



COURSE OUTLINE

CE103 – MICROPROCESSOR AND MICROPROCESSOR

1. GENERAL INFORMATION

Subject Name (Vietnamese):	Vi xử lý & vi điều khiển
Subject Name (English):	Microprocessors and Microcontrollers
Course code:	CE103
Belong to the knowledge block:	General course <input type="checkbox"/> ; Basic IT course <input type="checkbox"/> ; Junior CE core course <input checked="" type="checkbox"/> ; Senior CE core course <input type="checkbox"/> ; Graduating course <input type="checkbox"/>
Faculty, Department in charge:	Computer Engineering Faculty Department of Embedded Systems and Robots
Lecturer:	Trần Ngọc Đức Email: ductn@uit.edu.vn
Number of credit:	4
Theory:	3
Practice:	1
Self learning:	0
Prerequisite:	
Previous course:	Computer architecture

2. COURSE DESCRIPTION

(State Positions of subjects in the curriculum, purpose and main content of the subject; about 3 to 5 lines)

Introducing the knowledge of the 8086 microprocessor's concept, architecture and operating principle and methods for controlling data in and out of microprocessors. At the same time, introduce other modern microprocessors currently in use.

The course also provides microcontroller knowledge of the 8051 family and provides programming methods, providing examples of microcontroller-based applications in the 8051 life. Also introduced are some other microcontroller families currently used such as AVR, PIC, ARM...

3. COURSE GOALS

After completing this course, students can:

Table 1.

Symbo I	Course objectives [1]	Output standard in curriculum [2]
<i>G1</i>	Having Problem-solving skills	<i>3.2</i>
<i>G2</i>	Having skills to learn and research to solve scientific problems	<i>4.1</i>
<i>G3</i>	System thinking skills and learning ability in the IT industry	<i>5</i>
<i>G4</i>	Having professional ethics	<i>6</i>
<i>G5</i>	Reading professional documents in foreign languages	<i>9.2</i>

4. COURSE LEARNING OUTCOMES

(Course learning outcome (CLO) corresponds to the course objectives in Section 3. The CLO are coded G1 to Gn. There should be no more than 10 CLO.)

Table 2.

Course learning outcomes [1]	Description of Course learning outcomes (Specific Goals) [2]	Level of teaching [3]
<i>G1 (3.2.1)</i>	Applying skills to solve problems in the field of designing embedded systems from simple to complex	<i>ITU</i>
<i>G2 (4.1.1)</i>	Applying skills to learn and research to solve scientific problems	<i>ITU</i>
<i>G3 (5.2)</i>	Applying learning to develop in the Computer Engineering industry	<i>IT</i>
<i>G4 (6.1.1)</i>	Presenting and applying professional ethical requirements	<i>ITU</i>
<i>G5 (9.2.2)</i>	Apply reading and understanding professional documents in foreign languages	<i>ITU</i>

5. COURSE CONTENT, LESSON PLAN

(List the content of teaching theory and practice, showing the correlation with CLO)

a. Theory

Table 3.

Lesson (2.25 hour each) [1]	Content [2]	CLO[3]	Teaching and learning activities [4]	Evaluation component [5]
Lesson 1	Chapter 1. Overview 1.1 General introduction 1.2 Development History 1.3 Introduction of processors 1.4 Introduction of microcontrollers 1.5 The relevant knowledge needs reviewing	<i>G1, G2, G4</i>	Students prepare at home: Reading the slide week 1 provided by the teacher Teachers: Popularize class rules, introduce subject syllabus, provide learning materials for students. Teaching about the introduction of microprocessors, microcontrollers Students in class: Listen to the lecturer's lecture, compare it with the previous knowledge and ask the teacher questions, discuss microprocessor and microcontroller issues. Answer the questions at the end of the class Students study at home: Reviewing the lesson and answer the questions discussed at the end of the week 1 slide in the notebook	<i>A1, A2</i>
Lesson 2	Chapter 2. 8086 processor 2.1 Microprocessor architecture 2.2 Overview of 8086 processor 2.3 Internal structure of 8086 microprocessor	<i>G1, G2, G5</i>	Students prepare at home: Reading the slide week 2 provided by teachers Lecturer: Review knowledge of chapter 1, reiterate the embedded system knowledge chain. Teaching about what it processors overview 8086 Students in class: Listening to lectures by lecturers, compare them with previous knowledge and ask teachers questions, discuss general issues about 8086 microprocessors. Answering the questions at the end of the class Students learn at home: Reviewing lesson and answer the discussion questions at the end of the slide week 2 into the notebook.	<i>A1, A2</i>
Lesson 3	Chapter 2. 8086 processor (continued) 2.4 8086 processor hardware architecture	<i>G1, G2, G5</i>	Students prepare at home: Read the week slide 3 provided by teachers Lecturer: Review chapter 2, recalling the microprocessor knowledge chain. Teaching on the contents of the	<i>A1, A2</i>

