Module Specification – (Programme Specs Ver. 5.1) 2020/21

Module Code: 20CSAI08H	**Title:** Deep Learning	
Level: 6	**Modular weight:** 10	**Faculty/Dept:** ICS
Pre-requisite modules: CSCI05I, SCIB07P, SCIB03C, CSAI03H, CSAI02I , CSAI01I		
Reassessment: No restriction-		
Module Leader:		
Semester taught: One		
Date of latest revision: April 2019		

Aims

The aim of this module is to provide the students with the theoretical basis for Artificial Neural Networks and the Deep Neural Network architectures and algorithms. Students will also gain practical hands on experience on the main deep learning frameworks and deep learning applications; for example computer vision, word embeddings, natural language processing, reinforcement learning, etc.

Intended Learning Outcomes

On completion of this module students should be able to:

Knowledge and Understanding

1. Describe the core theoretical and conceptual frameworks for deep neural networks. [A1, A11**,** A12]
2. Explain the properties and functions of a range of different deep neural network architectures, algorithms and their applications. [A3, A11, A12]

Intellectual Skills

3. Explain the difference between deep learning architectures and their applications [B10, B11, B12].
4. Design and execute experiments with deep neural networks for different applications in computer vision and natural language processing, and reflect on the results [B11, B12].
5. Recognize potential real-world applications of deep neural networks and evaluate the suitability for a given application. [B1, B5, B11]
6. Asses the performance of deep learning models [B10, B12].

Practical and Professional Skills

7. Appropriately apply recent deep learning frameworks. [C2, C4, C6, C11, C12]

General and Transferable skills

8. Develop interpersonal and team work skills. [D2, D6, D8]

Employability

This module will provide opportunities for students to:

1. Understand the importance of being self-motivated in order to progress the area of work. [A.1, A.5]
2. Design and apply appropriate deep learning models to solve complex problems. [B.1.1]
3. Demonstrate effective time management to manage time effectively so as to prioritise tasks and to work to deadlines. [C.1.5]

Indicative Content

Artificial Neural Nets and their architectures, deep neural networks, back propagation algorithm, convolution and recurrent neural networks, recent topics in deep neural networks. Applications include computer vision, natural language processing, and others.

Methods of Learning, Teaching and Assessment

Total student effort for the module: 100 hours on average over 1 semester.

Type of session	ILOs Assessed	Typical Student Effort		
		Typical number in the semester/s	Typical hours per week	Total hours
Lecture	1-6	12	2	24
Tutorial	-	-	-	-
Laboratory	4-9	12	2	24
Private study	1-8			52

Assessment

Assessment Type	Weight %	ILOs Assessed	Exam Semester	Exam/ Written Coursework Length
Two group projects , weight of each is 30%	60	1-9	1	N/A
Unseen written exam.	40	1-6	1	2 Hours

Methods of Feedback

In response to assessed work:

- Developmental feedback generated through teaching activities.
- Feedback will be provided for each assessed component in written form as appropriate.
- Generic exam feedback will be given on the e-learning system.

Developmental feedback generated through teaching activities:

- Dialogue between students and staff in workshops and Labs

Indicative Reading List

- E. Charniak Introduction to Deep Learning, MIT Press, 2019.
- I. Goodfellow, Y. Bengio, A. Courville: Deep learning - 2016
- http://www.tensorflow.org/ , http://torch.ch/