

**University of Arkansas – Fort Smith**  
**5210 Grand Avenue**  
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**Fort Smith, AR 72913-3649**  
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**General Syllabus**

**CS 4143 Deep Learning**

Credit Hours: 3

Lecture Hours: 3

Laboratory Hours: 0

Prerequisite: CS 3113 Artificial Intelligence or CS 4333 Machine Learning

Effective Catalog: 2020-2021

**I. Course Information**

**A. Catalog Description**

The course covers deep neural networks and their applications to the fields of artificial intelligence, natural language processing, machine learning, and computer graphics and vision

**II. Student Learning Outcomes**

**A. Subject Matter**

Upon successful completion of this course, the student will be able to:

1. Explain key concepts of neural network models.
2. Explain the applications of deep neural networks.
3. Build, design, and implement applications using deep neural networks.
4. Optimize and improve neural network models through hyper-parameter tuning.
5. Apply deep neural networks to classification problems.
6. Explain concepts of overfitting and regularization.

**B. University Learning Outcomes**

This course enhances student abilities in the following areas:

**Analytical Skills**

**Critical Thinking Skills**

Students will identify a problem, break it down into its components and design a solution.

### **III. Major Course Topics**

- A.** Neural Networks
- B.** Perceptron
- C.** Back Propagation
- D.** Convergence
- E.** Gradient Descent
- F.** Overfitting and Regularization
- G.** Performance and Evaluation
- H.** Convolutional Neural Networks (CNN)
- I.** Recurrent Neural Networks (RNN)
- J.** Long Short-Term Memory (LSTM)
- K.** Generative Adversarial Networks (GAN)
- L.** Reinforcement Learning