**EE 596 Individual Studies**

**Cognitive Radar**

Instructor Ram Narayanan (rnarayanan@engr.psu.edu)

Office 202 Electrical Engineering East

Office Hours By appointment

Required Text:

*Cognitive Radar: The Knowledge-Aided Fully Adaptive Approach* - Joseph R. Guerci

Description:

This course will give exposure to the theory of adaption and cognition and specifically how they are useful and can be mapped for radar application. The course will involve independent research to further explore these topics and to understand how this technology is being developed to improve radar functionality/efficiency and where it is in need of improvement and further development.

Course Objectives:

Understand why cognitive radar can offer major improvements to current radar systems.

Understand Optimum Multi-input Multi-output (MIMO) Radar, Adaptive MIMO Radar, and Knowledge-aided adaptive radar and how these apply to cognitive radar.

Learn about the research process through further reading of scholarly journals and articles on the above subjects.

Evaluation:

25% Paper 1: Summary of Chapters 1-2 and supplementary materials

25% Paper 2: Summary of Chapters 3 and supplementary materials

25% Paper 3: Summary of Chapters 4 and supplementary materials

25% Paper 4: Summary of Chapters 5 and supplementary materials

Course Schedule:

**Week Topic Assignment Due**

**August 24** Chapter 1 Introduction and Background

Research

**August 31** Chapter 2: 2.1 – 2.4 Optimum MIMO Target ID

**September 7** Chapter 2: 2.5 Constrained Optimum MIMO Radar

and additional research related to topic

**September 14** Chapter 3: 3.1 – 3.2 Adaptive MIMO Radar Paper 1

**September 21** Chapter 3: 3.3 – 3.5 Performance bounds of

DDMA MIMO STAP approach

**September 28** Additional Research on adaptive MIMO Radar

**October 5** Additional Research on adaptive MIMO Radar

**October 12** Chapter 4: 4.1 – 4.2 Intro to knowledge-aided Radar Paper 2

**October 19** Additional Research on KA Radar

**October 26** Chapter 4: 4.3 – 4.4 Real-Time knowledge-aided Radar

**November 2** Additional Research on KA Radar

**November 9** Additional Research on KA Radar

**November 16** Chapter 5: Cognitive Radar: The Fully Adaptive Paper 3

Knowledge-aided Approach

**November 23** Chapter 5 continued

**November 30** Additional Research on Cognitive Radar

**December 7** Additional Research on Cognitive Radar

**December 14** Final Research and paper organization Paper 4

Student Signature: Date:

Instructor Signature: Date: