

SYLLABUS

1. **Course name:** Wireless Communication Systems Lab
2. **Course code:** LTEL422664
3. **Credits:** 2 credits (0/6/12) (0 theoretical credits, 6 practical credit)
Duration: 15 weeks (6 main periods and 12 self-study periods) /week
4. **Instructors:**
 - a. Primary instructor: Truong Ngoc Ha, MEng
 - b. Secondary instructors:
 - Truong Quang Phuc, MEng
 - Le Minh Thanh, MEng

5. Course conditions

Prerequisites: N/A.

Corequisites: Communication System, Wireless Communication Systems.

6. Course Description :

This course provides fundamental knowledge about transmission model of wireless communication, affect of fading and ISI to performance of communication wireless, multicarrier system, OFDMA, CDMA, MIMO and multiuser systems.

7. Course Goals:

Goals	<i>Goal description (This course provides students:)</i>	ELOs
G1	Ability to apply knowledge to connect many blocks in wireless communication systems.	01 (M)
G2	Ability to realize, calculate and solution problem in wireless communication system.	02 (M) 09 (L)
G3	Ability to use Matlab, Mathematica software in simulating, analyzing, and solving problems of performance.	03 (H) 04 (M)
G4	Ability to self-study and learn more about advanced techniques.	07 (M) 05 (M)
G5	Ability to apply methods, procedure to solution the lab.	11 (H) 06 (H)
G6	Ability to test, measurement, analysis, design the wireless communication system.	10(H), 11(M), 08 (H)

* Note: H: High; M: Medium; L: Low

8. Course Learning Outcomes - CLOs:

CLOs		<i>Description (After completing this course, students can have:)</i>	Outcome
G1	G1.1	Ability to use Matlab, Mathematica to simulation the labs.	01
	G1.2	Present the modules of wireless communication systems: OFDM, MIMO.	01
G2	G2.1	Analyze and solution the fault when connect the model each others.	02, 09

	G2.2	Analyze performance of wireless communication.	02
G3	G3.1	Simulation different wireless communication use MATLAB.	03
	G3.2	Simulation parameter of wireless communications.	04
G4	G4.1	Present operation of wireless communication by blocks of them.	05
	G4.2	Solve a part problem of systems with block diagram and math models.	07
G5	G5.1	Implement the steps design of wireless communication.	11
			06
G6	G6.1	Analyzes the waveform of the signal, transmission channel, and system performance.	11
			10
			08

9. Study materials:

a. Textbooks:

[1] Simulation of Wireless communication system using Matlab, Mc Graw-Hill, 2007.

b. References:

[2] William H. Tranter, Principles of Communication systems simulation with wireless applications., 2003.

10. Student Assessments:

a. Grading points: 10

b. Planning for students assessment is followed:

Type	Contents	Linetime	Assessment techniques	CLOs	Rates (%)
Midterms					50
P	Channel models in wireless communications, Fading, ISI.	Week 6	Present in class	G1.1, G1.2, G1.3, G2.1, G4.3	20
P	OFDMA.	Week 10	Present in class	G1.2, G1.4, G1.5, G2.1, G2.2, G2.3, G3.1, G4.3	15
P	Multiuser systems, MIMO	Week 14	Present in class	G1.3, G2.4, G3.2, G5.1, G5.2	15
Final exam					50
F	Content includes all output standards of the course.		Individual assessment in class		50

* Note: Q: Quiz; H: Homework; P: Project; M: Midterm Exam; F: Final Exam;

11. Course details:

Week	Contents	CLOs
1	<i>Chapter 1. Introduction software: MatLab, Mathematica (0/6/12)</i>	
	Teaching contents: (6)	G1.1, G1.3,

