(Tentative syllabus)

Instructor: **TA**

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Office Hour:	Thursday 5:00 - 7:00 PM or by appointment.	Friday 1 – 3PM

Textbook:

Fundamentals of Neural Networks: Architecture, Algorithms, and Applications, by Laurene Fausett, Prentice Hall.

Course Description:

This course offers, with considerable breadth and depth, an introduction to neural networks (NN), a new approach for modeling, formulating, and solving problems. Networks of neuron-like units and extensive inter-unit connections have shown impressive performance in applications in various fields such as pattern analysis, nonlinear control, combinatorial optimization, and knowledge acquisition where traditional Von Neumann machine and algorithmic approaches face tremendous difficulties. The successes in practical applications and substantive theoretical progress in NN research have aroused great interests among various disciplines and made it one of the most active research areas in computer science in the present days.

This course will cover both theoretical and practical aspects of NN. Topics to be covered by this course include

- *Basics of neural network computing*, in contrast to algorithmic approaches, traditional AI problem solving, and Von Neumann architecture.
- *Important neural network models*, such as Adaline and Perceptron; feedforward and feedback networks; recurrent networks, self-organizing networks (Kohonen's model and the ART models of Grossberg); and thermodynamic networks (Hopfield model, Boltzmann/Gauss/Cauchy machines).
- *Learning methods*, such as Hebbian learning, Perceptron learning theorem, back-propagation learning, unsupervised competitive learning.

The emphasis will be on the fundamentals of the models and related techniques. Analysis of mathematical properties of some network models will be given, and their limitations discussed. Applications and practical considerations of these techniques will be discussed. Students will gain hands-on experience through a sequence of computer projects.

This course mainly deals with the computational aspects of NN, therefore, familiarity of data structures, algorithm analysis, linear algebra and differential equations are of great help, but no prior knowledge of cognitive/biological/psychological sciences is presumed.

This course is open to Computer Science graduate students and upper level undergraduate students, and to students in other science and engineering disciplines with good programming experience.

Grading:

Course grading will be based on the following work:

Project 1	25%
Project 2	20%
Exam 1	30%
Exam 2	30%
Project 3	20% for graduate student (registered for CMSC691N) only