	<p>2.5 Describe the function of processor pins.</p> <p>2.6 Addressing modes</p>		<p>hardware architecture, the function of the pins and the addressing mode of 8086.</p> <p>Students in class: Listen to lectures by lecturers, compare them with previous knowledge and ask teachers questions, discuss issues about 8086. Answering the questions at the end of the class.</p> <p>Students study at home: Reviewing the lesson and answer the questions discussed at the bottom of the slide week 3 in the notebook.</p>	
Less on 4	<p>Chapter 2 . 8086 processor (continued)</p> <p>2 . 7 Assembly programming for 8086</p> <p>2.8 Assembly script</p> <p>2.9 Programming steps</p> <p>2:10 The general structure of the program</p> <p>2.11 Basic control structures</p>	<i>G1, G2, G5</i>	<p>Students prepare at home: Read the week slide 4 provided by teachers.</p> <p>Lecturer: Review knowledge of chapter 3, reiterate the microprocessor knowledge chain. Teaching of the contents of 8086 Assembly</p> <p>Students in class: Listen to lectures by lecturers, compare them with previous knowledge and ask teachers questions, discuss issues about 8086 Assembly. Answering the questions and do the end of the lesson</p> <p>Students studying at home: Reviewing the lesson and answer the discussion questions and do the exercise at the end of the week 4 slide in the notebook.</p>	<i>A1, A2</i>
Less on 5	<p>Chapter 2. 8086 processor (continued)</p> <p>2.12 Communication with memory</p> <p>2.13 Communication with memory (RAM, ROM)</p> <p>2.14 Decryption of the memory address</p>	<i>G1, G2, G5</i>	<p>Students prepare in advance: Reading slide slide of week 5 provided by teachers. Referring to the knowledge of memory communication.</p> <p>Lecturer: Review knowledge about Assembly programming in the previous day, check students assignments, reiterate the microprocessor knowledge chain. Lecture on the contents of address decoding and RAM, ROM communication.</p> <p>Students in class: Listening to the lecturer's lecture, compare it with the previous knowledge and ask the teacher questions, discuss memory communication issues.</p> <p>Answering the questions and do exercises in the end of the lesson</p> <p>Students study at home: Reviewing the lesson, answering discussion questions and do homework at the end of the slide of week 5 in the notebook.</p>	<i>A1, A2</i>
Less on 6	<p>Chapter 2 . 8086 processor (continued)</p> <p>2.15 Communication with peripherals</p> <p>2.15.1 Communication with peripherals</p>	<i>G1, G2, G5</i>	<p>Students prepare at home: Read the slide week 6 provided by the teacher. Referring to the knowledge of communication and the peripheral expansion of 8086</p>	<i>A1, A2</i>

