THAI NGUYEN UNIVERSITY
UNIVERSITY OF INFORMATION AND COMMUNICATION TECHNOLOGY

SOCIALIST REPUBLIC OF VIET NAM
Independence - Freedom – Happiness

COURSE SYLLABUS

(Training level: Undergraduate)

Course Title*:*

Vietnamese Course Title: Thông tin di động.

English Course Title: Mobile Communications.

Course Code: MOC321

Major: Electronics – Telecommunication Engineering Technology

Version: 2017

1. General Information

- Number of credits: 3 (Theory: 02; Practice: 0)
- Types of knowledge:

General Education		Base core courses		Major core courses		Concentration courses		Others
Required □	Optional □	Required □	Optional □	Required ☑	Optional □	Required □	Optional □	Alternative subject of Graduation Thesis □

- Required courses : None
- Pre-requisite: None
- Co-requisite: Transmission engineering, Optical Fiber Communications.
- Facility Requirements: Classrooms with projectors
- Practice Room: None
- Departments in Charge: Department of Electronic and Telecommunication - Faculty of Electronics And Communications Technology.

2. Time Allocated

Total: 36 periods	Theory: 22 periods
	Discussion/ Group Presentation: 12
	Assignment/ Essay/ Practice: 0 periods.
	Tests: 2 *+ Theory: Number of Tests: 02 Periods: 02* *+Practice: Number of Tests: 0. Periods:0.*
Self-Study: 60 periods. Other activities (visiting, surveying, outdoor activities, organizing events, clubs): 0 periods (or sessions)	

3. Lecturer's Information

No.	Lecturer name	Phone number	Email	Note
1	MSc.Pham Van Ngoc	0915900226	pvngoc@ictu.edu.vn	Leader
2	MSc.Do Van Quyen	0949834131	dvquven@ictu.edu.vn	Member
3	MSc. Mac Thi Phuong	0888221882	mtphuong@ictu.edu.vn	Member

4. Objectives

- Objectives:

+ Knowledge: The Mobile Communications course aims to equip students with basic knowledge of the basic design of cellular cellular communication systems, knowledge of GSM, 3G, 4G mobile systems...

+ Skills: Students have the ability to work independently or effectively in groups, and have the ability to self-study to accumulate knowledge.

+ Attitude: The course helps students gain confidence and professionalism in problem solving. Have standard professional ethics.

- Positionof the course: The course belongs to the major core courses, which is compulsory

- The course contributes to meeting the L5, L9, L11 learning outcomes of the training program…

5. Description of content and course learning outcome:

- Knowledge Standards: *(1) Remember ⇨ (2) Understand ⇨ (3) Apply ⇨ (4) Analyze ⇨ (5) Create.*

- Attitude Standards: *(1) Copy ⇨ (2) Self-manipulation ⇨ (3) Masterfully repeating to the norm ⇨ (4) Combining multiple activities ⇨ (5) Completely proactive.*

Notation CLOs	Contents	Level		PLOs
		Knoweldge	Skills	
C1	Understand the design basis of cellular communication systems	2		L9
C2	Explain the processes of operation, exploitation, error handling and management of GSM mobile communication system	3		L11
C3	Understand the knowledge of orthogonal codes and spread spectrum techniques.	2		L9
C4	Explain the processes of operation, exploitation, error handling and management of 3G-UMTS mobile communication system	3		L11
C5	Explain the processes of operation, exploitation, error handling and administration of 4G-LTE mobile communication system.	3		L11
C6	Ability to work independently, present on technical issues in the field of mobile communication		3	L5

6. Reading List

- Main Syllabus:

[1]. Trinh Anh Vu, *Mobile Communications*, VNU Publishing House.

[2]. Nguyen Pham Anh Dung (2004), *The Third Generation Mobile Technology*, Post Office Publishing House

- References:

[3] Pham Van Ngoc (2017), *Mobile Communication Lecture*, Faculty of Electronics And Communications Technology, ICTU.

