

## SYLLABUS

1. **Course name:** Mobile Communications
2. **Course code:** MOCO431864
3. **Credits:** 3 credits (3/0/6) (3 theoretical credits, 0 practical credit)  
*Duration:* 15 weeks (3 main periods and 6 self-study periods) /week)
4. **Instructors:**
  - a. Primary instructor: Pham Hong Lien, Assoc.Prof. Dr
  - b. Secondary instructors:
    - Pham Ngoc Son, Ph.D
    - Truong Ngoc Ha, MEng
5. **Course conditions**  
 Prerequisites: N/A.  
 Corequisites: Communication System.

### 6. Course Description :

This course provides fundamental knowledge in mobile communication (MC) system such as: development history of MC system, transmission media, block diagram of MC system, cell plan in MC system, signal processing between devices, and measurement of network quality, architecture of network elements in GSM and WCDMA.

### 7. Course Goals:

Goals	<i>Goal description (This course provides students:)</i>	ELOs
<b>G1</b>	Knowledge about mobile communication (MC) system, theory about radio channel, block diagram of MC system, and elements in MC system.	01 (H)
<b>G2</b>	Ability to calculate and analyze parameters in a mobile communication system.	02, 11 (M), 10 (L)
<b>G3</b>	Ability to realize simulating and analyzing MC system using the Matlab software	03 (M)
<b>G4</b>	Display engineering and technology standards of mobile network in practice	07 (M)

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

### 8. Course Learning Outcomes - CLOs:

CLOs	<i>Description (After completing this course, students can have:)</i>	ELOs
<b>G1</b>	G1.1 Present the development history of mobile communications.	01, 02, 07
	G1.2 Present channel models and radio signal attenuation characteristics	01, 07
	G1.3 Demonstrate the operation of the GSM wireless network	01, 02, 07, 11
	G1.4 Describe the processes of making a call and signaling	01, 07, 11

	G1.5	Present elements of the GSM wireless network	01, 07, 11
<b>G2</b>	G2.1	Present the problems of mobile network planning	02, 03, 10
	G2.2	Demonstrate the operation of the CDMA wireless network	01, 02, 07, 11
	G2.3	Present elements of the CDMA wireless network	02, 03, 07, 10
	G2.4	Demonstrate the operation and present elements of the WCDMA wireless network	02, 03, 07, 10
<b>G3</b>	G3.1	Ability to work in groups	03, 11
	G3.2	Explain basic English terms related to MC systems	10, 11
	G3.3	Present group-divided projects related to MC systems.	10, 11
<b>G4</b>	G4.1	Design of transmission systems in a MC system.	02, 10, 11
	G4.2	Design core network equipment and signaling network to meet the demand for subscription service.	02, 10, 11
	G4.3	Calculate and design a MC network.	02, 10, 11

**9. Study materials:**

a. Textbooks:

- [1] Nguyễn Phạm Anh Dũng. *Mobile Communication*. Post-office publisher, 2002.

b. References:

- [2] Andrea Goldsmith, *Wireless Communications*. New York, Cambridge University Press, 2009.
- [3] Gordon L. Stuber, *Principles of Mobile Communication*, 2<sup>nd</sup> Ed., Kluwer Academic Publisher, U.S, 2002.
- [4] Andreas F. Molisch, *Wireless communications*, 2<sup>nd</sup> Ed., John Wiley & Sons, 2011

**10. Student Assessments:**

a. Grading points: 10

b. Planning for students assessment is followed:

Type	Contents	Linetime	Assessment techniques	CLOs	Rates (%)
<b>Midterms</b>					<b>50</b>
Q	Knowledge of all chapters.	Week 4	Individual paper test in class	G1.1, G1.2, G1.3, G2.1, G4.3	10
M.1	Knowledge of chapters 3 and 4	Week 8	Individual paper test in class	G1.4, G1.5, G5.1	20