	<p>2.15.2 Communicate with 8255</p> <p>2.15.3 Communicate with 8251</p>		<p>Lecturer: Review knowledge of memory communication, examine students' assignments, and repeat the series of microprocessor knowledge. Teaching on issues of communication peripherals and peripheral expansion in 8086</p> <p>Students in class: Listening to lectures by lecturers, comparing with previously knowledge and asking teachers questions, discussion of issues of peripheral communication. Answering the questions and do the end-of-class exercises</p> <p>Students studying at home: Reviewing the lesson, answering the questions discussed at the bottom of the week 6 slide in the notebook.</p>	
Less on 7	<p>Chapter 2. 8086 processor (continued)</p> <p>2.15 Communicate with peripheral devices</p> <p>2.15.4 Communication with Timer 8253</p> <p>2.15.5 Communication with Interrupt 8259</p> <p>2.15.6 Communicate with 8087 co-processor</p>	<i>G1, G2, G5</i>	<p>Students prepare at home: Reading the slide week 7 provided by the teacher. Referring to knowledge about Timer communication and co-processing</p> <p>Lecturer: Reviewing knowledge of sensor, reiterate about microprocessor knowledge chain. Teaching about Timer and co-processing communication.</p> <p>Students in class: Listening to lectures by lecturers, compare with previously knowledge and ask teachers questions, discuss Timer 8259 issues and co-handle 8087 and related knowledge. Answering the questions and do the end-of-class exercises</p> <p>Students study at home: Reviewing lessons, answer discussion questions and do homework at the end of the week 7 slide into the notebook</p>	<i>A1, A2</i>
Less on 8	Mid-semester review	<i>G2, G3, G5</i>	<p>Students prepare at home: Read the slide week 8 provided by the teacher, review all chapters 1 and 2 and the lecture slides from week 1 to week 7 and review the previous exercises .</p> <p>Teachers: Give students a 30-minute test to test students' knowledge. Reviewing knowledge of chapters 1 and 2 and repeat the exercises done, paying special attention to the exercises and knowledge that students have not yet learned on the test. Answering students' questions</p> <p>Students studying in class: Take tests, monitor and listen to lecturers, record review contents and necessary exercises</p>	<i>A1, A2</i>

			Students studying at home: Reviewing knowledge and exercises	
Lesson 9	Chapter 3. 8051 microcontroller 3.1 General introduction 3.2 Hardware architecture	<i>G1, G2, G5</i>	Students prepare at home: Reading the slide week 9 is provided by teachers. Referring to the basics of 8051 microcontroller. Lecturer: Review memory organization knowledge, reiterate the microcontroller knowledge chain. Lectured on the basics of 8051. Students studying in class: Listen to lectures by lecturers, compare with previous knowledge and ask questions of lecturers, discuss basic overview issues about 8051 and related knowledge. Answer the questions and do the end-of-class exercises Students study at home: Review the lesson, answer the discussion questions and do the exercises at the end of the week 9 slide in the notebook.	<i>A1, A4</i>
Lesson 10	Chapter 3. 8051 microcontroller (continued) 3.3 8051 microcontroller architecture 3.4 Organization of memory 3.5 Addressing modes	<i>G1, G2, G5</i>	Students prepare at home: Reading the slide week 10 provided by the teacher. Referring to the knowledge of 8051 architecture and memory organization. Lecturer: Reviewing general knowledge of microcontrollers 8051, reiterated the microcontroller knowledge chain. Teaching about 8051 architecture issues and organize its memory. Students in class: Listen to lectures by lecturers, compare with previously read knowledge and ask teachers questions, discuss 8051 architecture issues and organize memory and related knowledge. Answer the questions and do the end-of-class exercises Students study at home: Review the lesson, answer the discussion questions and do the exercises at the end of the week 10 slide in the notebook.	<i>A1, A4</i>
Lesson 11	Chapter 3. 8051 microcontroller (continued) 3.6 Programming Assembly language on 8051 3.7 Assembly programming on 8051 3.8 General structure for the program	<i>G1, G2, G5</i>	Students prepared at home: Read the slide week 11 provided by the teacher. Refer to more knowledge about programming on 8051 Assembly. Lecturer: Review knowledge of the 8051 structure and organize memory, recalling the microcontroller knowledge chain. Lecture on Assembly on 8051 programming Students in class: Listen to lectures by lecturers, compare them with previous	<i>A1, A4</i>

