

Programme Information

Professional Diploma in Artificial Intelligence for Computer Vision

NFQ Level 9
One Year part time
Blended Learning

Professional Diploma in Artificial Intelligence for Computer Vision

Quick View:

Semester 1	Semester 2	Start Date	Application Deadline	Induction	Weekly Timetable	Fee	Deposit*
Sept. – Dec.	Jan. – May	5/9/22	10 Aug 22	1 - 2 days 1 week prior to start date	Online 2hrs plus self-directed learning and group work.	EU = €3,500 Non-EU = €4,750	EU = €250 Non-EU = €600

*The deposit is required once an offer is issued to secure a place.

Course Introduction:

This **UL @ Work Professional Diploma in Artificial Intelligence for Computer Vision** will introduce students to the principles of computer vision, and rapidly advance their knowledge in this innovative field of technology. Computer Vision is a field of Artificial Intelligence that enables a computing system to derive meaningful information from digital images, video, and related signals. When connected to a control system – e.g., a robot or a vehicle – it enables the system to take meaningful action.

Applications of computer vision include:

- [Automated unmanned aerial vehicles](#)
- [Industrial control systems for Industry 4.0](#)
- [Robotic Guidance](#)
- [Automated driving](#)
- [Security](#)
- [Social Media](#)
- [Public Safety](#)
- [Manufacturing Inspection](#)
- [Agriculture](#)
- [Digital Marketing](#)

In this course students will learn about the fundamentals of image processing, modern Deep Learning approaches to computer vision, and how to infer the structure of a real-world scene given a set of images. You will cover a cross-section of applications, including object detection, facial recognition, and structure from motion.

The programme emphasis is on peer and team learning, critical reflection and feedback incorporating coding challenges in AI and Computer Vision and will be of interest to those working in engineering and technical roles or graduates with a degree in numerate disciplines including Engineering, Computer Science and Physics. Students will experience a supportive and dynamic learning environment in which there will be an emphasis on peer learning, team learning, critical reflection, and feedback. Through the virtual learning environment students will have an opportunity to engage with a range of learning methods and problems. Between sessions, students will be supported by faculty and staff online.

Learning Outcomes:

On successful completion of this programme, the graduate will be able to:

- Utilise and design state of the art artificial intelligence and computer vision techniques and algorithms for a wide range of applications in automotive safety, manufacturing, security, and consumer devices.
- Work in technical, engineering, and scientific roles requiring computer vision.

How will students be assessed?

There is no terminal exam or project. Assessment is based on group work, regular e-tivity assessments including biweekly coding tasks and short online quizzes. Students complete two future focused professional portfolio modules, which will involve group work and development of a presentation/event on a relevant

topic(s). Final grade will be associated with key project deliverables in each module, as well as engagement in the process week -to-week.

What companies are a good fit?

Companies where AI and Computer Vision is prevalent include, but are not limited to: AMCS, Amazon, Analog Devices, Cainthuis, Colins Aerospace, Dataminr, Emdalo Technologies, Ericsson, Facebook, Huawei, IBM, Intel, Jaguar Land Rover, Johnson & Johnson, Qualcomm, Shutterstock, Valeo Vision Systems, Xperi, GM, Twitter.

Entry Requirements:

Applicants are normally expected to hold a primary honours degree in a cognate (related) discipline, (minimum H2.2), or equivalent and have at least 5 years of relevant industrial experience.

All applicants that meet the educational requirements will be considered. Priority will be given to those that also meet the industry experience requirement.

Alternative Entry Route:

In accordance with the University's policy on the Recognition of Prior Learning candidates who do not meet the minimum entry criteria may be considered. These candidates will be required to submit a portfolio to demonstrate their technical and/or management experience. An interview with the course admission team is also required to ensure candidates have the experience, motivation, and ability to complete and benefit from this course.

Course structure:

Type	Delivery Method	Duration	Lectures Per Week	e-moderated Groups & Live Q&A Per Week	Private Study	Weekly Time Commitment
Flexible	Online*	1 Year- Over 2 Semesters	2hrs	2hrs	9hrs	10-15hrs


* All lectures will be recorded. Live sessions will be at a time suitable to the student group, these live sessions will also be recorded. The course will be delivered online via the University of Limerick Virtual Learning Environment.




Programme Content:

Semester 1 September– December 2022	Introduction to Scientific Computing for AI To prepare students to take a range of Artificial Intelligence related modules by introducing the associated scientific computing, programming language and host platforms. Students are introduced to Python, numerical computing with Numpy, Linear Algebra, randomness and probability, and classifiers and optimisation.
	Machine Vision & Image Processing This module will introduce students to the principles of Machine Vision & Image Processing. Key topics such as linear image processing, feature detection and basic object detection are introduced. Practical examples of these techniques are included in the laboratories for this module to increase student engagement with this material. This module acts as a precursor to advanced vision modules which require a good understanding of these key principles.

