



Syllabus

1. **Course name:** Practice Microprocessor

2. **Course code:** PRMI320463

3. **Credits:** 2 credits (0:2:4) (0 lecture periods, 2 lab period, 4 self-study periods per week)

4. **Instructors**

a. Chief lecturer: MEng. Nguyen Dinh Phu

b. Co-lecturers:

- MEng. Nguyen Thanh Binh
- Meng. Truong Ngoc Anh
- Meng. Pham Van Hoan
- Meng. Nguyen Van Hiep
- Meng Nguyen Thanh Nghia

5. **Course Requirements:**

Prerequisite course(s): Microprocessor

Previous course(s): Microprocessor

6. **Course Description**

This subject equips learners with practical programming exercises using microcontrollers. The activities focus on controlling single-led, 7-segment LEDs via the direct method or the scanning method. Other devices such as LCD, GLCD, or led matrix are also is described. The exercises get inputs from buttons, matrix keyboard, digital sensors, analog sensors to control operator. Communication with other sensors via I2C devices, real-time clock, serial EEPROM memory, ADC/DAC are advantages exercises in this course. Moreover, counter-based applications such as external-pulse counting and timer applications are mentioned in detail. Stepper motor and DC motors are introduced with pulse width modulation (PWM).

7. **Learning Outcomes (CLOs)**

| CLOs | Descriptions | ELO(s) /PI(s) | Compe- tency |
|------|---|------------------|-----------------|
| CLO1 | Ability to configure functional registers to meet a given requirement. | ELO1/PI1.2 | M |
| CLO2 | Ability to present, report and introduce a microprocessor system. | ELO2/PI2.3 | M |
| CLO3 | Ability to identify possible applications of a microcontroller in the modern economy. | ELO3/PI3.1 | I |
| CLO4 | Ability to use a new microcontroller with modern hardware. | ELO4/PI4.2 | R |
| CLO5 | Ability for work organization | ELO5/PI5.2 | R |
| CLO6 | Ability for report writing | ELO6/PI6.1 | R |
| CLO7 | Ability to analyze and modify the hardware and software factors of a microcontroller system | ELO7/PI7.3 | R |

8. **Content outline**

- Introduction to the PIC16F887 microcontroller kit.
- Introduction to programming software and loading software.
- Practical exercises on led modules, buttons, and matrix keyboards.
- Practical exercises on 7-segment led modules by direct methods and scanning methods.
- Practical exercises on LCD modules.
- Practical exercises on sensors and ADC modules.
- Practical exercises in I2C serial communications.
- Practical exercises on motor controlling and pulse width modulation modules.
- Practical exercises on LED matrix modules.

9. Teaching Methods

- Presentation method
- Practical teaching method
- Teamwork method

10. Assessment(s)

- Grading scale: **10**
- Assessment plan:

| No. | Content | CLOs | Competency | Assessment methods | Assessment tools | Weighting % |
|-----------------------------|---|------|------------|--------------------|----------------------|-------------|
| Formative assessment | | | | | | 50 |
| 1. | Understand the experiment KIT and microcontroller applications. | CLO3 | I | Multichoice | Multichoice question | 5 |
| 2. | Weekly report | CLO5 | R | Report writing | Rubric | 5 |
| 3 | Project presentation | CLO6 | R | Checklist | Rubric | 5 |
| Summative assessment | | | | | | 50 |
| 4. | Simulation on PROTEUS software and test the simulation circuit on test boards, write a controlling program. | CLO7 | R | Observation form | Rubric | 15 |
| 5 | Identify display hardware for microprocessors such as LED, 7-segments, and its controlling methods | CLO2 | M | Observation form | Rubric | 20 |
| 6 | Use peripheral modules and communication modules such as LCD Modules, sensors, I2C in an application. | CLO4 | R | Observation form | Rubric | 20 |
| 7 | Configure functional register to drive GLCD modules, sensors, DC motors, step motors, ADCs. | CLO1 | M | Observation form | Rubric | 20 |

11. Learning Materials:

- Textbook(s):
GVC.ThS. Nguyễn Đình Phú, *Giáo trình Thực hành vi điều khiển*, NXB Đại học Quốc gia 2012.
- References:
GVC.ThS Nguyễn Đình Phú, *Giáo trình Vi xử lý*, NXB Đại học Quốc gia 2012.

12. General Information:

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13. Approval Date: <dd/mm/yyyy>

14. Endorsement:

| Dean | Head of Department | Chief Lecturer |
|---|--|----------------|
| Assoc. Prof. Dr. Nguyen Minh Tam | Assoc. Prof. Dr. Nguyen Thanh Hai | <Full Name> |

15. Revision History:

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|--|--|
| 1st Revision: <dd/mm/yyyy> | Lecturer: Head of Department: Assoc. Prof. Dr. Nguyen Thanh Hai |
| 2nd Revision: <dd/mm/yyyy> | Lecturer: Head of Department: |