

## SYLLABUS

1. **Course name:** Advanced Topics in Communications
2. **Course code:** TETM423164
3. **Credits:** 2 credits (2/0/4) (2 theoretical credits, 0 practical credit)  
*Duration:* 15 weeks ((2 main periods and 4 self-study periods) /week)

**4. Instructors:**

- a. Primary instructor: Pham Ngoc Son, Ph.D
- b. Secondary instructors:
  - Phan Van Ca, Ph.D
  - Pham Hong Lien, Assoc. Prof., Ph.D
  - Le Minh Thanh, MEng
  - Truong Ngoc Ha, MEng

**5. Course conditions**

Prerequisites: Finish all specialized courses  
 Corequisites: N/A.

**6. Course Description :**

This course introduces selective topics in communication field being applied now. This course focuses to research overview and analyze, evaluate technology and technical methods, as well as intensive theories of communication field. Commonly practical matters are also proposed as topic forms and being presented, discussed in the class. Detail content of this course can be changed according to selecting specialize topics. These topics can include overview introduction of communication networks, details about Public Switched Telephone Network (PSTN), principle of WCDMA system being used, SDH HiT 7070 transmission, NGN, radio optimization, power system, KPI, MPLS, ... Last, the results about overview analyzation and evaluation will be included in research topics that are suitable for students.

**7. Course Goals:**

Goals	<i>Goal description (This course provides students:)</i>	ELOs
G1	Ability to apply basic techniques about modulation and demodulation, multiplex, spectrum spreading, switching, power, radio to realize, analyse and evaluate communication matters being deployed.	01 (H)
G2	Ability to realize, set up, solve technique matters, and design a simple communication system.	02 (M)
G3	Ability to use software in radio optimization such as Driving test, log file analysis to collect data and propose solutions.	03 (M)
G4	Ability to self-study of new technologies.	07 (M)
G5	Ability to set up, configure and operate real communication systems; detect and shoot trouble, optimize system.	10 (L) 11 (H)

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

**8. Course Learning Outcomes - CLOs:**

CLOs	<i>Description (After completing this course, students can have:)</i>	Outco me
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<b>G1</b>	G1.1	Describe development of exchange generations, NGN system, function blocks of system, mobile generations.	01, 07
	G1.2	Present techniques used in communication systems now such as spectrum spreading, switching, and multiplexing.	01, 07
	G1.3	Describe power system of communication devices.	01, 07
	G1.4	Analyze and evaluate key performance index of system.	01, 07
<b>G2</b>	G2.1	Analyze collected data to adjust properly.	02
	G2.2	Detect trouble through relationships.	02, 07
<b>G3</b>		Use software in radio optimization such as Driving test, log file analysis to harvest data and, analyze and to propose solutions.	03
<b>G4</b>		Evaluate new communication technologies.	07
<b>G5</b>	G5.1	Set up, configure and operate real communication systems.	11
	G5.2	Detect and shoot trouble, optimize system.	11

## 9. Study materials:

### a. Textbooks:

This subject doesn't have mandatory textbooks. Students will be provided specialized documents to study and report.

### b. References:

- [1] Roger L. Freeman: *Fundamentals of telecommunications* –2nd ed.
- [2] Ericsson, Telia: *Understanding Telecommunications*, Part II, ISBN 91-44-00214-9
- [3] James F. Kurose, Keith W. Ross: *Computer Networking* (2nd Ed.,Addison Wesley)
- [4] A.S. Tanenbaum: *Computer Networks* (4th Ed., Prentice Hall)

## 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	Including knowledge in all chapters.	Weeks 2-15	Individual paper test in class	G1.1, G1.2, G4, G5.1, G5.2	20
M.1	Including knowledge in chapter 1 and 2.	Week 6	Individual paper test in class	G1.1, G1.2, G4	15
M.2	Including knowledge in chapter 3	Week 9	Individual paper test in class	G1.1, G1.2, G2.2, G4	15
<b>Final exam</b>					<b>50</b>
F	Content covers communication matters being deployed.		Essay		50

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

## 11. Course details:

Week	Contents	CLOs
1	<i>Chapter 1. Introduce communication networks (2/0/4)</i>	

	<p><b>Teaching contents: (2)</b>  1.1 Public Switched Telephone Network (PSTN)  1.2 Intergrated Switching Digital Network (ISDN)  1.3 ATM and ISDN broadband  1.4 X-25 and Frame Relay</p> <p><b>Teaching methods:</b>  + Theoretical lectures  + Questions and discussion</p> <hr/> <p><b>Self-study contents: (4)</b>  1.5 IETF, IEEE, ITU-T standards</p>	G1.1, G1.2, G4
	<b>Chapter 1. Introduce communication networks (cont.) (2/0/4)</b>	
2	<p><b>Teaching contents: (2)</b>  1.6 Mobile networks: GSM and WCDMA  1.7 Signaling system #7  1.8 Internet, TCP/IP configuration and services</p> <p><b>Teaching methods:</b>  + Theoretical lectures  + Questions and discussion</p> <hr/> <p><b>Self-study contents: (4)</b>  1.9 Layers in OSI model and their functions.  1.10 X21</p>	G1.1, G1.2, G4
	<b>Chapter 2. Public Switched Telephone Network (PSTN) (2/0/4)</b>	
3	<p><b>Teaching contents: (2)</b>  2.1 Introduction  2.2 Services and terminals</p> <p><b>Teaching methods:</b>  + Theoretical lectures  + Questions and discussion</p> <hr/> <p><b>Self-study contents: (4)</b>  2.3 PCM  2.4 PBX exchange</p>	G1.1, G1.2, G4
	<b>Chapter 2. Public Switched Telephone Network (PSTN) (cont.) (2/0/4)</b>	
4	<p><b>Teaching contents: (2)</b>  2.5 Exchange techniques  2.6 Types of switching</p> <p><b>Teaching methods:</b>  + Theoretical lectures  + Questions and discussion</p> <hr/> <p><b>Self-study contents: (4)</b>  2.7 Huffman code  2.8 Q52 recommendation</p>	G1.1, G1.2, G4
	<b>Chapter 2. Public Switched Telephone Network (PSTN) (cont.) (2/0/4)</b>	
5	<p><b>Teaching contents: (2)</b>  2.9 PSTN exchange and interfaces  2.10 Call flows</p> <p><b>Teaching methods:</b>  + Theoretical lectures</p>	G1.1, G1.2, G2.2, G4