			<p>knowledge and ask questions of teachers, discuss Assembly issues and related knowledge. Answer the questions and do the end-of-class exercises</p> <p>Students study at home: Review the lesson, answer the discussion questions and do the exercises at the end of the week 11 slide into the notebook.</p>	
Lesson 12	<p>Chapter 3. 8051 microcontroller (continued)</p> <p>3.9 Communication with 8051</p> <p>3.9.1 Timer</p> <p>3.9.2 UART</p>	<i>G1, G2, G5</i>	<p>Students prepared at home: Read the slides of week 12 teacher supply. Refer to the knowledge of communication on 8051.</p> <p>Lecturer: Review knowledge of programming Assembly 8051, reiterated the microcontroller knowledge chain. Teaching about 8051 peripheral communication with Timer and UART.</p> <p>Classroom students: Listen to lectures by teachers, compare them with pre-read knowledge and ask teachers questions, discuss Timer, UART issues and related knowledge. Answer the questions and do the end-of-class exercises</p> <p>Students study at home: Review the lesson, answer the discussion questions and do the exercises at the end of the week 12 slide in the notebook.</p>	<i>A1, A4</i>
Lesson 13	<p>Chapter 3. 8051 microcontroller (continued)</p> <p>3.9 Communication with 8051</p> <p>3.9.3 Interrupt</p>	<i>G1, G2, G5</i>	<p>Students prepared at home: Read the slides of week 13 teacher supply. Refer to the knowledge about Interrupt in 8051.</p> <p>Lecturer: Review knowledge of Timer and UART, reiterate the microcontroller knowledge chain. Teaching about using Interrupt in 8051, guide students to do programming exercises on interrupt handling.</p> <p>Students in class: Listen to lectures by lecturers, compare with previously read knowledge and ask teachers questions, discuss interrupt issues and related knowledge. Answer the questions and do the end-of-class exercises.</p> <p>Students study at home: Review the lesson, answer the discussion questions and do the exercise at the end of the week 13 slide in the notebook.</p>	<i>A1, A4</i>
Lesson 14	<p>Chapter 4: Introduction of modern microcontrollers</p> <p>4.1 AVR Microcontroller</p> <p>4.2 PIC microcontrollers</p> <p>4.3 ARM microcontrollers</p>	<i>G1, G2, G3, G4, G5</i>	<p>Students prepared at home: Read the slides of week 14 teacher supply. Refer to the basics of AVR, PIC and ARM.</p> <p>Lecturer: Review knowledge of interrupt handling in 8051, reiterated the microcontroller</p>	<i>A1, A4</i>

			<p>knowledge chain. Teaching about Modern microcontrollers like AVR, PIC and ARM</p> <p>Students in class: Listen to lectures by lecturers, compare them with previous knowledge and ask teachers questions, discuss basic issues of AVR, PIC and ARM and related knowledge. Answer the questions and do the end-of-class exercises</p> <p>Students study at home: Review the lesson, answer the discussion questions and do the exercises at the end of the week 14 slide in the notebook.</p>	
Lesson 15	Project report and end of semester review	G2, G3, G5	<p>Students prepare in advance: Read the slide of week 15 provided by the teacher, review all chapters 3,4 and slides from week 9 to week 14 and review the previous exercises.</p> <p>Teachers: Give students a 30-minute test to test students' knowledge. Review knowledge of chapters 3 and 4 and repeat the exercises done, paying special attention to the exercises and knowledge that students have not yet learned on the test. Answer students' questions</p> <p>Students studying in class: Take tests, monitor and listen to lecturers, record review contents and necessary exercises</p> <p>Students studying at home: Review the knowledge and exercises (in the review exercise file, and the exercises in the slide of week 15)</p>	A1, A4

b. Practice

Table 4.

Lesson (3.75 hours each)	Content	CL O	Teaching and learning activities	Evaluation component
Lesson 1	<i>Exercise 1: Familiarize with programming and compiling Assembly for 8086 on Emu8086</i>	G1, G2, G5	<p>Students prepare at home: Read Exercise # 1 in the microprocessor practice guide and prepare the software to practice according to the instructions.</p> <p>Trainers: Disseminate practice rules, guide students step by step to install the program and instruct students how to perform basic commands in the practice to get used to Assembly and Emu8086, how to write report and submit practice reports</p> <p>Students learn at the same time: Install the program, follow the instructions of the instructor, perform practical exercises, write and submit the practice report according to regulations.</p>	A3

