

COURSE SYLLABUS
(Training Level: Undergraduate)

Course Title:

Vietnamese Course: Kỹ thuật điện tử tương tự

English Course: Analog Electronic Engineering

Course Code: MAN131

Major: Electronic and telecommunications engineering technology, Computer engineering technology, Biomedical engineering.

Training program: Bachelor; Engineer.

Version: 2021

1. General information

- Number of credits: 03 (Theory: 02; Practice: 01).

- Type of knowledge:

General Education		Base core courses		Major core courses		Concentration courses		Others
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 <input type="checkbox"/>	Optional <input type="checkbox"/>	

- Required course: None.

- Pre-requisite: Physic Subject.

- Co-requisite: None.

2. Time Allocated

Total: 60 periods	Theory: 28 periods
	Group Discussion/Presentation: 0
	Assignments/Essays/Practices: 29 periods.
	Tests: 03 + Theory: Number of Tests: 02 Periods: 01 + Practice: Number of Tests: 01 Periods: 01
	Self-study: 105 periods Other activities: 0

3. Departments in Charge: Faculty of Electronic and Communication Technology

4. Lecturer's Information

No.	Lecturer name	Phone number	Email	Note
1	MSc. Nguyen Thanh Trung	0987843338	nttrungktmt@ictu.edu.vn	Leader
2	MSc. Nguyen Sy Hiep	0976262145	nshiep@ictu.edu.vn	Member
3	MSc. Doan Manh Cuong	0973039940	dmcuong@ictu.edu.vn	Membe

5. Facility Requirements: The classroom is equipped with a projector, and the lab is equipped with modules for analog electronic engineering practical exercises.

6. Course Description:

The subject of Analog Electronic Engineering belongs to the fundamental knowledge group of majors. The course aims to provide students with knowledge of electronic components and basic electronic circuits, including passive electronic components, semiconductor electronic components such as diodes, bipolar transistors, field-effect transistors, amplification algorithms, and basic electronic circuits including small signal amplification circuits, modulated oscillation circuits, and some circuits using amplification algorithms such as inverted amplification circuits, non-inverted amplification circuits, integration circuits, differentiation circuits, feedback circuits... This basic knowledge is the foundation for students to analyze, design electronic circuits and electronic systems.

7. Objectives

Objectives	Description	PLOs	Proficiency level
G1	The application of basic knowledge of electronic components in analyzing and designing basic electronic circuits.	1.4.1	3
G2	Critical thinking skills to analyze and solve problems in analog electronic circuits	2.1	4
G3	Basic practical skills with analog electronic circuits	2.2.1	3 3

8. Learning Outcomes

Objectives	CLOs	Description of CLOs	PLOs	Proficiency level
G1	G1.1	Basic knowledge of the structure and function of electronic components (resistors, capacitors, inductors, transformers, diodes, bipolar transistors, field-effect transistors)	1.4.1	2
	G1.2	Application of knowledge of electronic components to analyze the operation of basic electronic circuits.	1.4.1	3
G2	G2.1	Analyze and detect basic issues in analog electronic circuits	2.1.1	4
	G2.2	Synthesize professional knowledge and skills to solve problems in analog electronic circuits	2.1.2	4

Objectives	CLOs	Description of CLOs	PLOs	Proficiency level
G3	G3.1	Basic operation of analog electronic circuits	2.2.1	3

9. Scientific ethics

Actively attend theoretical classes, complete assignments assigned by instructors, participate fully in practical classes with the spirit of enhancing autonomy and responsibility, and complete regular assessments. Any academic dishonesty or misconduct will be subject to disciplinary action.