[4] Vu Duc Tho (2004), *Calculation of Digital Mobile Communication Network*, Vietnam Education Publishing House.

[5] Pham Cong Hung (2007), *Mobile Communications*, Science and Technics Publishing House.

[6]. Stefania Sesia (2011), *LTE — UMTS Long Term Evolution*, from Theory to practice, Second Edition, John Wiley & Sons.

[7]. Jaana Laiho and Achim Wacker (2006), *Radio Network Plainning and Optimisation for UMTS,* Second Edition, John Wiley & Sons.

7. Score Assessment

- Score Scale: 10.
- Components Assessment:

Evaluation Time	**Components Assessment**	**Course Learning Outcome**	**Factor**	**Score**	**Weight**
During the duration of the course	Attendance: (score b_0)		1	d=($b_0+b_1+b_2$)/3	40%
According to the teaching plan in section 9	Test No.1: (score b_1)	C1, C2, C6	1		
	Test No.2: (score b_2)	C3, C4, C5, C6	1		
The end of the term.	Final exam	C1-C5		e	60%
Final Score: (f)				f = d ×40% + e ×60%	

- Final exam: Multiple choice question.

8. Regulations for students

8.1. Student's duties

- Read the material and prepare for each lesson before attending class.
- Complete assigned assignments.
- Prepare discussion content for the course.

8.2. Regulations on Exams and Academic Studies

- Students must attend classes, ensuring at least 80% of classroom sessions.
- Complete the assigned tasks for the course.

- Participate in the full number of regular tests.

9. Teaching Plan

No.	Period	Contents	Teaching Methodology	CLOs	References
1.	2	**Chapter 1: Basics of Cellular Mobile Systems Design** 1.1. Overview of Mobile Communications. 1.2. Cells and frequency allocation 1.3. Co-channel interference and system capacity 1.4. Adjacent channel interference and channel allocation scheme 1.5. Frequency reuse 1.6. Channelization and handover strategy	Presentation; Raise and solve problems.	C1, C6	[1] Pages 1-29 [5] Pages 89-101
2.	3	**Chapter 1: Basics of Cellular Mobile Systems Design (continue)** 1.7. Trunks and service levels 1.8. Increase the capacity of the cellular system 1.9. Balanced technical basis 1.10. Diversification technique	Presentation; Raise and solve problems.	C1, C6	[1]. Pages 29- 66 [1]. Pages 163-178 [4]. Pages 174-205
3.	3	**Discussion 1:** - Compare methods to increase the capacity of the cellular system. - How does adjacent channel interference affect the GSM system? - How does adjacent channel interference affect the mobile communication system? Instructions for solving assigned exercises.	Student groups present and discuss according to the plan under the supervision of the lecturer	C1, C6	[1]. Pages 1-66 [1]. Pages 163-178 [4]. Pages 174-205 [5]. Pages 89-101
4.	3	**Chapter 2: The GSM Mobile Communication System** 2.1. GSM system architecture 2.2. Geographical structure of GSM network 2.3. Radio Architecture 2.4. Types of channels in GSM 2.5. Frame structure 2.6. Signaling in GSM 2.7. Calls in GSM	Presentation; Raise and solve problems.	C2, C6	[1]. Pages 88 - 102 [4]. Pages 110-133 [5]. Pages 73 - 77
5.	2	**Chapter 2: The GSM Mobile Communication System (continue)** 2.8. Handover in GSM 2.9. Signal processing in GSM 2.10. General packet radio system architecture GPRS	Presentation; Raise and solve problems.	C2, C6	[1]. Pages 88 — 102 [1]. Pages 230 -236 [1]. Pages 134-157 [5]. Pages 105-110