			Students studying at home: Do additional exercises and submit assignments as prescribed	
Lesson 2	<i>Exercise 2: Realization of calculation on 8086</i>	<i>G1, G2, G5</i>	<p>Students prepare at home: Read exercise # 2 in the microprocessor practice guide and learn about the calculations made on 8086</p> <p>Lecturer: On guidance to students using assembly programming on 8086 calculations.</p> <p>Students learn at the same time: Listen and follow the instructor's steps, perform practical exercises on calculating 8086</p> <p>Students studying at home: Do additional exercises and submit assignments as prescribed</p>	<i>A3</i>
Lesson 3	<i>Exercise 3: Communication 8086 with 8255</i>	<i>G1, G2, G5</i>	<p>Students prepared at home: Read the exercise #3 in practices documentation. Understand processor and investigate carefully Assembly programming in interfacing between 8086 to 8255.</p> <p>Lecturer: Teach students how to write programs communication 8086 and 8255</p> <p>Classroom students: Listen and follow the instructor's step, perform practical exercises on reading communication 8255</p> <p>Students studying at home: Do additional exercises and submit assignments as prescribed</p>	<i>A3</i>
Lesson 4	<i>Exercise 4: LED Display, Timer, Interrupt for 8051</i>	<i>G1, G2, G5</i>	<p>Students prepare at home: Read exercise # 4 in the microcontroller practice guide and learn more about it programming Timer LED and Interrupt for 8051</p> <p>Lecturer: Remind the principles of peripheral control, LED on/off programming, Timer control and Interrupt processing.</p> <p>Students in class: Listen and follow the steps of the faculty's trainers, perform the exercises on the microcontroller, write and submit reports as prescribed</p> <p>Students studying at home: Do additional exercises and submit assignments as prescribed</p>	<i>A3</i>
Lesson 5	<i>Exercise 5: Design clock pulse, control 7-segment LED using Timer interrupt for 8051</i>	<i>G1, G2, G5</i>	<p>Students prepare at home: Read exercise # 5 in the microcontroller practice guide and learn the knowledge to design Clock, control 7-segment LED.</p> <p>Teachers: Remind me of the knowledge of the clock design and interrupt use in 8051 to control 7-segment LED. Guide students to write successful interrupt handling.</p>	<i>A3</i>

			Students study in class: Listen and follow the instructor's steps, perform practical exercises on using interrupt for 7-segment LED control. Students studying at home: Do additional exercises and submit assignments as prescribed	
Lesson 6	<i>Exercise 6: Sub-project reports and practice tests</i>	<i>G1, G2, G5</i>	Students prepare at home: Read exercise # 6 in the microcontroller practice guide. Instructors: Remind knowledge of using hardware and software to fully solve a project using 8051, with interrupt and peripheral control. Students in class: Listen and follow the instructor's step, practice the exercises subproject. Students studying at home: Do additional exercises and submit assignments as prescribed	<i>A3</i>

6. COURSE ASSESSMENT

Table 5.

Evaluation component [1]	Course learning outcomes [2]	Rate (%) [3]
A1. Learning Process (Test on class, assignments)	<i>G1, G2, G5</i>	<i>15%</i>
A2. Mid-term Semester	<i>G1, G2, G3, G4, G5</i>	<i>15%</i>
A3. Practice	<i>G1, G2, G5</i>	<i>20%</i>
A4. Final Semester Test	<i>G1, G2, G3, G4, G5</i>	<i>50%</i>

[1]: Evaluation components of the subject. [2]: List the corresponding course learning outcome evaluated by the evaluation component. [3]: Scores of assessments on the total subject score.

Rubric of each component evaluated in Table 5

a. Rubric of A1 rating components

Examination in class	Excellence (8-10đ)	Good (6-7đ)	Average(5đ)	Weak(3-4đ)	Bad(0-3đ)
<i>Ask for old lessons, new lessons and do class work (test self-studying ability of college students in G2)</i>	<i>Volunteer to answer exercise 4 - 5 times</i>	<i>Volunteer to answer or board the exercise 3 times</i>	<i>Volunteer to answer or go to the board to do the exercise 2 times</i>	<i>Volunteer to answer or board the exercise 1 time</i>	<i>Volunteer to answer or board the exercise 0 times</i>
<i>Attendance is completed</i>	<i>Attend full attendance at 100% attendance sessions</i>	<i>Attend school 75 % attendance sessions</i>	<i>Attend 50% of attendance sessions</i>	<i>Attend 25% of attendance sessions</i>	<i>Not going to school</i>
15-minute test	Excellence (8-10đ)	Good (6-7đ)	Average(5đ)	Weak(3-4đ)	Bad(0-3đ)
<i>Test No. 1 on programming Assembly on 8086 (Check knowledge of embedded system G1, G5)</i>	<i>Fully present the 8086 instruction set and solve assembly language exercises on 8086</i>	<i>Present the 8086 instruction set correctly and solve part of the assembly language exercises on 8086</i>	<i>Present the correct 8086 instruction set</i>	<i>Partial presentation of 8086 instruction set</i>	<i>Misrepresent the script and not solve the assembly programming language on 8086</i>
<i>Test No. 2 on programming on 8051 Assembly (Check knowledge of operating system G1 , G5)</i>	<i>Fully present the 8051 script and solve assembly language exercises on 8086</i>	<i>Present the 8051 script correctly and solve part of the assembly language exercises on 8086</i>	<i>Present the correct 8051 script</i>	<i>Present part of the 8051 script correctly</i>	<i>Misrepresent the script and not solve assembly language exercises on 8051</i>

