MIMO Systems and Simulation

Instructor: Prof. Huaping Liu, huaping.liu@gmail.com

Classroom: Room 338, Building #1 (classroom)

Lecture Time: Sunday, June 26th: 1:30-4:30 pm **and** 6:30-8:30 pm
                 Monday, June 27th: 1:30-4:30 pm **and** 6:30-8:30 pm
                 Tuesday, June 28th: 1:30-4:30 pm **and** 6:30-8:30 pm
                 Wednesday, June 29th: break (for digesting the materials learned in the first three days)
                 Thursday, June 30th: 1:30-4:30 pm **and** 6:30-8:30 pm
                 Friday, July 1st: 1:30-4:30 pm **and** 6:30-8:30 pm

Office hours: Contact Drs. Pan and Liu (by appointment)

Prerequisites: Junior standing in ECE, Digital Communications, Probability & Random Processes

Goals:
- Matlab skills (using help and basic commands, vectors & matrices, user-defined functions)
- Basic modulation/demodulation, and detection schemes, and error performance in AWGN
- Basic concepts fading channels and diversity technique
- Space-time codes to achieve spatial diversity and spatial multiplexing

Day	Topics	Chapters
1	• Matlab basics: Symbolic math and basic functions • Basic modulation/demodulation, and detection schemes	Notes part 1 (take notes)
2	• Basic modulation/demodulation, and detection schemes (continued)	
3	• Fading, diversity and combining	Notes part 2
4	• Space-time codes • Spatial multiplexing	Notes part 3 Notes part 4
5	• Spatial multiplexing (continued)	

Course Text: Three chapters of a book by Kwonhue Choi and Huaping Liu are provided (copyright by IEEE Press & Wiley & Sons).

Computer tools: matlab

Course policy: No exams will be given; grades are based on three sets of homework and one final project.
    Homework #1:   25%
    Homework #2:   25%
    Homework #3:   25%
    Final exam: 25% (Friday, July 1st, 6:30-8:30pm, in class)
    Students are expected to finish all assigned homework problems and projects and hand them in on time. **No late homework/project will be accepted**.

Homework & project assignment: described in detail in the three chapters of a book provided to students.
- **Homework #1:** write a report on symbolic math and fading & diversity materials (chapter 25)
- **Homework #2:** write a report on space-time code materials (chapter 28)
- **Homework #2:** write a report on spatial multiplexing materials (chapter 29)
- **Final exam:**   Comprehensive, covering the basic concepts explained in class

Submission of homework: submit via **email.** Submission time of each set of homework (a report) will be announced in class later.

Honor code:
    Students should provide their own (unassisted by anyone) solutions to all homework problems and projects, but may discuss with their colleagues on interpretation of the problems. Copying other students' solutions is strictly prohibited. Unauthorized assistance in any form will severely affect your final grade.