

Module Title:	Deep Learning
Language of Instruction:	English
Credits:	5
NFQ Level:	8
Module Delivered In	1 programme(s)
Teaching & Learning Strategies:	This module will be delivered through a mix of lectures, laboratory assignments, and projects including a professional write-up. It will employ a mixture of active/task-based learning, reflective learning, and problem-based learning
Module Aim:	Deep neural networks can inform both the contents of an image or video frame and the content's location within the image boundaries. Additionally, neural networks can manipulate images and video frames. This module investigates methods of image classification, location, and manipulation. The module also examines optimisation of the computation and storage of these neural network models' immense data to provide the student with a demonstrable understanding of the advanced neural network features.

Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Design AI modules that identify features in images.
LO2	Develop AI modules to track the movement of features in images.
LO3	Manage image manipulation within image sets, e.g., using GANs.
LO4	Improve the performance of the neural network model.
LO5	Complete a project as an individual or in a small group to design and implement a solution for a real world problem.

Pre-requisite learning		
Module Recommendations <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>		
9271	COMP C4602	Computer Vision
9655	ELEC C4602	Artificial Intelligence and Machine Learning
Incompatible Modules <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>		
No incompatible modules listed		
Co-requisite Modules		
No Co-requisite modules listed		
Requirements <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>		
No requirements listed		

Module Content & Assessment
Indicative Content
Image classification and localisation

Models to find the best classification accuracy and localisation of images. Localisation of objects in an image or video stream.

Semantic segmentation

Location and movement of items within a frame.

Image Manipulation

Generative variational auto-encoders, generative adversarial Networks (GANs), spectral normalisation.

Optimisation

Optimisation techniques such as pruning, activation functions, compression, and alternative number representation.

Ethics, Safety, and Trustworthiness

Algorithm and data bias, model safety and EU trustworthiness policy, GDPR considerations.

Assessment Breakdown	%
Continuous Assessment	20.00%
Project	40.00%
Practical	40.00%

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Short Answer Questions	n/a	1,2	20.00	Week 4

Project

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	n/a	1,2,3,4,5	40.00	Sem 2 End

Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	n/a	1,2,3,4	40.00	Every Week

No End of Module Formal Examination

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Every Week	2.00
Laboratory	Every Week	3.00
Independent Learning	Every Week	6.00
Total Hours		11.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_EEROB_B	Bachelor of Engineering (Honours) in Robotics and Automated Systems	8	Mandatory