

SYLLABUS

1. **Course name:** Communication Systems Lab
2. **Course code:** COSL420764E
3. **Credits:** 2 credits (0/2/4) (0 theoretical credits, 2 practical credit).
Duration: 15 weeks (6 main periods and 12 self-study periods)/week).

4. Instructors:

- a. Primary instructor: Dang Phuoc Hai Trang, M.Eng.
- b. Secondary instructors:
 - Nguyen Van Phuc, M.Eng.
 - Truong Ngoc Ha, M.Eng.

5. Course conditions:

- a. Prerequisites: N/A.
- b. Corequisites: Communication Systems, Electronics Practice.

6. Course Description:

This course provides the basic skills such as: analyzing, measuring, explaining and repairing analog modulation circuits (AM, FM), digital modulation circuits (ASK, FSK, PSK ...), pulse modulation circuits (PAM, PWM, PPM ...), multiplexing circuits (TDM, FDM) and other practical circuits.

7. Course Goals

Goals	Goal description <i>This course provides students:</i>	ELOs
G1	Basic knowledge and how to connect blocks in a communication system.	01 (M)
G2	Ability to analyze and assemble electronic circuits.	02 (M)
G3	Ability to use modern equipments in experiments.	03 (H)
G4	Ability to communicate in technical environment, read and present communication documents.	04 (M), 05 (M)
G5	Ability to perform steps to design a communication system.	07 (M)
G6	Ability to measure, test, analyze, calculate, design and assembly electronic circuits or communication systems.	10 (H), 11 (M)
G7	Ability to work effectively as a member of teams, build industrial style.	06 (H), 08 (H), 9 (L)

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

8. Course Learning Outcomes - CLOs:

CLOs		Description <i>After completing this course, students can have:</i>	ELOs
G1	G1.1	Know how to use the experimental kits.	01
	G1.2	Ability to present block diagrams: analog and digital modulator and demodulator, pulse modulator and demodulator, multiplexer.	01
G2	G2.1	Ability to analyze and fix errors in a block.	02

	G2.2	Ability to analyze and fix errors when connecting blocks in a system.	02
G3	G3.1	Ability to use MultiSim software to simulate a communication system.	03
	G3.2	Ability to use Matlab software to simulate system parameters.	03
G4	G4.1	Ability to perform operation of the experimental kits.	04
	G4.2	Reading digital datasheet.	05
G5	G5.1	Ability to perform steps to design a communication system.	07
G6	G6.1	Ability to design and assembly balance modulator circuit, frequency modulator, pulse modulator ...	11
	G6.2	Ability to analyze audio and carrier signal, modulated and multiplexed signal ...	11
	G6.3	Test and measurement in the communication systems experiments.	10
G7	G7.1	Ability to work in a team, formed industrial style.	06, 08, 09

9. Study materials:

a. Textbooks:

[1]. Sigma, *Experiment manual*.

b. References:

[2]. Phan Van Ca, *Communication Systems*, VNUP, 2017.

[3]. Datasheets.

10. Student Assessments:

a. Grading points: 10

b. Planning for students assessment is followed:

Type	Contents	Line time	Assessment techniques	CLOs	Rates (%)
Report					40
P	AM, FM, ASK, PSK, FSK system.	Week 6	Report by individual / group	G1, G4, G5, G7	10
P	PAM/PWM/PPM, PCM, DM system.	Week 10	Report by individual / group	G1, G4, G5, G7	10
P	TDM, FDM system.	Week 14	Report by individual / group	G1, G4, G5, G7	10
H	Homework.	Week 14	Report by individual / group	G3, G5	10
Test 1					30
M	AM, FM, ASK, PSK, FSK kits.	Week 7	Assembling, measuring.	G2, G6	30
Test 2					30
M	PAM/PWM/PPM, PCM, DM, TDM, FDM kits.	Week 15	Assembling, measuring.	G2, G6	30

