

1. Course number and name

CptS 434: Neural Network Design and Application

2. Credits and contact hours

3 credits, 3 lecture hours

3. Instructor's or course coordinator's name

John Miller

4. Textbook, title, author, and year

L. Fausett. 1994. *Fundamentals of Neural Networks*, Pearson Education, Inc., Uttar Pradesh, India. ISBN 978-81-317-0053-2.

D.M. Skapura. 1996. *Building Neural Networks*. ACM Press Books, New York, NY. ISBN 978-0201539219.

S. Haykin. 2009. *Neural Networks and Learning Machines* (3rd ed.). Pearson Education, Inc., Upper Saddle River, NJ. ISBN 978-0-13-147139-9.

H. Demuth and M. Beale. 2002. *Neural Network Toolbox* (Version 4). The MathWorks, Inc., Natick, MA. (e-book)

5. Specific course information

a. *Catalog description*: Neural Network Design and Application

b. *Prerequisites or corequisites*: CptS 121, CptS 131 or EE 221, STAT 360, Certified major in CptS, CE, EE, or SE.

6. Specific goals for the course

By the end of the course, students will be able to

- Apply artificial neural networks (ANNs) to “real-world” problems (1a, 1c).
- Compare ANNs to other supervised machine-learning techniques (1d).
- Understand ANNs as a non-parametric statistical method of data analysis (1b, 1e)

7. Brief list of topics to be covered

- Survey of ANN history and applications
- Perceptron applications to multivariate linear and classification
- Logistic regression
- Multilayer perceptron applied to regression and classification
- Weight optimization by back propagation
- Learning approaches that avoid overfitting
- Radial basis function ANN
- Optimizing weights by genetic algorithm
- Self-organizing maps
- Convolution neural networks