10. Detailed Contents

Period	Contents	References	CLOs	Proficiency level	Teaching Methodology	Assessment Methodology
1,2,3	CHAPTER 1: PASSIVE ELECTRONIC COMPONENTS AND SEMICONDUCTOR DIODES					
	A. Classroom content (3) 1.1. General introduction to electronic components 1.2. Passive electronic components	[1] [3] [4]	G1.1 G1.2	2 3	Presentation; State and solve the problem	Assessment by comments
	B. Self-study content at home (6) Answer questions and do exercises on passive electronic components.	[1], [3], [4]	G1.1 G1.2	2 3	Self-study with guidance	Motivational Assessment/ Combined with attendant Assessments
4,5,6	Chapter 1: Passive electronic components and semiconductor diodes (continued)					
	A. Classroom learning content (3) 1.3. Semiconductor diodes and their applications circuits.	[1], [3], [4], [5]	G1.1 G1.2	2 3	Presentation; State and solve the problem	Assessment by comments
	B. Self-study contents (6) Exercises on semiconductor components and diodes	[3], [5]	G1.1 G1.2	2 3	Self-study with guidance	Motivational Assessment/ Combined with attendant Assessments
7, 8, 9	CHAPTER 2: BIPOLAR TRANSISTORS					

Period	Contents	References	CLOs	Proficiency level	Teaching Methodology	Assessment Methodology
	A. Classroom content (3) 2.1. Structure of bipolar transistor 2.2. Operating principle and basic parameters	[1], [4], [5]	G1.1 G1.2	2 3	Presentation; State and solve the problem	Assessment by comments
	B. Self-study topics (6) Answer questions and do exercises on the structure and operating principles of bipolar transistors	[1], [3], [5]	G1.1 G1.2	2 3	Self-study with guidance	Motivational Assessment/ Combined with attendant Assessments
10, 11, 12	Chapter 2: Bipolar Transistor (continued)					
	A. Classroom content (3) 2.3. Biasing and static operating point stabilization.	[1], [2], [5]	G1.1 G1.2	2 3	Presentation; State and solve the problem	Assessment by comments
	B. Topics for self-study at home (6) Solve exercises on biasing circuits for BJT Pre-read the material on basic circuit diagrams of amplifier stages using BJT	[1], [2], [3], [5]	G1.1 G1.2	2 3	Self-study with guidance	Motivational Assessment/ Combined with attendant Assessments
13, 14, 15	Chapter 2: Bipolar Junction Transistor (continuation)					
	A. Classroom learning content (3) 2.4. Basic diagrams of amplifier stages using transistors 2.5. Interconnection between amplifier stages	[1], [2], [5]	G1.1 G1.2	2 3	Presentation; State and solve the problem	Assessment by comments
	Periodic Test No.1	[1], [2], [5]	G1.1 G1.2	2 3	Written test	Score test assessment.
	B. Self-study contents (6) Do exercises related to analyzing small signal amplification stages Pre-read the material on field-effect transistor (FET)	[1], [3], [5]	G1.1 G1.2	2 3	Self-study with guidance	Motivational Assessment/ Combined with attendant Assessments

Period	Contents	References	CLOs	Proficiency level	Teaching Methodology	Assessment Methodology
16, 17, 18	Chapter 3: Field Effect Transistor (FET)					
	A. Classroom learning content (2): 3.1. General introduction to field-effect transistor (FET) 3.2. Junction Field-Effect Transistor (JFET)	[1], [2], [5]	G1.1 G1.2	2 3	Presentation; State and solve the problem	Assessment by comments, score of the test
	B. Additional contents for self-study at home (6): Do exercises and answer questions related to JFET. Read ahead the material on MOS-FET.	[1], [3], [5]	G1.1 G1.2	2 3	Self-study with guidance	Motivational Assessment/ Combined with attendant Assessments
19, 20, 21	Chapter 3: Field-Effect Transistor (FET) (continued)					
	A. Classroom topics (3): 3.3. Insulated gate field-effect transistor (IGFET) or MOSFET (metal-oxide-semiconductor field-effect transistor)	[1], [2], [4] [5]	G1.1 G1.2	2 3	Presentation; State and solve the problem	Assessment by comments
	B. Self-study contents (6): Do exercises related to the insulated-gate field-effect transistor (IGFET) Read the material on amplification algorithms before class.	[1], [3], [4] [5]	G1.1 G1.2	2 3	Self-study with guidance	Motivational Assessment/ Combined with attendant Assessments
22, 23, 24	CHAPTER 4: AMPLIFYING ALGORITHMS					
	A. Classroom learning content (2) 4.1. Amplifying the error 4.2. Basic concepts of algorithm amplification B. Self-study contents (4)	[1], [2], [5]	G2.1 G2.2	4 4	Presentation; State and solve the problem	Assessment by comments
	Answer the questions about error amplification and algorithm amplification	[1], [2], [5]	G2.1 G2.2	4 4	Self-study with guidance	Motivational Assessment/ Combined with

