		
Combined total for all components						100%	hours

Change Control

What	**When**	**Who**