



**FUDA ENGN310 Special Topics in Wireless Communications  
The Alliance for Global Education Contemporary Society and  
Language Program, Engineering Summer Term**

*Professor (Chun-Ye) Susan Vasana, Ph.D., Associate Professor of Electrical Engineering,  
University of North Florida*

**Course Description:**

The world has become connected due to the technology such as wireless communications. This course introduces emerging technologies and principles in wireless communications. Topics include cellular system, spread spectrum, communication link and wireless channel analysis and practical applications. The students also get to learn about the state of the science and technology in modern China through field trips and guest lectures.

**Class Schedule:**

Two class sessions per week, 3 class hours per session.

**Prerequisite:**

Fundamental Signals and Systems Representations

**Textbook:**

Communication Systems Engineering, by John G. Proakis and Masoud Salehi; Prentice-Hall (ISBN 0-13-061793-8).

**References:**

1. Modern Digital and Analog Communication Systems, Third Edition, by B. P. Lathi, Oxford University Press, Inc. 1998. (EEL4514 Textbook)
2. Fundamentals of Communication Systems, John G. Proakis and Masoud Salehi, Prentice Hall, 2005
3. Digital Communications – Fundamentals and Applications, Bernard Sklar, Prentice-Hall.
4. Digital and Analog Communication Systems, Leon W. Couch, II, Prentice-Hall.

**Course Objectives:**

- To provide insights in selected topics of engineering and engineering in China.
- To introduce principles of wireless/mobile communications.
- To introduce emerging digital communications technologies.
- To study communication signals and signal representations.
- To analyze the communication link and wireless channel characteristics.
- To introduce cellular systems and spread spectrum communication systems.
- To illustrate multiple access techniques: FDMA, TDMA, and CDMA, etc.
- To illustrate the performance improvement through antenna diversity.
- To understand professional and ethical responsibilities in engineering.
- To bridge cultural differences between the West and the East through engineering and technology.

**Course Requirements:**

- Three written exams (open book): two non-cumulative mid-term tests and a cumulative final exam.
- Students are required to complete a project and a presentation on examples of the impact of technology and engineering solutions in a global, economic, environmental, and societal context.
- Students will participate in the following additional educational opportunities:
  - A guest lecture by a director in the Chinese Academy of Sciences, and
  - A visit to an engineering laboratory and the new campus of Shanghai Jiao Tong University.

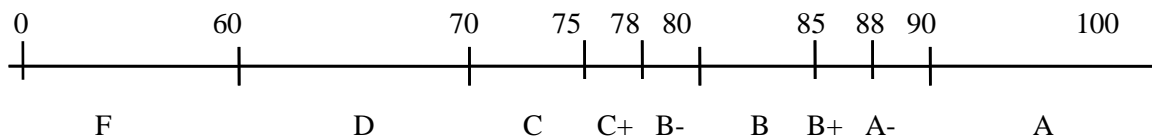
**Grading:**

Midterm Test I	20%
Midterm Test II	20%
Final Exam	30%
Project and Presentation	30%

Note: Class and excursion attendance is mandatory.

**Grades:**

90-100	= A
88-89	= A-
85-87	= B+
80-84	= B
78-79	= B-
75-77	= C+
70-74	= C
60-69	= D
0-59	= F



## **Course Outline:**

### **Week 1: Engineering Education in East and West**

- Engineering background in China's top national leadership and Chinese views of science and technology.
- The different emphases of engineering educations in Eastern & Western systems.
- Art and Science components of engineering and topics in raising creativity.
- Policy in Corporate Industry – Patents and Intellectual Property
- Misconceptions about engineering: gender issues, etc.

### **Required Readings:**

Video: What the Bleep? - Down the Rabbit Hole.

Allyson Holbrook, Lisa Panozza and Elena Prieto, Engineering in Children's Fiction – Not a Good Story? (hand-out)

Robert Sternberg on Creativity

[http://business.nmsu.edu/~mhyman/M670\\_Articles/Sternberg\\_AP\\_2001.pdf](http://business.nmsu.edu/~mhyman/M670_Articles/Sternberg_AP_2001.pdf)

Coping with Complexity: Educating for Capability

<http://www.bmj.com/cgi/content/full/323/7316/799>

### **Week 2: Fundamentals in Wireless Communications**

- Random Process and Probability
- Fourier Transform (<http://falstad.com/fourier/>)
- Analog to Digital Conversion
- Overview of Digital Communication Systems

### **Required Reading:**

Textbook (Chapter 2 and 4 selected review topics)

### **Week 3: Topics in Wireless Communications**

- Modulation and Detection
- Antenna Diversity
- Midterm I exam

### **Required Reading:**

Textbook (Chapter 7 section 7.5)

### **Week 4: Lab Tour and Culture Study**

- Tour: Dr. Jin RongHong, Professor; Shanghai JiaoTong University is willing to host a tour to his engineering laboratory and the new campus of Shanghai JiaoTong University.
- Culture and Technology Discussion

### **Reference:**

Tong Sing - The Chinese Book of Wisdom (Based on the Ancient Chinese Almanac), Dr. Charles Windridge, Barnes & Noble, 1999, ISBN 0-7607-4535-8.

### **Week 5: Guest Lecture and Midterm Exam**

- Guest Lecture: Tian ShengRong, Director of Science & Technology Division, Chinese Academy of Sciences -- Shanghai Branch, has agreed to give a guest lecture. He is involved in making many important decisions in China's technology advancement in the areas of Solar Energy, Electric Cars, Bio-engineering Energy Sources, Biomedical, and ICs for Communications.
- Midterm II Exam
- Project proposal due: Understanding Moral Issues and Professional Ethical Responsibility: Examples of the impact of technology and engineering solutions in a global, economic, environmental, and societal context.

### **Week 6: How Cell Phone System Work**

- Spread-Spectrum Techniques and the CDMA System
- Wireless and Mobile Fading Channel Characteristics
- Cellular Systems (slide presentation)

### **Required Reading:**

Textbook (Chapter 10: Wireless Communications)

### **Week 7: Project Presentations and Final Exam**

- Student Projects Presentations
- Final Exam
- Project Report Due

**Instructor: Dr. (Chun-Ye) Susan Vasana**



Dr. (Chun-Ye) Susan Vasana grew up in China and studied and taught both in China and in North America. She is currently an associate professor of electrical engineering at the University of North Florida, USA. She received her B.S.E.E. degree from Shanghai Jiaotong University, China, and her M.S. degree from Tongji University, China. She received her Ph.D. in electrical and computer engineering from Queen's University, Canada in 1994. She taught at Tongji University for 3 years. She worked for Motorola Inc. for 8 years; and she is the inventor of 10 US patents. Her research interests include wireless communications and digital signal processing.