Period	Contents	References	CLOs	Proficiency level	Teaching Methodology	Assessment Methodology
						attendant Assessments
25, 26	Chapter 4: Algorithm Amplification (Continued)					
	A. Classroom learning content: (3) 4.3. Some basic circuits applying algorithm amplification."	[1], [2], [5]	G2.1 G2.2	4 4	Presentation; State and solve the problem	Assessment by comments
	B. Self-study content at home: (4) Answer questions and do exercises on some basic circuits using algorithm amplification		G2.1 G2.2	4 4	Self-study with guidance	Motivational Assessment/ Combined with attendant Assessments
27,28,29,30	CHAPTER 5: OSCILLATOR CIRCUITS					
	A. Classroom learning content: (3) 5.1. General principles of harmonic oscillator 5.2. LC oscillator circuit 5.3. RC oscillator circuit	[1],[2],[5]	G2.1 G2.2	4 4	Presentation; State and solve the problem	Assessment by comments, score of the test
	Periodic Test No.2	[1],[2],[5]	G2.1 G2.2	4 4	Written test	Score test assessment.
	B. Self-study content at home: (8) Read materials related to oscillator circuits.	[1],[2],[5]	G2.1 G2.2	4 4	Self-study with guidance	Motivational Assessment/ Combined with attendant Assessments

Practice section:

Period	Contents	References	CLOs	Proficiency level	Teaching Methodology	Assessment Methodology
31, 32, 33, 34,35,36	Lesson 1. Types of Diodes					
	A. In-class content: (6) Study the operation of silicon diode, germanium diode, LED, and Zener diode. Study basic circuit applications of diodes (rectifier, limiter, and shift circuit). Top of Form	[1], [6]	G3.1	3	Module operation instructions, experimental report writing	Comments on grading
	B. Self-study content at home: (9): Simulate other basic circuit applications of diodes (integrator, differentiator, and pulse shaping).	[1], [6]	G3.1	3	Self-study with guidance	Motivational Assessment/ Combined with attendant Assessments
37,38,39,40,41,42	LESSON 2. TRANSISTOR AMPLIFIER CIRCUIT DIAGRAM Lesson 2: Transistor Amplifier Circuit Diagram A. In-class content: (6) Study the common emitter, common collector, and common base amplifier stages	[1], [6]	G3.1	3	Module operation instructions, experimental report writing	Comments on grading
	B. Self-study content at home: (9) Read the practical instruction materials in advance.	[1], [6]	G3.1	3	Self-study with guidance	Motivational Assessment/ Combined with attendant Assessments
43,44,45,46,47,48	Lesson 3. Transistor Amplification in Cascade Configuration					