b. Rubric of A2 rating component

Quiz section	Excellence (8-10d)	Good (6-7d)	Average(5d)	Weak(3-4d)	Bad(0-3d)
<i>8086 microprocess or definitions, concepts and principles</i>	<i>Correctly identify 80 to 100% of definitions, concepts and knowledge related to the 8086-microprocess or overview</i>	<i>Identify exactly 60 to 80% of the definitions, concepts and knowledge related to the 8086-microprocess or overview</i>	<i>Correctly identify 50 to 60% of the definitions, concepts and knowledge related to the 8086-microprocess overview</i>	<i>Correctly identify 30 to 50% of the definitions, concepts and knowledge related to the 8086-microprocess or overview</i>	<i>Correctly identify under 30% of definitions, concepts and knowledge related to the overview of 8086 microprocessors</i>
<i>8086 processor, script, assembly use and memory communication problem</i>	<i>Correctly identify 80 to 100% of definitions, concepts and knowledge related to using Assembly and memory communication issues</i>	<i>Identify exactly 60 to 80% of definitions, concepts and knowledge related to using Assembly and memory communication issues</i>	<i>Correctly identify 50 to 60% of definitions, concepts and knowledge related to using Assembly and memory communication issues</i>	<i>Correctly identify 30 to 50% of definitions, concepts and knowledge related to using Assembly and memory communication issues</i>	<i>Identify well below 30% of definitions, concepts and knowledge related to using Assembly and memory communication issues</i>
<i>8086 processor, peripheral programming 8255, 8251</i>	<i>Correctly identify 80 to 100% of definitions, concepts and knowledge related to peripheral programming 8255, 8251</i>	<i>Identify exactly 60 to 80% of definitions, concepts and knowledge related to peripheral programming 8255, 8251</i>	<i>Correctly identify 50 to 60% of definitions, concepts and knowledge related to peripheral programming 8255, 8251</i>	<i>Correctly identify 30 to 50% of definitions, concepts and knowledge related to peripheral programming 8255, 8251</i>	<i>Identify well below 30% of definitions, concepts and knowledge related to peripheral programming 8255, 8251</i>

<i>8086 processor, peripheral programming, Timer 8254, Interrupt, and 8087 co-processor</i>	<i>Identify exactly 80 to 100% of definitions, concepts and knowledge related to peripheral programming, Timer 8254, Interrupt, and co-processor 8087</i>	<i>Identify exactly 60 to 80% of definitions, concepts and knowledge related to peripheral programming, Timer 8254, Interrupt, and co-processor 8087</i>	<i>Correctly identify 50 to 60% of definitions, concepts and knowledge related to peripheral programming, Timer 8254, Interrupt, and co-processor 8087</i>	<i>Identify exactly 30 to 50% of definitions, concepts and knowledge related to peripheral programming, Timer 8254, Interrupt, and 8087 co-processor</i>	<i>Correctly identify under 30% of definitions, concepts and knowledge related to peripheral programming, Timer 8254, Interrupt, and co-processor 8087</i>
The essay section	Excellence (8-10d)	Good (6-7d)	Average(5d)	Weak(3-4d)	Bad(0-3d)
<i>Design of memory communication system and address decoding.</i>	<i>Properly and completely present the memory communication system design and address decoding and properly drawing status tables</i>	<i>Proper and complete presentation of memory communication system design and address decoding</i>	<i>Correct presentation of memory communication system design and address decoding</i>	<i>Correct presentation of memory communication system design and address and mixed decoding but there are errors in draw state tables</i>	<i>Wrong presentation on memory communication system design and address decoding</i>
<i>Using 8086 Assembly language in peripheral communication Interrupt, Timer</i>	<i>Correct and complete presentation of using 8086 Assembly Language in peripheral communication Interrupt and Timer</i>	<i>Correct and complete presentation of 8086 Assembly language using in Interrupt or Timer peripheral communication and incomplete in the remaining peripheral</i>	<i>Correct description of using 8086 Assembly language in peripheral communication Interrupt and Timer</i>	<i>Correctly presented using the 8086 Assembly language in peripheral Interrupt or Timer</i>	<i>Misrepresented the use of assembly language 8086 in communication peripheral and Timer Interrupt</i>

