

COURSE SYLLABUS
(Training level: Undergraduate)

Course Title:

Vietnamese Course Title: Kỹ thuật truyền dẫn

English Course Title: Transmission engineering

Course Code:

Major: Electronic and telecommunication technology.

Version: 2017

1. General Information

- Number of credits: 2 (Theory: 2; Practice:0)

- Types of knowledge:

General Education		Base core courses		Major core courses		Concentration courses		Others
Required <input type="checkbox"/>	Optional <input type="checkbox"/>			Electronic and telecommunication technology.				
		Required <input type="checkbox"/>	Optional <input type="checkbox"/>	Required <input checked="" type="checkbox"/>	Optional <input type="checkbox"/>	Required <input type="checkbox"/>	Optional <input type="checkbox"/>	

- Required courses: Digital communications

- Pre-requisite: None

- Co-requisite: None

- Facility Requirements: Classrooms with projectors.

- Departments in Charge: Faculty Electronic and Communication technology.

2. Time Allocated

Total: 36 periods	Theory: 22 periods
	Discussion/ Group Presentation: 12
	Assignment/ Essay/ Practice: 0 period.
	Tests: 02 + Theory: Number of Tests: 2. Periods: 2 + Practice: Number of Tests: 0 Periods: 0
Self-Study: 60 periods.	

3. Lecturer's Information

No.	Lecturer name	Phone number	Email	Note
1	ThS. Nguyễn Thị Ngân	092 386 8884	ntngan@ictu.edu.vn	Leader

2	TS. Hoàng Quang Trung	090 405 5956	hqtrung@ictu.edu.vn	Member
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4. Objectives

- Knowledge: After studying this course, students will understand the basic knowledge of transmission systems, multiplexing technology, and techniques of converting analog signal to digital signal. From there, students can understand and explain actual transmission problems.
- Skills: Students can calculate some practical transmission problems.
- Attitude: The course creates confidence, professionalism in problem solving. Promote the students' sense of self-study and creativity. Consciously apply the knowledge learned to life in general and professional reality in particular.
- Position of course: The course belongs to the major core courses, which is compulsory.
- The course contributes to meeting the L5, L7, L9 learning outcomes of the training program.

5. Description of content and course learning outcome:

- **Knowledge Standards:** (1) Remember \Rightarrow (2) Understand \Rightarrow (3) Apply \Rightarrow (4) Analyze \Rightarrow (5) Create.
- **Attitude Standards:** (1) Copy \Rightarrow (2) Self-manipulation \Rightarrow (3) Masterfully repeating to the norm \Rightarrow (4) Combining multiple activities \Rightarrow (5) Completely proactive.

Notation CLOs	Contents	Level		PLOs
		Knowledge	Skills	
C ₁	Understand the process of transmission system development	2		L7
C ₂	Understand the role of the components in the transmission system	2		L9
C ₃	Understand analog transmission and digital transmission	2		L9
C ₄	Analyze the factors that affect signal quality	4		L7
C ₅	Explain remedial measures	2		L9
C ₆	Explain: sampling theorem, pulse information system, digitizing principles of each technique	2		L9
C ₇	Explain signal digitization diagrams	2		L9
C ₈	Understand each signal digitization	2		L9
C ₉	Explain: coding rules, spectrum, advantages and disadvantages, applications of each type of line code and the problem of jitter	2		L9
C ₁₀	Execute line coding		3	L5
C ₁₁	Do the exercises: bit rate, symbol rate and minimize jitter		3	L5
C ₁₂	Explain the advantages and disadvantages of polar and bipolar code	2		L7
C ₁₃	Explain the working principle of TDM and FDM	2		L9

Notation CLOs	Contents	Level		PLOs
		Knoweldge	Skills	
C ₁₄	Understand PCM30 and PCM24 systems; SDH and PDH	2		L9
C ₁₅	Explain the structure and function of optical transmission equipment	2		L9
C ₁₆	Understand actual transmission network systems: PSTN, xDSL, Cellular Mobile Access Network, core network	2		L5
C ₁₇	Explain the structure of some actual transmission networks	2		L7

6. Reading List

- Main Syllabus:

[1]. David R. Smith (2004), *Digital Transmission Systems*, Springer US

[2]. Nguyen Quoc Binh (2001), *Transmission engineering*, Military Technical Academy.