	<p>1.1 Introduction software: Matlab, Mathematica...</p> <p>Teaching methods:</p> <ul style="list-style-type: none"> + Theoretical lectures + Questions and discussion <hr/> <p>Self-study contents: (12)</p> <p>1.2 Review the basic knowledge of Telecommunication Systems, wireless communication systems.</p>	G5.2
	Chapter 2. Wireless Channel Models (0/6/12)	
2	<p>Teaching contents: (6)</p> <p>2.1 Free space path-loss model</p> <p>2.2 Path-loss and Shadowing models</p> <p>Teaching methods:</p> <ul style="list-style-type: none"> + Theoretical lectures + Questions and discussion <hr/> <p>Self-study contents: (12)</p> <p>2.3 Statistical Fading models</p>	G1.2, G1.5, G2.3, G3.1
	Chapter 2. Wireless Channel Models (cont.) (0/6/12)	
3	<p>Teaching contents: (6)</p> <p>2.4 Narrowband fading models</p> <p>2.5 Large_scale fading models</p> <p>Teaching methods:</p> <ul style="list-style-type: none"> + Theoretical lectures + Questions and discussion <hr/> <p>Self-study contents: (12)</p> <p>2.6 ISI</p>	G1.3, G2.1
	Chapter 3. Effect of Multipath Fading and Propagation (0/6/12)	
4	<p>Teaching contents: (6)</p> <p>3.1 Channel capacity</p> <p>3.2 Diversity in wireless communication</p> <p>Teaching methods:</p> <ul style="list-style-type: none"> + Theoretical lectures + Questions and discussion <hr/> <p>Self-study contents: (12)</p> <p>3.3 Maximal ratio combining</p>	G1.4, G1.5, G2.1, G2.4
	Chapter 4. Multiple Access Techniques (0/6/12)	
5	<p>Teaching contents: (6)</p> <p>4.1 FDMA</p> <p>4.2 TDMA</p> <p>Teaching methods:</p> <ul style="list-style-type: none"> + Theoretical lectures + Questions and discussion <hr/> <p>Self-study contents: (12)</p> <p>4.3 Space multi access technique</p>	G1.4, G1.5, G2.2, G4.3
6	Chapter 4. Multiple Access Techniques (cont.) (0/6/12)	
	<p>Teaching contents: (6)</p>	G1.5, G2.2,

	4.4 CDMA 4.5 OFDMA Teaching methods: + Theoretical lectures + Questions and discussion <hr/> Self-study contents: (12) 4.6 Standard 802.11b/g/n in wireless communication	G2.3, 3.1, 5.1
7	Labs Presentation achieve	
8	Chapter 5: Wireless Communication Systems (0/6/12)	
	Teaching contents: (6) 5.1 Spread spectrum technology Teaching methods: + Theoretical lectures + Questions and discussion <hr/> Self-study contents: (12) 5.2 Pseudo Random	G2.2, G3.1, G5.1
	Chapter 5: Wireless Communication Systems (cont.) (0/6/12)	
8	Teaching contents: (6) 5.3 3G WCDMA/UMTS Teaching methods: + Theoretical lectures + Questions and discussion <hr/> Self-study contents: (12) 5.4 FDD vs TDD	G1.2, G1.4, G1.5, G2.3, G3.1
	Chapter 5: Wireless Communication Systems (cont.) (0/6/12)	
	Teaching contents: (6) 5.5 MIMO Teaching methods: + Theoretical lectures + Presentation, questions and discussion <hr/> Self-study contents: (12) 5.6 Using Matlab to compare exactitude with approximation of bit/symbol error	G1.2, G1.4, G1.5, G2.3, G3.1
10, 11	Chapter 5: Wireless Communication Systems (cont.) (0/6/12)	
	Teaching contents: (6) 5.7 LTE Teaching methods: + Theoretical lectures + Presentation, questions and discussion <hr/> Self-study contents: (12) 5.8 Uplink and downlink in LTE system.	G1.5, G2.2, G2.3, G3.2, G4.3
	Chapter 5: Wireless Communication Systems (cont.) (0/6/12)	
12, 13, 14	Teaching contents: (6) 5.9 LTE (cont.) Teaching methods:	G1.1, G1.2, G2.1, G2.2, G2.3, G3.1,

	+ Theoretical lectures + Presentation, questions and discussion	G3.2, G4.1, G4.2, G4.3.
	Self-study contents: (12) 5.10 Physical layer in LTE	
15	<i>Review</i>	

12. Learning ethics:

Home assignments and projects must be done by the students themselves. Plagiarism found in the assessments will get zero point.

13. First approved date: August 1st 2012

Approval level:

Dean

Department

Instructor

14. Syllabus updated process

1st time: Updated content dated, August 1st 2014	Instructors Head of department
2nd time: Updated content dated, August 1st 2016	Instructors Head of department