M.2	Knowledge of chapters 5 and 6	Week 9	Individual paper test in class	G1.1, G1.2, G1.3, G1.6, G6.1,	20
<b>Final exam</b>					<b>50</b>
F	Content includes all output standards of the course.		Individual paper assessment in class		50

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

## 11. Course details :

Tuần	Nội dung	CLOs
1	<b>Chapter 1. Introduction about mobile communication (MC) system. (3/0/6)</b>	
	<p><b>Contents of lesson (3)</b></p> <p>1.1. A general introduction about the history of mobile communications.</p> <p>1.2. The basic characteristics of mobile communication systems.</p> <p>1.3. Introduction about the development trend of mobile information networks</p> <p><b>Teaching methods:</b></p> <p>+ Theoretical lectures</p> <p>+ Questions and discussions</p>	G1.1, G3.1, G3.2, G3.3, G2.1, G2.2, G4.1, G3.2
	<p><b>Self- study contents: (6)</b></p> <p>1.4. Non-voice services</p>	
2	<b>Chapter 1. Introduction about mobile communication (MC) system (cont.) (3/0/6)</b>	
	<p><b>Contents of lesson (3)</b></p> <p>1.5. The general structure of a mobile information system</p> <p>1.6. Classification of the functional planes of the mobile communication system.</p> <p><b>Teaching methods:</b></p> <p>+ Theoretical lectures</p> <p>+ Questions and discussion</p>	G1.1, G3.1, G3.2, G3.3, G2.1, G2.2, G4.1, G3.2
	<p><b>Self- study contents: (6)</b></p> <p>1.7. Voice services</p>	
3	<b>Chapter 2. GSM system (3/0/6)</b>	
	<p><b>Contents of lesson (3)</b></p> <p>2.1 Radio interfaces and transmissions</p> <p>2.2 Structure of the MSS switching subsystem</p> <p><b>Teaching methods:</b></p> <p>+ Theoretical lectures</p>	G1.3, G3.1, G3.2, G3.3, G2.1, G2.2, G4.1, G3.2

	+ Questions and discussion <b>Centralized examination: (1)</b>	
	<b>Self- study contents: (6)</b> 2.3 Mobile MS and subscriber identity number	
4	<b>Chapter 2: GSM system (cont.) (3/0/6)</b>	
	<b>Contents of lesson (3)</b> 2.4 BSS radio network structure <b>Teaching methods:</b> + Theoretical lectures + Questions and discussion	G1.3, G3.1, G3.2, G3.3, G2.1, G2.2
	<b>Self- study contents: (6)</b> 2.5 Types of uplink and downlink channels	
5	<b>Chapter 2. GSM system (cont.) (3/0/6)</b>	
	<b>Contents of lesson (3)</b> 2.6 Handovers in the mobile communication <b>Teaching methods:</b> + Theoretical lectures + Questions and discussion	G1.3, G3.1, G3.2, G3.3, G2.1, G2.2, G4.1, G3.2
	<b>Self- study contents: (6)</b> 2.7 The principle of the GPRS network	
6	<b>Chapter 2: GSM system (cont.) (3/0/6)</b>	
	<b>Contents of lesson (3)</b> 2.8 Signaling network structure <b>Teaching methods:</b> + Theoretical lectures + Questions and discussion	G1.6, G3.1, G3.2, G3.3, G2.1, G2.2, G4.1, G3.2
	<b>Self- study contents : (6)</b> 2.9 Some study cases related to signalling	
7	<b>Chapter 3. CDMA system (3/0/6)</b>	
	<b>Contents of lesson (3)</b> 3.1 General introduction 3.2 Spectrum spreading techniques <b>Teaching methods:</b>	G1.6, G3.1, G3.2, G3.3, G2.1, G2.2