Period	Contents	References	CLOs	Proficiency level	Teaching Methodology	Assessment Methodology
	A. Class content: (6) Investigating common-base transistor amplification Investigating common-emitter transistor amplification	[1], [6]	G3.1	3	Module operation instructions, experimental report writing	Comments on grading
	B. Topics to be self-studied at home: (9) -Read the practical guide and related documents containing the content. Top of Form	[1], [6]	G3.1	3	Self-study with guidance	Motivational Assessment/ Combined with attendant Assessments
49,50,51,52,53,54	Lesson 4. Sinusoidal Signal Oscillation Circuit Diagram					
	A. Class content: (6) Investigating phase-shift oscillator circuits, phase-shift oscillator circuits, LC high-frequency oscillator circuits, Armstrong oscillator circuits, quartz crystal oscillator circuits.	[1], [4], [6]	G3.1	3	Module operation instructions, experimental report writing	Comments on grading
	B. Self-study content: (9) Read the instructions for practical exercises and relevant materials containing related content	[1], [4], [6]	G3.1	3	Self-study with guidance	Motivational Assessment/ Combined with attendant Assessments
55,56,57,58,59,60	Lesson 5. Amplifier Algorithm					
	A. Class content: (6) Investigate the operation of algorithmic amplifiers Investigate the operation of circuits using algorithmic amplifiers such as: inverting amplifier, non-inverting amplifier, summing amplifier, difference amplifier (subtractor), integrator, differentiator.	[1], [4], [6]	G3.1	3	Module operation instructions, experimental report writing	Assessment by comments, score of the test
	Periodic Test No.3	[1],	G3.1	3	Written test	Score test assessment.

Period	Contents	References	CLOs	Proficiency level	Teaching Methodology	Assessment Methodology
		[4], [6]				
	B. Contents to be self-studied at home: (9) Read the practical instruction documents and related materials	[1], [4], [6]	G3.1	3	Self-study with guidance	Motivational Assessment/ Combined with attendant Assessments

11. Student Assessment: 10 score Scale.

11.1 . Test plan:

No.	Content	Time (Period)	CLOs	Proficiency level	Assessment methods	Assessment tools	Weight %
Attendance					Assessment by comments	Rubric 1	7.5
Regular Test Score							22.5
1	Chapter 1,2	15	G1.1 G1.2	2 3	Written	Rubric 2	7.5
2	Chapter 3,4,5	30	G2.1 G2.2	4 4	Written	Rubric 3	7.5
3	Practice	60	G3.1	3	Practice	Rubric 4	7.5
Final exam							70
4	Chapter 1-5		G1.1 G1.2 G2.1 G2.2 G3.1	2 3 4 4 3	Written	Rubric 5	70

CLOs	Contents			Test Method			
	Periods 1-15	Periods 16-30	Periods 31-60	Written Assessment I	Written Assessment II	Practice Assessment III	Final exam
G1.1	X			X			X
G1.2	X			X			X
G2.1		X			X		X
G2.2		X			X		X
G3.1			X			X	X

11.2 Assessment Rubrics

* Rubric 1: Attendance

Criteria assessment	Weight (%)	Very good (8.5-10)	Good (7.0-8.4)	Average (5.5-6.9)	Below average (4.0-5.4)	Poor (0-3.9)
Level of participation in classes.	70	Full attendance	Absent from 1-9% of the periods	Absent from 10-15% of the periods	Absent from 16-20% of the periods	Missing 20% of periods (banned)
Activeness in lessons, self-study, homework	30	Actively participate in questions, discussions, Complete practice exercises	Quite actively participate in asking questions, discussing, doing homework	Less actively participating in asking questions, discussing, doing homework	The teacher's influence is required to ask questions, discuss, and do exercises.	Only attend classes but do not actively participate in asking questions, discussing, doing homework

* Rubric 2: Periodic Test No.1 (Allotted time: 1 period; Form: Written; Total of questions:02; Score Scale: 10)