<p>Semester 2</p> <p>January– May</p> <p>2023</p>	<p>Geometric Computer Vision</p> <p>Geometry is used to describe the structure and shape of the environment in which a camera is located. Geometric computer vision is, therefore, the process of determining the structure of the environment, and the position and orientation of the camera, and how the camera moves, with respect to the environment, through the analysis of camera image streams. It is commonly used in mobile robotics, vehicle autonomy and augmented reality.</p> <p>Deep Learning for Computer Vision</p> <p>Deep learning has become the dominant approach to designing solutions for many common computer vision tasks. In this module the application of deep learning to the key computer vision tasks of image classification, object detection, semantic segmentation and facial recognition is discussed in detail. Fundamental concepts in the design and structure of deep neural networks will also be discussed, so students gain a full understanding of how to design and build networks for their own applications.</p>
<p>Both Semesters:</p>	<p>Future Focused Professional Portfolio 1&2</p> <p>Participants will be guided in the organisation of a series of future facing industry relevant talks on the technology and the future of markets and society more broadly. Participants will work collaboratively to identify key trends impacting their field/discipline and create and use their professional network to reach out to key thought leaders in this space.</p> <p>This module provides learners with an opportunity to demonstrate independent and self-determined learning through the creation of their individual portfolio. The portfolio includes a range of activities that enable the learner to demonstrate: the development of their reflective practice, evidence-based excellence in applying discipline specific knowledge in different contexts, and leading discussion on the future of their respective discipline.</p>

Course Tutor Profiles:

 <p>Dr. Tony Scanlan (Course Director)</p>	<p>Dr. Scanlan is a Senior Research Fellow in the Dept. of Electronic & Computer Engineering. He is currently lecturing on several computer/machine vision modules in the Artificial Intelligence & Computer Vision graduate programmes at UL. He has extensive experience in the field of microelectronics and signal processing in association with multinational and SME industrial partners. His current research interests are in the application of Artificial Intelligence (AI) & computer vision to manufacturing inspection, environmental monitoring and consumer & media applications.</p>
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 <p>Dr. Ciarán Eising</p>	<p>Dr. Eising has extensive experience working in computer vision, having worked for >15 years designing computer vision algorithms and systems for driver assistance and automated driving solutions, particularly with Valeo Vision Systems. He has experience with geometric computer vision, reconstruction, simultaneous localisation and mapping (SLAM), and machine learning in image processing. Since 2020, he has lectured in Artificial Intelligence and Computer Vision within the Dept. of Electronic & Computer Engineering department. His research focuses on the applications of artificial intelligence and computer vision in areas such as medical imaging, waste management, and automated driving.</p>
 <p>Dr. Pepijn van de Ven</p>	<p>Dr. Van de Ven is a Senior Lecturer in Artificial Intelligence and Machine Learning and Course Director for UL's national online MSc in AI, an industry- to upskill Ireland's workforce in use of Artificial Intelligence. His research revolves around applications of Artificial Intelligence in health and in the circular economy. For the former, he was co-PI and WP leader in two FP7 projects (ICT4Depression and E-COMPARED) aimed at the use of Artificial Intelligence in the personalisation of mental health interventions and is currently co-applicant for a UK MRC funded project with King's College London, the University of Bristol, and the University of Sao Paulo where works on the application of machine learning for the advanced analysis of depression intervention treatment data.</p>
 <p>Dr. Patrick Denny</p>	<p>Dr. Denny has in excess of 25 years' experience in scientific and technological development internationally, 19 of these at a senior level, designing, leading, innovating and consulting on new technologies with multimillion Euro project budgets. Specifically, he has worked since 2002 with Valeo as Senior Expert / Senior R&D Engineer in Vision Systems and Advanced Driver Assistance Systems working on human and AI vision systems. Patrick joined the University of Limerick in March 2022 as a lecturer in Artificial Intelligence, Computer Vision, and Natural Language Processing within the Dept. of Electronic & Computer Engineering.</p>

How to apply:

Simply click on the link below and click "Apply". You can review the full application form without submitting and save your application as you go along.

[Click here to Apply](#)

Frequently Asked Questions

1. ***What would be a good feeder course for a student to go on this programme?***

This programme may be of interest to previous graduates with a degree in a numerate discipline including Engineering disciplines, Mathematics, Computer science, Physics or related fields. Students need not have a strong programming background but should be computer literate.

2. ***Who is this course for?***

This course will be of interest to qualified candidates who wish to expand their expertise & knowledge in the field of computer vision, who wish to use computer vision in their career, or anyone that wants to develop competences in one of the world's fastest growing fields.

3. ***What types of roles would candidates, considering this course, have held?***

Candidates may be working in a broad range of Engineering and technical roles in sectors such as manufacturing, automotive electronics, avionics, software development, medical devices, applications engineering and data science, or anyone that simply wants to expand their knowledge into this dynamic field. This programme may also be of interest to recent graduates from numerate or cognate disciplines.

4. ***What types of roles will candidates be qualified for after taking this course?***

Graduates will be qualified to work in technical, engineering, and scientific roles requiring computer vision. (See example computer vision roles [here](#) & [here](#)).

5. **What software / programmes will they be using?**

Python packages including, Numpy, sklearn, OpenCV, Tensorflow with access to this software via Google Colab. However, prospective students do not need to already have experience with these tools – you will be taught them during the programme. Access to a reasonably modern PC and a good internet connection that is suitable for live video lectures. All software used in the programme is open source and freely available.

6. **How will the student apply their learning?**

The programme is strongly focused on task-based learning. Each module is split into a set of E-tivities, which consist of coding challenges in AI and Computer Vision. Therefore, the application of students learning is built into the very ethos of the way in which this programme is taught.