c. Rubric of A3 evaluation components

<i>Report the exercises</i>	<i>Excellence (8-10d)</i>	<i>Good (6-7d)</i>	<i>Average(5d)</i>	<i>Weak(3-4d)</i>	<i>Bad(0-3d)</i>
<i>Report programming and using Assembly for 8086 on Emu8086</i>	<i>Complete full command and full implementation of all practical exercises</i>	<i>Complete orders and execute 4/7 practical exercises</i>	<i>Complete the orders and execute 2/7 practical exercises</i>	<i>Complete orders or perform 3/7 practical exercises</i>	<i>Do not complete the commands and do not complete the exercises</i>
<i>Report on calculation on 8086</i>	<i>Complete the examples and fully implement practical exercises</i>	<i>Complete the examples and implement 3/4 practical exercises</i>	<i>Complete the examples and perform 2/4 practical exercises</i>	<i>Complete the examples or perform 2/4 practical exercises</i>	<i>Do not complete the examples and do not complete the exercises</i>
<i>Report of 8086 communication practice with 8255</i>	<i>Complete the examples and fully implement practical exercises</i>	<i>Complete the examples and perform 4/6 practical exercises</i>	<i>Complete the examples and perform 2/6 practical exercises</i>	<i>Complete the examples or perform 3/6 practical exercises</i>	<i>Do not complete the examples and do not complete the exercises</i>
<i>Report application control LED Display, Timer, Interrupt for 8051</i>	<i>Complete the examples and fully implement practical exercises</i>	<i>Complete the examples and implement 3/4 practical exercises</i>	<i>Complete the examples and perform 2/4 practical exercises</i>	<i>Complete the examples or perform 2/4 practical exercises</i>	<i>Do not complete the examples and do not complete the exercises</i>
<i>Report on clock pulse design, control 7 segment LED using Timer interrupt for 8051</i>	<i>Complete the examples and fully implement practical exercises</i>	<i>Complete the examples and perform 4/6 practical exercises</i>	<i>Complete the examples and perform 2/6 practical exercises</i>	<i>Complete the examples or perform 3/6 practical exercises</i>	<i>Do not complete the examples and do not complete the exercises</i>

<i>Sub-project report</i>	<i>Complete the examples and fully implement practical exercises</i>	<i>Complete the examples and implement 3/4 practical exercises</i>	<i>Complete the examples and perform 2/4 practical exercises</i>	<i>Complete the examples or perform 2/4 practical exercises</i>	<i>Do not complete the examples and do not complete the exercises</i>
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a. Rubric of A4 evaluation components

Quiz section	Excellence (8-10d)	Good (6-7d)	Average(5d)	Weak(3-4d)	Bad(0-3d)
8086 microprocessor definitions, concepts and principles	Correctly identify 80 to 100% of 8086 processor definitions, concepts, principles	Identify exactly 60 to 80% of 8086 microprocessor definitions, concepts, principles	Correctly identify 50 to 60% of 8086 microprocessor definitions, concepts, principles	Identify exactly 30 to 50% of 8086 microprocessor definitions, concepts, principles	Correctly identify under 30% of 8086 microprocessor definitions, concepts and principles
8051 Assembly problem, addressing modes	Properly identifying 80 to 100% of the issue programming Assembly in 8051, addressing modes	Correctly identify 60 to 80% of the Assembly problems on 8051, addressing modes	Correctly identify 50 to 60% of 8051 Assembly programming problems, addressing modes	Correctly identify 30 to 50% of 8051 Assembly programming problems, addressing modes	Correctly identify under 30% of programming issues on 8051, addressing modes
Peripheral communication problem in 8051: Timer, UART, Interrupt	Properly identifying 80 to 100% of the thought a principle, the communication peripherals in 8051: Timer, UART, Interrupt	Properly identifying 60 to 80% of all the thought a principle, communication peripherals in 8051: Timer, UART, Interrupt	Properly identifying 50 to 60% of all the thought a principle, communication peripherals in 8051: Timer, UART, Interrupt	Properly identifying 30 to 50% of all the thought a principle, communication peripherals in 8051: Timer, UART, Interrupt	Properly identifying 30% of the thought a principle, communication peripherals in 8051: Timer, UART, Interrupt
The modern microcontroller	Identify exactly 80 to 100% of modern microcontroller knowledge	Identify exactly 60 to 80% of the knowledge about modern microcontrollers	Correctly identify 50 to 60% of modern microcontroller knowledge	Identify exactly 30 to 50% of modern microcontroller knowledge	Identify less than 30% of knowledge about modern microcontrollers
The essay section	Excellence (8-10d)	Good (6-7d)	Average(5d)	Weak(3-4d)	Bad(0-3d)