Evaluation criteria		Weight (%)	Quality Level Description				
Question	CLOs		Very Good	Good	Average	Below Average	Poor
			(8,5-10 point)	(7,0-8,4 point)	(5,5-6,9 point)	(4,0-5,4 point)	(0-3.9 point)
1	G1.1	50	Beautiful and clear presentation . Content that solves 90-100% of	Clearly presented. Content that addresses 70 to less than 90% of the	The presentation is relatively clear. Content that addresses between 50	The presentation is not clear. Content that addresses between 40 and	The presentation is not clear. Content that resolves less than 40% of of

			the knowledge of variables and control Flow.	knowledge of variables and control Flow.	and less than 70% of the knowledge of variables and control Flow.	less than 50% of the knowledge of variables and control Flow.	the knowledge of variables and control Flow.
2	G1.2	50	Beautiful and clear presentation. Content that solves 90-100% of the knowledge of function.	Clearly presented. Content that addresses 70 to less than 90% of the knowledge of function.	The presentation is relatively clear. Content that addresses between 50 and less than 70% of the knowledge of function.	The presentation is not clear. Content that addresses between 40 and less than 50% of the knowledge of function.	The presentation is not clear. Content that resolves less than 40% of the knowledge of function.

*** Rubric 3: Periodic Test No.2** (Allotted time: 1 period; Form: Written; Total of questions: 02; Score Scale: 10)

Evaluation criteria		Weight (%)	Quality Level Description				
Question	CLOs		Very Good	Good	Average	Below Average	Poor
			(8,5-10 point)	(7,0-8,4 point)	(5,5-6,9 point)	(4,0-5,4 point)	(0-3,9 point)
1	G2.1	50	The presentation is neat and clear. The student has identified and solved most of the issues related to analog electronic circuits	The presentation is clear and coherent. Many issues related to analog electronic circuits were identified and resolved	The presentation is relatively clear. Many issues related to analog electronic circuits are identified and solved to a certain extent	The presentation was not clear enough. The ability to identify and solve issues related to analog electronic circuits was limited.	The presentation is relatively unclear. Identified and solved very few issues related to analog electronic circuits.
2	G2.2	50	The presentation is neat and clear. The student has identified and solved most of the	The presentation is clear and coherent. Many issues related to analog electronic circuits were	The presentation is relatively clear. Many issues related to analog electronic circuits are	The presentation was not clear enough. The ability to identify and solve issues related to	The presentation is relatively unclear. Identified and solved very few issues related to

Evaluation criteria		Weight (%)	Quality Level Description				
Question	CLOs		Very Good	Good	Average	Below Average	Poor
			(8,5-10 point)	(7,0-8,4 point)	(5,5-6,9 point)	(4,0-5,4 point)	(0-3.9 point)
			issues related to analog electronic circuits.	identified and resolved	identified and solved to a certain extent	analog electronic circuits was limited.	analog electronic circuits.

*** Rubric 4: Periodic Test No.3 3** (Time limit: 15 minutes; Format: Practical exercise; Total number of questions: 01; Score Scale: 10)

Evaluation criteria		Weight (%)	Quality Level Description				
Question	CLOs		Very Good	Good	Average	Below Average	Poor
			(8,5-10 point)	(7,0-8,4 point)	(5,5-6,9 point)	(4,0-5,4 point)	(0-3.9 point)
Content	G3.1	40	Meet 90-100% of the requirements	Meet 80-90% of the requirements	Meet 70-80% of the requirements	Meet 50-60% of the requirements	Meet below 50% of the requirements
Presentation skills		20	Speak clearly, confidently, persuasively, and engage the audience well	Speak clearly, confidently, and engage with the audience	Speak clearly, have little interaction with the audience	Unclear speech, lack of confidence, and little interaction with the audience/listeners	Speak softly, lack of confidence, not interactive with the audience
Answering questions		20	Very proficient in the function and operation process of analog electronic circuits	Understand well the functions and operation process of analog electronic circuits	Have a relatively strong grasp of the functions and operating procedures of analog electronic circuits	Understand partially the functions and operating procedures of analog electronic circuits	Not familiar with many functions and procedures for operating analog electronic circuits
Participation in carrying out		20	100% of the participating members have carried out/presented.	~ 80% of the participating members carried out/presented the task.	~ 60% of the participating members carried out/presented the task.	50% of the participating members carried out/presented the task.	Below 50% of the participating members carried out/presented the task.