	+ Theoretical lectures + Questions and discussion <hr/> <b>Self- study contents:</b> 3.3 Some problems in CDMA	
8	<b>Chapter 3 : CDMA system (cont.)</b> <b>Contents of lesson (3)</b> <b>3.4 Features of CDMA</b> <b>Teaching methods:</b> + Theoretical lectures + Questions and discussion	
	<hr/> <b>Self- study contents: (6)</b> 3.5 Some examples of the main procedures in the CDMA network	G1.4, G3.1, G3.2, G3.3, G2.1, G2.2
9	<b>Chapter 3: CDMA system (cont.)</b> <b>Contents of lesson (3)</b> 3.6 Mobile communication System IS-95 A <b>Teaching methods:</b> + Theoretical lectures + Questions and discussion	
	<hr/> <b>Self- study contents: (6)</b> 3.7 Mobile communication System IS-95 B	G1.4, G3.1, G3.2, G3.3, G2.1, G2.2
10	<b>Chapter 3: CDMA system (cont.) (3/0/6)</b> <b>Contents of lesson (3)</b> 3.8 CDMA-2000 mobile communication system (3/0/6) <b>Teaching methods:</b> + Theoretical lectures + Questions and discussion	, G3.1, G3.2, G3.3, G2.1, G2.2, G4.1, G3.2
	<hr/> <b>Self- study contents: (6)</b> 3.9 Trends to 3G	
11	<b>Chapter 4: 3G mobile communication system (3/0/6)</b> <b>Contents of lesson (3)</b> 4.1 General introduction about WCDMA mobile communication system	G3.1, G3.2, G3.3, G2.1, G2.2, G2.3, G4.1, G3.2

	<p>4.2 Generic block diagram of the WCDMA system</p> <p><b>Teaching methods:</b></p> <p>+ Theoretical lectures + Questions and discussion</p> <p><b>Centralized examination: (1)</b></p> <hr/> <p><b>Self- study contents: (6)</b></p> <p>4.3 Layered architecture in the WCDMA system</p>	
12	<b>Chapter 4: 3G mobile communication system (cont.) (3/0/6)</b>	
	<p><b>Contents of lesson (3)</b></p> <p>4.4 Radio Access Network</p> <p><b>Teaching methods:</b></p> <p>+ Theoretical lectures + Questions and discussion</p> <hr/> <p><b>Self- study contents: (6)</b></p> <p>4.5 Power control</p>	G3.1, G3.2, G3.3, G2.1, G2.2
13	<b>Chapter 4: 3G mobile communication system (cont.) (3/0/6)</b>	
	<p><b>Contents of lesson (3)</b></p> <p>4.6 Signaling in the WCDMA system 4.7 WCDMA network features</p> <p><b>Teaching methods:</b></p> <p>+ Theoretical lectures + Questions and discussion</p> <hr/> <p><b>Self- study contents: (6)</b></p> <p>4.8 Trends to 4G</p>	G3.1, G3.2, G3.3, G2.1, G2.2, G4.1, G3.2
<b>Chapter 5: 4G mobile communication system (3/0/6)</b>		
14	<p><b>Contents of lesson (3)</b></p> <p>5.1 General introduction about OFDM 5.2 General introduction about MC-CDMA, MTC-MC-CDMA</p> <p><b>Teaching methods:</b></p> <p>+ Theoretical lectures + Questions and discussion</p>	

	<i>Self- study contents:</i> (6) 5.3 General introduction about WiMAX
15	<b>Review: Questions and discussion</b>

**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: January 15**

**14. Approval level**

**Dean**

**Department**

**Instructor**

**Nguyen Minh Tam, Ph.D**

**Nguyen Ngo Lam, MEng**

**Phan Van Ca, Ph.D**

**15. Syllabus updated process**

<i>1<sup>st</sup> time: Updated content dated : 15/01/2014</i>	<b>Instructors:</b> Phan Van Ca, Ph.D  <b>Head of department:</b> Vo Minh Huan, Ph.D
<i>2<sup>nd</sup> time: Updated content dated : 15/01/2016</i>	Instructors: Truong Ngoc Ha, MEng  Head of department : Phan Van Ca, Ph.D