No.	Period	Contents	Teaching Methodology	CLOs	References
		2.11. Types of channels in GPRS network 2.12. Mobile Management GPRS 2.13. Numbering system in mobile network			
6.	3	**Discussion 2:** - Compare GSM and GPRS system architecture. - Compare channel types in GSM and GPRS systems - Compare numbering in mobile and fixed networks.	Student groups present and discuss according to the plan under the supervision of the lecturer	C2, C6	[1]. Pages 88 — 102 [4]. Pages 110-157 [4]. Pages 73-110
7.	2	Test No. 1 (Written)	Test the theory	C1, C2, C6	[1]. Pages 191-200 [5]. Pages 132-144
		Chapter 3: Orthogonal codes and spread spectrum techniques 3.1. Pseudo-random sequence (PN) 3.2. Orthogonal code	Presentation; Raise and solve problems.	C3, C6	[1]. Pages 200-222 [1]. Pages 152-164 [5]. Pages 120-132
8.	2	**Chapter 3: Orthogonal codes and spread spectrum techniques (continue)** 3.3. Overview of spread spectrum techniques 3.4. Direct Sequential Spread Spectrum - DSSS 3.5. Operation of Direct Sequence Spread Spectrum – DSSS 3.6. Frequency Hopping Spread Spectrum – FHSS 3.7. Operation of frequency hopping spread spectrum – FHSS 3.8. Time Hopping Spread Spectrum – THSS 3.9. Multi-carrier spread spectrum system	Presentation; Raise and solve problems.	C3, C6	[1]. Pages 200-222 [1]. Pages 152-164 [5]. Pages 120-132
9.	3	**Chapter 4: The 3G-UMTS Mobile Communication System** 4.1. General introduction 4.2. Architecture of 3G- UMTS System. 4.3. Physical, Transport and Logical Channels in WCDMA 4.4. UMTS network interface	Presentation; Raise and solve problems.	C4, C6	[2]. Pages 307-411 [5]. Pages 111-119 [7]. Pages 28 - 75
10.	2	**Chapter 4: The 3G-UMTS Mobile Communication System (continue)** 4.5. Power control 4.6. Transfer control. 4.7. Set up calls in UMTS	Presentation; Raise and solve problems.	C4, C6	[2]. Pages193-202 [2]. Pages307 - 426 [5]. Pages 111-157 [7]. Pages 197-224

No.	Period	Contents	Teaching Methodology	CLOs	References
11.	3	**Discussion 3:** - Compare the GSM and WCDMA system architecture. - Compare the channel types of WCDMA vs GSM system - Compare the handover in GSM and CDMA networks	Student groups present and discuss according to the plan under the supervision of the lecturer	C4, C6	[2]. Pages 193-202 [2]. Pages 307-426 [5]. Pages 144-157
12.	3	**Chapter 5: The 4G-LTE Mobile Communication System** 5.1. 4G network architecture 5.2. Protocol Architecture 5.3. Service quality	Presentation; Raise and solve problems.	C5, C6	[6]. Pages 25-120
13.	2	Test No. 2 (Written)	Test the theory	C3, C4, C5, C6	[2]. Pages 193-202 [2]. Pages 307-426 [5]. Pages 144-157 [6]. Pages 25-120
		Chapter 5: The 4G-LTE Mobile Communication System (continue) 5.4. E-UTRAN network interfaces 5.5. Channels in 4G	Presentation; Raise and solve problems.	C5, C6	[6]. Pages 189-214 [6]. Pages 343 - 369
14.		**Discussion 4** - Compare the 3G and 4G system architecture. - Compare the channel types of 3G vs 4G system	Student groups present and discuss according to the plan under the supervision of the lecturer	C4, C5, C6	[2]. Pages 193-202 [2]. Pages 307-426 [5]. Pages 144-157 [6]. Pages 189-214 [6]. Pages 343-369

10. Competent Authority Approval: University of Information and Communication Technology

August 27th , 2017

Vice Rector	Vice Dean	Vice Head of Department	Composer Team
PhD. Do Dinh Cuong	PhD. Vu Chien Thang	MSc. Doan Thi Thanh Thao	Pham Van Ngoc Do Van Quyen Mac Thi Phuong