***Rubric 5: Final Examination** (Allotted time: 60 minutes; Form: written; Total of questions: 01;
Score Scale: 10)

Evaluation criteria		Weight (%)	Quality Level Description				
			Very Good (8,5-10 point)	Good (7,0-8,4 point)	Average (5,5-6,9 point)	Below Average (4,0-5,4 point)	Poor (0-3.9 point)
Question	CLOs						
1	G1.1 G1.2	30	Beautiful and clear presentation. Has a very strong understanding of the structure and function of electronic components, and provides very clear and detailed analysis of analog electronic circuits	Clear presentation. Solid understanding of the structure and functions of electronic components, with clear and detailed analysis of analog electronic circuits.	Presented relatively clearly. Has a fairly good grasp of the structure and function of electronic components, and can analyze the details of similar electronic circuits relatively clearly.	Presentation is not clear. Have a partial understanding of the structure, functions of electronic components and can analyze some similar electronic circuits.	Unclear presentation. Understand very little about the structure and function of electronic components, and have analyzed very little about similar electronic circuits.
2	G2.1 G2.2	35	Beautiful and clear presentation. Has a very strong understanding of the structure and function of electronic components, and provides very clear and detailed analysis of analog electronic circuits	Clear presentation. Solid understanding of the structure and functions of electronic components, with clear and detailed analysis of analog electronic circuits.	Presented relatively clearly. Has a fairly good grasp of the structure and function of electronic components, and can analyze the details of similar electronic circuits relatively clearly.	Presentation is not clear. Have a partial understanding of the structure, functions of electronic components and can analyze some similar electronic circuits.	Unclear presentation. Understand very little about the structure and function of electronic components, and have analyzed very little about similar electronic circuits.
3	G3.1	35	Beautiful and clear presentation. Has a very strong understanding of the structure and function of electronic components, and provides very clear	Clear presentation. Solid understanding of the structure and functions of electronic components, with	Presented relatively clearly. Has a fairly good grasp of the structure and function of electronic components, and can analyze the details of similar	Presentation is not clear. Have a partial understanding of the structure, functions of electronic components and can analyze some similar	Unclear presentation. Understand very little about the structure and function of electronic components, and have analyzed very little about similar

Evaluation criteria		Weight (%)	Quality Level Description				
			Very Good	Good	Average	Below Average	Poor
Question	CLOs		(8,5-10 point)	(7,0-8,4 point)	(5,5-6,9 point)	(4,0-5,4 point)	(0-3.9 point)
			and detailed analysis of analog electronic circuits	clear and detailed analysis of analog electronic circuits.	electronic circuits relatively clearly.	electronic circuits.	electronic circuits.

12. Reading List

A. Main Syllabus

[1]. Do Xuan Thu (2009), Electronic engineering, education publisher.

B. References

[2]. Pham Minh Ha (2009), Electronic circuit technology, Science and Technology Publishing House.

[3]. Nguyen Viet Nguyen (2009), Electronics Components and Applications Coursebook, education publisher.

[4]. Tran Quang Vinh (2007), Principles of Electronic Engineering, education publisher.

[5]. Thomas L.Floyd (2005), Electronic Devices, Prentice Hall Pearson.

[6]. Department of biomedical electronics (2021), Guide to Practicing Analog Electronics Techniques, Internal circulation documents

C. Hardware: Practical modules: AE101 to AE108 and auxiliary equipment

13. First approval date: September 5th, 2021

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

Vice Rector

Dean

Vice of Department

Composer Team






Nguyen Thanh Trung



Nguyen Sy Hiep



Doan Manh Cuong

PhD. Do Dinh Cuong

PhD. Vu Chien Thang

MSc. Nguyen Thanh Trung