- References:

[3]. Bui Trung Hieu, Trinh Thong (2001), *Synchronyzation Digital Hierachy SDH*, Buu Dien

[4]. Bui Thien Minh (2000), *digital microwave*, Buu Dien

[5]. Sarah Katie Wilson, Stephen G. Wilson, Ezio Biglieri (2016), *Transmission Techniques for Digital Communications*, Academic Press Library in Mobile and Wireless Communications

[6]. R. G. Winch (1998), *Telecommunication Transmission systems*, McGraw-Hill

[7]. Gilbert Held (1999), *High Speed Digital Transmission Networking: Covering T/E – Carrier Multiplexing, SONET and SDH*, John Wiley & Son

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	$d=(b_0+b_1+b_2+ \dots)/\dots$	30%
According to the teaching plan in section 9	Test No.1: (score b_1)	C ₁ , C ₂ , C ₃ , C ₄ , C ₅ , C ₆ , C ₇ , C ₈ , C ₉ , C ₁₀ , C ₁₁ , C ₁₂	1		
	Test No.2: (score b_2)	C ₁₃ , C ₁₄ , C ₁₅	1		
The end of the term.	Final exam	C ₁ , C ₂ , C ₃ , C ₄ , C ₅ , C ₆ , C ₇ ,		e	70%

		C ₈ , C ₉ , C ₁₀ , C ₁₁ , C ₁₂ , C ₁₃ , C ₁₄ , C ₁₅			
Final Score: (<i>f</i>)				$f = d \times 30\% + e \times 70\%$	

- 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.

9. Teaching Plan

No.	Period	Contents	Teaching Methodology	CLOs	References
1	3 (theory)	Chapter 1: Overview 1.1. Historical Background 1.2. Introduction to digital transmission system 1.3. Transmission medium 1.4. Analogue transmission and digital transmission 1.5. Configuration of the transmission system 1.6. Basic quality parameters of digital transmission system 1.7. Digital Transmission Standards	Presentation	C ₁ , C ₂ , C ₃ , C ₄ , C ₅	[1]. 1-15, 437-611 [2].152-200 [6]. 8-18 [7]. 2-22
2	3 (theory)	Chapter 2. Analog-to-Digital Conversion Techniques 2.1 Sampling theorem and pulse information system 2.2. Analog-to-Digital Conversion Techniques 2.2.1. PCM	Presentation	C ₆ ,C ₇	[1]. 85-112, [2]. 26-38 [6]. 21-34, [7]. 48-53
3	3 (theory)	2.2.2. DPCM 2.2.3. ADPCM	Presentation	C ₅ , C ₆	[1].131-160, [2]. 38-42 [4].215-263

No.	Period	Contents	Teaching Methodology	CLOs	References
4	3 (Discuss)	<u>Discuss1</u> - Do the excercises: calculate Rb, Rs - pros and cons of each digitizing Technique	Discuss	C ₆ ,C ₇ , C ₈ ,C ₁₁	[1]. 85-160, [2]. 29-42 [7]. 56
5	3 (theory)	2.3. Baseband signal processing 2.3.1. <i>Problem of jitter and wander</i> 2.3.2. <i>Minimizing jitter</i> 2.3.3. <i>Digital signal recovery</i> 2.3.4. <i>Line coding</i>	Presentation	C ₉ , C ₁₀ , C ₁₁ , C ₁₂	[2].76-107 [4]. 215-313 [6]. 38-48 [7]. 28-35
6	3 (Discuss)	<u>Discuss2</u> - Do the excercises: Line coding and random scrambling - Line coding	Discuss	C ₉ , C ₁₀ , C ₁₁ , C ₁₂	[4]. 215-313 [6]. 38-48 [7]. 28-35
7	3 (theory)	Chapter 3. Multiplexing 3.1. Overview 3.2. Time-Division Multiplexing - Test No.1 (Written)	Presentation	C ₁₃	[1].177-200, [2]. 52-58, [4]. 145-151 [7]. 73-83
8	3 (theory)	3.3. Primary multiplexing 3.3.1. <i>PCM24</i> 3.3.2. <i>PCM30</i> 3.4. Higher-Order Digital Multiplexing 3.4.1. <i>PDH</i>	Presentation	C ₁₄	[2]. 58-67 [4]. 145-159 [6]. 34-62
9	3 (theory)	3.4.2. <i>SDH</i> 3.4.3. <i>ATM</i> 3.4.4. <i>TV signal multiplexing</i>	Presentation	C ₁₄ , C ₁₅	[1].177-200, [2]. 65-67, [3].11-39,116-119 [4]. 145-159 [6]. 34-62 [7]. 73-83
10	3 (Discuss)	<u>Discuss3</u> - Digital Multiplexing + Digital Signal TDM and Analog Signal TDM + Synchronous TDM and statistical TDM + PCM24 and PCM30 + SDH and PDH	Discuss	C ₁₃ , C ₁₄ C ₁₅	[1].75-85; [3]. 11-8, 76-92 [4].136-165
11	3 (theory)	Chapter 4. Reality Transmission Systems 4.1. PSTN 4.2. Access network	Presentation	C ₁₆ , C ₁₇	[1].745-799 [5]. 11-16

No.	Period	Contents	Teaching Methodology	CLOs	References
		4.2.1. xDSL 4.2.2. FTTx 4.3. Core network - Test No. 2 (Written)			
1 2	3 (Discuss)	- <u>Discuss3</u> Architecture of several actual networks - Review	Discuss	C ₁₆ , C ₁₇	[5]. 11-16

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

August 27th, 2017

Vice Rector

Dean

[Vice] Head of Department

Composer Team

MSc. Nguyen Thi Ngan

MSc. Hoàng Quang Trung

11. Updated Procedure

1st update:

Updater