ENEE 434 - Spring 2006 Course Description

1. Course: ENEE 434 Introduction to Neural Networks and Neurocomputing
2. Time: M W 14:00 - 15:15
3. Place: Room CHE 2136 moved to CSI 1121 starting 02/06/06
4. Instructor: R. W. Newcomb

Office: AVWII-1347; MSLab: AVWII-1362
Phones: Office: (301) 405-3662 Home: (301) 622-0177 (before 9:30pm)
Office Hours: M W 16:15-16:45
email address: newcomb@eng.umd.edu; URL: http://www.ee.umd.edu/newcomb/mslab.html

5. Teaching Assistant: none; Grader: Ms. Yu Jiang, email:jiangyu @glue.umd.edu
6. Prerequisite: ENEE 302 or consent of instructor
7. Textbook: M. T. Hagan, H. B. Demuth, and M. H. Beale, "Neural Network Design," U. of CO bookstore, ISBN: 0-9717321-0-8

heavy use of Matlab Neural Net Toolbox Manual available on line at
/afs/glue.umd.edu/software/matlab/6.1/help/pdf_doc/nnet/nnet.pdf

Recommended Programs: MatLab with Simulink and Neural Network Toolbox (on SUNS). Student Version of MATLAB with Simulink, Spice (on the SUNS); evaluation versions to 9.0 of PSpice for PCs;

8. References: Journal Articles from: IEEE Transactions on Neural Networks, Neural Networks, Neurocomputing, International Journal of Neural Systems, IEEE Journal of Solid-State Circuits, Electronics Letters, IEEE Transactions on Circuits and Systems, IEE Transactions on Robotics and Automation.
9. Course files: (when installed) Useful information and files can be seen and downloaded from the course section web address:
http://www.ee.umd.edu/newcomb/courses/spring2006/434/ENEE434_Spring2006.html
10. Course Description: This course covers artificial neural networks (ANNs) as inspired by biological neural networks. Different classes of ANNs will be covered as taken from the textbook (associated with the MatLab Neural Network toolbox) and from papers in the literature. Emphasis will be placed upon their design, roles in neurocomputing, and , at times their vlsi realizations.
11. Course Operation: Lectures and discussions will occur at the class periods, including some computer demonstrations. Each student will design a neural network based upon a paper in the journal literature. Early in the course each student will choose their own journal article (see References above) and proceed to design the ANN. In the end this will involve possibly two (only one for class size larger than 20) oral presentations, a first one on the theory of the ANN's operation and a second one on its simulation, with the latter followed by a written report on all aspects of the design. Every student will be a commentator on another student's paper. Exercises related to the textbook should be worked on an individual basis and collected in a notebook.. Some problems to be graded will be assigned regularly.

For those interested, VLSI layout is possible with fabrication via MOSIS (actual fabrication will require a commitment to make measurements on the chip, for which the Microelectronics Design Laboratory annex, Rm AVW 1364, can be made available).

Use of MatLab with Simulink and the Neural Network Toolbox will be emphasized; this is readily available on the Unix system in Glue for which each student should have an account. PSpice (and/or Berkeley Spice or a similar circuit analysis program) will also be used by those interested in ANN circuit design. Copies of various evaluation versions of PSpice are available for student download (ftp of 6.2 disks from http://www.ee.umd.edu/newcomb/spice_dl.htm; latest [version 9.0] on CD from OrCad/Cadence on www via http://www.orcad.com/products/pspice/eval_f.htm); the professional version is on the PCs of Room EGR 0123 and in the Jasmine Lab; the full Spice is on the UNIX workstations of the EE Department Computer Laboratories (Rooms AVW 1442, 1454).

12. Grading: Roughly:

20% = homework and designs [collected in a dated indexed notebook]
15% = class participation including commentator and discussion section activities
20% = midterm exam
25% = formal written individual design report [<11 pages, 1.5 spacing, 12pt]
20% = final [W 05/17/06 13:30-15:30]