

# Syllabus

Arthur J. Redfern

[arthur.redfern@utdallas.edu](mailto:arthur.redfern@utdallas.edu)

Jan 19, 2021 (original)

Feb 21, 2021 (update)

---

## 1 Logistics

Class: CS 6301.501.21S Special Topics in Computer Science –  
Convolutional Neural Networks  
Location: Mon and Wed from 5:30 – 6:45 pm online + recordings  
Office hours: Fri 12:00 – 1:00 pm online  
Course material: <https://github.com/arthurredfern/UT-Dallas-CS-6301-CNNs>

## 2 Description

Description: This course provides an introduction to neural network variants (xNNs) including convolutional neural networks (CNNs), recurrent neural networks (RNNs) and attention based models. The course is motivated by the realization that many information extraction problems can be reduced to a classification or regression problem and neural networks are universal function approximators. Network design and training methods are discussed along with software and hardware requirements for high performance implementations. Theory and implementation are demonstrated and expanded on in the context of applications.

Outline:     Math            – linear algebra, algorithms, probability, calculus and analysis  
             Networks        – design, training and implementation  
             Applications    – vision, language, speech and games

Objectives:     Course learning objectives include:

1. Ability to design xNNs
2. Ability to train xNNs
3. Ability to implement xNNs
4. Ability to apply xNNs to applications including vision, language, speech and games

References:     No required book to purchase, links to open source materials will be provided.

## 3 Plan

01 Wed Jan 20	Introduction	
02 Mon Jan 25	Overview	
03 Wed Jan 27	Linear algebra	
04 Mon Feb 01	Linear algebra	
05 Wed Feb 03	Linear algebra	
06 Mon Feb 08	Algorithms	
07 Wed Feb 10	Probability	
00 Mon Feb 15	No class (weather)	
00 Wed Feb 17	No class (weather)	
08 Mon Feb 22	Probability	
09 Wed Feb 24	Calculus	
10 Mon Mar 01	Calculus	
11 Wed Mar 03	Analysis	
12 Mon Mar 08	Design	
13 Wed Mar 10	Design	Project 1 due Fri Mar 12: math
00 Mon Mar 15	No class (break)	
00 Wed Mar 17	No class (break)	
14 Mon Mar 22	Design	
15 Wed Mar 24	Training	
16 Mon Mar 29	Training	
17 Wed Mar 31	Training	
18 Mon Apr 05	Implementation	
19 Wed Apr 07	Implementation	
20 Mon Apr 12	Vision	Project 2 due: networks
21 Wed Apr 14	Vision	
22 Mon Apr 19	Vision	
23 Wed Apr 21	Language	
24 Mon Apr 26	Language	
25 Wed Apr 28	Speech	
26 Mon May 03	Speech	
27 Wed May 05	Summary	
00 TBD	Games (optional)	
00 TBD	Games (optional)	
00 Mon May 10	No class	Project 3 due: applications

## 4 Grades

25% Project 1: linear algebra, algorithms, probability, calculus and analysis

25%	Project 2:	network design, training and implementation
25%	Project 3:	vision, language, speech and games
25%	Homework	