Syllabus
ECE8720: Artificial Neural Networks
Spring 2018

R.J. Schalkoff

INSTRUCTOR: Dr. R.J. Schalkoff, EIB 334, 656-5913, rjschal@g.clemson.edu.

LECTURE TIME & LOCATION: 5:00 pm - 6:15 pm, TR, Rhodes Annex 109 (RHDANX).

PREREQUISITES - graduate standing.

OVERVIEW: The notion of 'computing' takes many forms. Usually, procedural algorithms are designed and subsequently implemented using the currently-dominant architecture. An alternative viewpoint arises when considering the 'computing' necessary in biological systems. For example, the computation in the human brain is much different from the aforementioned paradigm, in the sense that:

- The computation is massively distributed and parallel;
- The computation involves (relatively) simple building blocks;
- The computation is not obvious, from an I/O perspective; and
- Learning replaces apriori algorithm/program development.

These observations lead to a biologically-motivated computing paradigm called Artificial Neural Networks (ANNs). This course explores theoretical and practical aspects related to ANNs. We will try to get comfortable with the emerging concept of 'neural engineering', especially through applications to engineering problems.

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189 Old Greenville Hwy.
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WEB SUPPORT: We will be using Canvas. You will find this syllabus as well as other related materials and resources on the ECE 8720 Canvas page. Be sure you can access this, since it will be the source of handouts, assignments and other information. This repository will evolve over the semester.

COURSE CONTENT BY TOPICS-

I. INTRODUCTION TO NEURONS AND NEURAL NETS
II. 1st GENERATION NEURAL NETWORK-BASED PATTERN ASSOCIATORS
III. FEEDFORWARD NETWORKS AND LEARNING (TRAINING)
IV. RECURRENT ARCHITECTURES AND APPLICATIONS
V. UNSUPERVISED LEARNING/TRAINING- SELF-ORGANIZING NETWORKS
VI. RADIAL BASIS, TIME DELAY AND CONVOLUTIONAL NEURAL NETWORKS
VII. FUZZY NEURONS AND NETWORKS
VIII. HARDWARE REALIZATIONS

OFFICE HOURS: 11-12 MTWTh.

OTHER PROCEDURAL ASPECTS (Grading:)

Quizzes (2), Simulation/Takehome (2), Final Exam (1). There are 5 scores recorded. Quizzes are weighted at 25%, Simulations are weighted at 20% and the Final Exam is 10%. No re-tests or ‘extra credit assignments’ are given. No scores are dropped.

Basically, we need to be careful about the conditions under which collaboration may occur. To this end: Simulations are an *individual effort* and will be pledged.
### Assignment

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<tr>
<th>Assignment</th>
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<th>Due</th>
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<tr>
<td>1</td>
<td>2/6</td>
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<td>2</td>
<td>3/13</td>
<td>4/10</td>
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### In-Class Quiz Dates.

- Quiz 1: 2/20
- Quiz 2: 3/27
- Final Exam: Thurs. 5/3; 7:00-9:30PM (Charleston Section TBD)

**ATTENDANCE:** Necessary. You are responsible for anything covered in lecture, whether you are there or not. Students intending to drop a class should request the course be dropped and should not assume they will be dropped due to lack of attendance.

**STUDENTS WITH DISABILITIES**

Students with disabilities requesting accommodations should make an appointment with Disability Services (the Clemson SDS Office) to discuss specific needs within the first two weeks of classes. **Accommodations are not retroactive** and new Faculty Accommodation Letters must be presented each semester.

You must meet with me (in person) during office hours and provide me a copy of your SDS letter at least two weeks prior to the first in-class quiz. SDS accommodations do not apply to the simulation assignments.

If your Faculty Accommodation Letter concerns special provisions for in-class quizzes, you MUST arrange to take ALL CPSC/ECE quizzes, including Quiz 3, through the Clemson Testing Center.

**Title IX Statement**

This is now addressed in the ECE Common syllabus.

**Additional Remarks and Incorporation**

- Any additions or corrections to this syllabus will be posted on Canvas.
- The *Clemson University Announcements* and the ECE Common syllabus contain additional information and guidelines on a number of important and related topics, including attendance, special needs, emergency procedures and academic integrity.
ADDITIONAL REMARKS

Students are required to monitor their university email. See:
http://www.clemson.edu/studentaffairs/student-handbook
/universitypolicies/email-communications.html

My teaching philosophy may be summarized in these remarks:

• The class (you) and I are "in this together" throughout the semester.
• However, your progress is largely up to you.
• All our interactions should be conducted within a framework of mutual respect.