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

11. Course details:

Week	Contents	CLOs
1	Part 1. Introduction (0/6/12)	
	Teaching contents: (6) 1.1. Introduction laboratory equipments. 1.2. Introduction communication system kit. Teaching methods: + Theoretical lectures. + Previous operation.	G1.1 G1.2
	Self-study contents: (12) + Review relevant knowledge.	
2	Part 2. Analog Modulation (0/6/12)	
	Teaching contents: (6) 2.1 Oscillator. 2.2 Filter. 2.3 Balance modulator. Teaching methods: + Theoretical lectures. + Previous operation.	G1.2 G3.1 G3.2 G5.1 G6.1 G6.3
	Self-study contents: (12) + Design a sine waveform with variable frequency	G7.1
3	Part 2. Analog Modulation (continuous) (0/6/12)	
	Teaching contents: (6) 2.4 Amplitude Modulation 2.5 Frequency Modulation Teaching methods: + Theoretical lectures. + Previous operation.	G1.2 G3.1 G3.2 G5.1 G6.1 G6.3
	Self-study contents: (12) 2.6 Phase Modulation	G7.1
4	Part 3. Digital Modulation (0/6/12)	
	Teaching contents: (6) 3.1 Design 8-bit data generator. 3.2 Assemble 8-bit data generator. 3.3 Amplitude Shift Keying Teaching methods: + Theoretical lectures. + Previous operation.	G1.2 G2.1 G4.1, G7.1 G5.1 G6.1 G6.3
	Self-study contents: (12) + Design 16-bit data generator.	G3.1 G5.1 G6.1
5	Part 3. Digital Modulation (continuous) (0/6/12)	

	<p>Teaching contents: (6) 3.4 Frequency Shift Keying 3.5 Phase Shift Keying 3.6 Design and assemble 2-input adder. 3.7 Design and assemble level-shift circuit.</p> <p>Teaching methods: + Theoretical lectures. + Previous operation.</p>	G2.2 G4.1 G6.2 G6.3 G7.1
	<p>Self-study contents: (12) + Design a VCO-FSK generator. + Design a FSK demodulator.</p>	G4.2 G5.1 G6.2
6	REPORT 1	G1, G4, G5
7	TEST 1	G2, G6
	Part 4. Pulse Modulation (0/6/12)	
8	<p>Teaching contents: (6) 4.1 Pulse Amplitude Modulation. 4.2 Pulse Width Modulation. 4.3 Pulse Position Modulation.</p> <p>Teaching methods: + Theoretical lectures. + Previous operation.</p>	G2.2 G3.1 G4.1 G6.2 G6.3 G7.1
	<p>Self-study contents: (12) + Design a R-AMP generator.</p>	G3.1 G4.2 G6.2
	Part 4. Pulse Modulation (continuous) (0/6/12)	
9	<p>Teaching contents: (6) 4.4 Pulse Code Modulation. 4.5 Differential Pulse Code Modulation.</p> <p>Teaching methods: + Theoretical lectures. + Previous operation.</p>	G2.2 G3.1 G4.1 G6.2 G6.3 G7.1
	<p>Self-study contents: (12) + Find out PCM ICs.</p>	G3.1 G4.2 G6.2
10	REPORT 2	G2, G6
	Part 5. Multiplexing (0/6/12)	
11	<p>Teaching contents: (6) 6.1 Time Division Multiplexing.</p> <p>Teaching methods:</p>	G2.2 G4.1 G7.1

	+ Theoretical lectures. + Previous operation.	G6.2 G6.3
	Self-study contents: (12) + Design 8-input adder.	G5.1 G6.2
	Part 5. Multiplexing (continuos) (0/12/24)	
12-13	Teaching contents: (12) 6.2 Frequency Division Multiplexing. Teaching methods: + Theoretical lectures. + Previous operation.	G2.2 G4.1 G7.1 G6.2 G6.3
	Self-study contents: (24) + Design 16-input adder.	G5.1 G6.2
14	REPORT 3 - 4	G1, G4, G5
15	TEST 2	G2, G6

12. Learning ethics:

- Home assignments and projects must be done by the students themselves. Plagiarism found in the assessments will get zero point.
- Students who attend less than 80% or do not complete 80% of homework will be banned.

13. First approved date: 01/01/2012

14. Approval level

Dean

Department

Instructor

Nguyen Minh Tam, Ph.D

Nguyen Ngo Lam, M.Eng

15. Syllabus updated process:

1st time: Updated content dated: 15/01/2014 <i>Contents:</i>	Instructor: Head of department: Vo Minh Huan, Ph.D
2nd time: Updated content dated: 15/01/2016 <i>Contents:</i>	Instructor: Head of department: Phan Van Ca, Ph.D
3rd time: Updated content dated: 06/05/2017 <i>Contents:</i>	Instructor: Dang Phuoc Hai Trang, M.Eng Head of department: Phan Van Ca, Ph.D