System design 8051 external memory and peripheral communication	Present properly and fully designed memory communication and external peripheral	Present 60 to 70% of the correct memory and peripheral peripheral design	Present exactly 50 to 60% of memory and peripheral peripheral design	Present exactly 30 to 50% of memory and peripheral peripheral design	Presents less than 30% of memory and peripheral peripheral design
Use Assembly 8051 language in peripheral communication Interrupt, Timer	Present properly and fully on using Assembly 8051 language in peripheral communication Interrupt and Timer	Present properly and fully on using Assembly 8051 language in Interrupt or Timer peripheral communication and incomplete in the remaining peripheral	Correct description of using Assembly 8051 language in peripheral communication Interrupt and Timer	Correctly presented using the Assembly 8051 language in peripheral communication Interrupt or Timer	Wrong presentation of using Assembly 8051 language in peripheral communication Interrupt and Timer

7. COURSE REQUIREMENTS AND EXPECTATIONS

(State other courses regulation, if any, example: students who do not submit assignments or report on will be consider as not submitting; Students who miss practice 2 session will not be allowed to take a final exam, ...)

- Attendance: according to school regulations.
- Theory class:
 - Students need to print lecture slides and read in advance at home before class.
 - In the class, student aren't allowed to make noise, or sleep-in class, attentive listening and full notes.
 - Proactively answer questions from teachers and volunteer on the worksheet, ask when having questions.
 - Review the lesson at home after each lesson, if student still don't understand what knowledge content you can send an email to ask or ask in the next lesson.
- Practical class:
 - Students must not miss more than 3 lesson in the total number of practice exercise. There will be 0 points for practice.
 - Students who miss any practical lesson without first obtaining permission for acceptable reason will receive a zero for that practice session.
 - Read the instruction manual before each practice session. Pay attention to the instructor for practice. Ask questions when you have questions.

- Focus on doing practice, not surfing the web, reading Facebook, playing games, chatting on the Internet ... However, you can discuss with each other in class about the exercise you are doing.
 - When submitting the exercise, students should note that each copy of each copy will get a score of 0.
- Theoretical test: do not cheat, ask other students when taking the exam. If the supervisor finds out, the answer sheet will be marked and depending on the extent of the violation the score may be deducted or given a score of 0 for the test.

8. LEARNING MATERIAL, REFERENCE

(The number of textbooks does not exceed 3 documents, the number of reference documents does not exceed 10 documents, in the process of teaching, lecturers can provide additional reference material other than this category.)

Curriculum

1. Phan Dinh Duy. Lecture + Slide subject of Microprocessor - Microcontroller, University of Information Technology (internal circulation), 2015.
2. Vu Duc Lung, Nguyen Quang Minh and Phan Dinh Duy. Microcontroller syllabus. Publisher of VNU HCMC, 2016, 207 pages.
3. Tong Van On. System design with 8051 family. Phuong Dong Publishing House, 2006, 460 pages.

References

1. Kenneth Ayala. 8051 Microcontroller: Architecture, Programming and Applications Second Edition. Delmar Learning Publishing House, 1996, 367 pages.
2. Walter A. Triebel, Avtar Singh. The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware, and Applications 4th Edition. Prentice-Hall, 2002, 1019 pages.
3. Douglas v. Hall. Microprocessors and Interfacing: Programming and Hardware. Publisher Glencoe McGraw-Hill, 1991, 624 pages .

9. SOFTWARE OR TOOLS SUPPORTING PRACTICE

1. Programming simulation software for 8086 (Emu8086)
2. Programming simulation software for 8051 (Protus 8.1)

HCMC, date 01 month 3 year 2019

**Head of department /
subject**

(Sign and write full name)

Lecturer

(Sign and write full
name)