	+ Questions and discussion	
	<b>Self-study contents: (4)</b> 2.11 HiE exchange (Siemens)	
	<b>Chapter 3: Principle of WCDMA system (2/0/4)</b>	
6	<b>Teaching contents: (2)</b> 3.1 Radio transmission environment. 3.2 Multi access technique and full-duplex transmission. 3.3 CDMA principle and Rake receiver <b>Teaching methods:</b> + Theoretical lectures + Questions and discussion	G1.1, G1.2, G4
	<b>Self-study contents: (4)</b> 3.4 Rayleigh fading 3.5 Simulate and analyze performance of 2 nodes connected directly	
	<b>Chapter 3: Principle of WCDMA system (cont.) (2/0/4)</b>	
7	<b>Teaching contents: (2)</b> 3.6 Technical features of WCDMA FDD 3.7 Compare radio interfaces between WCDMA and GSM <b>Teaching methods:</b> + Theoretical lectures + Questions and discussion	G1.1, G1.2, G4
	<b>Self-study contents: (4)</b> 3.8 Open-loop power control and closed-loop power control 3.9 Hard handover and soft handover	
	<b>Chapter 3: Principle of WCDMA system (cont.) (2/0/4)</b>	
8	<b>Teaching contents: (2)</b> 3.10 WCDMA bands 3.11 RAN interface protocol <b>Teaching methods:</b> + Theoretical lectures + Questions and discussion	G1.1, G1.2, G4
	<b>Self-study contents: (4)</b> 3.12 Function of Iur interface 3.13 Messages in Iub interface	
	<b>Chapter 4: SDH HiT 7070 transmission (Siemens) (2/0/4)</b>	
9	<b>Teaching contents: (2)</b> 4.1 Wavelength Division Multiplexing (WDM) 4.2 Configuration and operation of HiT 7070 device <b>Teaching methods:</b> + Theoretical lectures + Questions and discussion	G1.2, G2.2, G4, G5.1, G5.2
	<b>Self-study contents: (4)</b> 4.3 HiT 7070 interfaces	
	<b>Chapter 5: NGN system (2/0/6)</b>	
10	<b>Teaching contents: (2)</b> 5.1 Media gateway	G1.1, G2.2, G4, G5.1,

	<p>5.2 Border access control device or Session Border Controller (SBC)  5.3 SoftSwitch</p> <p><b>Teaching methods:</b>  + Theoretical lectures  + Questions and discussion</p> <hr/> <p><b>Self-study contents: (4)</b>  5.4 Gigabit Route Switch</p>	G5.2
	<b>Chapter 6: Radio network optimization (2/0/4)</b>	
11	<p><b>Teaching contents: (2)</b>  6.1 Purpose of optimization  6.2 Driving test  6.3 Data analysis and correction</p> <p><b>Teaching methods:</b>  + Theoretical lectures  + Presentation, Questions and discussion</p> <hr/> <p><b>Self-study contents: (4)</b>  6.4 Add neighbor in RNC, BSC system</p>	G1.1, G1.2, G2.1, G2.2, G3, G4, G5.2
	<b>Chapter 7: Power supply in communication system (2/0/4)</b>	
12	<p><b>Teaching contents: (2)</b>  7.1 Overview types of power supply  7.2 Standards of setting up power supply</p> <p><b>Teaching methods:</b>  + Theoretical lectures  + Presentation, Questions and discussion.</p> <hr/> <p><b>Self-study contents: (4)</b>  7.3 Accu and its capacity</p>	G1.3, G2.1, G2.2, G5.1, G5.2.
	<b>Chapter 8: KPI in 3G network (2/0/6)</b>	
13	<p><b>Teaching contents: (2)</b>  8.1. Meaning of KPI.  8.2. Typical kinds of KPI</p> <p><b>Teaching methods:</b>  + Theoretical lectures  + Presentation, Questions and discussion.</p> <hr/> <p><b>Self-study contents: (4)</b>  8.3. KPI of mobile network</p>	G1.4, G2.1, G2.2, G5.2.
	<b>Chapter 9: MPLS (2/0/4)</b>	
14	<p><b>Teaching contents: (2)</b>  9.1 Overview of MPLS.  9.2 How MPLS is working</p> <p><b>Teaching methods:</b>  + Theoretical lectures  + Presentation, Questions and discussion</p> <hr/> <p><b>Self-study contents: (4)</b>  9.3 VPN-MPLS</p>	G1.2, G4
15	<b>Review</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 2014**

**14. Approval level:**

**Dean**

**Department**

**Instructor**

**Nguyễn Minh Tâm, Ph.D**

**Nguyễn Ngô Lâm, MEng**

**Phan Văn Ca, Ph.D**

**15. Syllabus updated process**

<b>1<sup>st</sup> time:</b> Updated content dated	Instructors
<b>2<sup>st</sup> time:</b> Updated content dated	Head of department