



Department of Electrical and Computer Engineering

COURSE OUTLINE

ELEC 564 (ELEC/CENG 496) – Neural Networks and their Implementation

Term - FALL 2014 (201409)

Instructor

Dr. Nikitas Dimopoulos
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Office Hours

Days: WF
Time: W (15:00-15:50) F (13:30-14:20)
Location: EOW 437

I can be reached via email (please use ELEC564 question as your subject)
If you need to see me in person at a different time, please make an appointment. In an emergency, you may try me at the office.

Lectures

A-Section(s): A01, (ELEC 496 A01, A02) / CRN 11251, (11242, 11243)
Days: TW
Time: 13:00-14:20
Location: CLE C115

Required Text

Title: Class Notes; papers from the open literature
Author: N. J. Dimopoulos
Publisher:
Year:

Optional Text

Title:
Author:
Publisher:
Year:

Course Web site: www.ece.uvic.ca/~elec564

login: elec564

password: will be distributed in class

Assessment:

Assignments:	5%
Project	25%
Mid-term	20%
Final	50%

Date: Wednesday, October 15, 2014

Note: Failure to complete all laboratory requirements will result in a grade of N being awarded for the course.

Due Dates for Assignments:

Homework will normally be assigned at the end of concept entities. The due dates will normally be one week after the assignment. There will be approximately 6 assignments. Assignments will be collected but not corrected. Solutions will be posted after the due date of the assignment.

The final grade obtained from the above marking scheme will be based on the following percentage-to-grade point conversion:

Passing Grades	Grade Point Value	Percentage for Instructor Use Only	
A+	9	90 – 100	
A	8	85 – 89	
A-	7	80 – 84	
B+	6	77 – 79	
B	5	73 – 76	
B-	4	70 – 72	
C+	3	65 – 69	
C	2	60 – 64	
D	1	50 – 59	
Failing Grades	Grade Point Value	Percentage for Instructor Use Only	Description
E	0	0 - 49	Fail, *Conditional supplemental exam. (For undergraduate courses only)
F	0	0 – 49	Fail, no supplemental.
N	0	0 – 49	Did not write examination, Lab or otherwise complete course requirements by the end of term or session; no supplemental exam.

**Assignment of E grade will be at the discretion of the Course Instructor.*

The rules for supplemental examinations are found on page 80 of the current 2014/15 Undergraduate Calendar.

Term in which E Grade Was Obtained	Application Deadline for Supplemental Exam	Supplemental Exam Date
First term of Winter Session (Sept – Dec)	February 28 in the following term	First week of following May
Second term of Winter Session (Jan – Apr)	June 30 in the following term	First week of following September
Summer Session (May – Aug)	October 31 in the following term	First week of following January

Deferred exams will normally be written at the start of the student's next academic term; i.e., approximately 4 months following the deferral of the exam.

Course Description

1. Course Objectives

To introduce the mathematical techniques and application skills needed to apply neural network techniques in engineering problems .

2. Learning Outcomes

Use back-propagation to train neural networks given a set of exemplars.
Determine the structure of a ANN including the size of hidden layer(s) and the training goal to ensure generalization.
Use Hopfield networks as associative memory
Be able to pre-process the presented data including performing PCA.
Use regularization to improve generalization abilities
Understand basic neural cell physiology and the generation and propagation of action potentials and the computational models used.
Recall the use of recurrent NN in modelling dynamical systems.

3. Syllabus

Physiological Principles

Neurons and their electrical activity; Neural Interconnections
Structures of physiological neural networks (e.g. retina, cerebellum etc.)

Artificial Neural Networks their structure and stability

Perceptrons; Hopfield's model; Grossberg's model; Dimopoulos' model.

Learning in Artificial Neural Networks

Hebian Learning; Back Propagation; Dynamic Back Propagation
Simulated annealing; Boltzman machine.

Applications

Pattern recognizers; Associative memories;
Identification and Control of Dynamical Systems

Impementation of Artificial Neural Networks

Simulators; Optical embodiments; Electronic embodiments: Analog, Digital

Note to Students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the ECE Chair by email or the ECE Chair's Secretary eceasst@uvic.ca to set up an appointment.

Accommodation of Religious Observance

See <http://web.uvic.ca/calendar2014/GI/GUPo.html>

Policy on Inclusivity and Diversity

See <http://web.uvic.ca/calendar2014/GI/GUPo.html>

Standards of Professional Behaviour

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour at <http://www.uvic.ca/engineering/current/undergrad/index.php#section0-25>

which contains important information regarding conduct in courses, labs, and in the general use of facilities.

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult

<http://web.uvic.ca/calendar2014/FACS/UnIn/UARe/PoAcl.html> for the UVic policy on academic integrity.