

Course Outline

Microcontroller Technology

Course Title

GE 116

Dep't. & Course No.

I. COURSE DESCRIPTION

This course is designed to provide students with the knowledge and skills to diagnose, repair and operate a microcontroller devices and equipments employed in various industrial applications. It includes programming, wiring, and interfacing for different I/O circuits and devices.

II. SEMESTER CREDITS: 3 Credits

III. CONTACT HOURS PER WEEK:

2
Lecture

3
Lab

5
Total

IV. PREREQUISITE: NONE

V. STUDENT LEARNING OUTCOMES :

At the end of the semester, the student with a combined accuracy of 65% should be able to:

1. Draw the architectural design of Microcontroller.
2. List the different application of Microcontroller.
3. List the steps in assembling the microcontroller.
4. Discuss the procedures in initializing the operation of Microcontroller
5. Explain the how the architectural design of microcontroller works.
6. Discuss the steps in repairing the Microcontroller.

VI. COURSE CONTENT

A. Introduction to Microcontroller

1. The MPU Design
2. The Architecture of Microcontroller

B. Getting Started with Microcontroller.

1. Application
2. Hardware and Software Requirements
3. Hardware and Software Setup

C. Assembly

1. Parts mounting
2. Soldering and wirings

D. Testing

1. Loading the test program
2. Alignment and Adjustment

E. Microcontroller Operation

1. Five Basic Parts Operation

F. Safety Rules in Troubleshooting the Microcontroller

1. ESD
2. Replacing the Chip

7. Discuss the importance of four essential signals of microcontroller.

8. Write programs for microcontroller

9. Integrate Input/output devices to microcontroller.

G. Four Essential Signals to Check.

1. Reset Signal
2. Clock Signal
3. Power Signal
4. Standby Signal

H. Controlling the LED

I. Integrating Input Pushbutton Switch

J. Controlling the Motion

K. Measuring the Rotation

L. Controlling the Digital Display

M. Measuring the light

N. Controlling the frequency and sound.

O. Interface Driver Circuit

P. Controlling the current flow with a transistor

Q. Introducing The Digital Potentiometer

R. Controlling the AC motor.

S. Controlling the AC Lamp

VII. MATERIALS AND EQUIPMENT

Complete Set of Parallax Basic Stamp 2 Microcontroller
Parallax Stamp Version 2.2 Software
PIC Microcontroller
Assembly for PIC microcontroller Version 3 Software
AC and DC Motors.
Relays and Contactors
AC and DC Lamps

VIII. TEXT AND REFERENCES

A. Required Text: Andy Lindsay, What is a Microcontroller. USA, Parallax Inc. 2011.

IX. METHOD OF INSTRUCTION

- B. Lecture for the presentation of theory
- C. Demonstration for the presentation of skills
- D. Discussion and questioning for test of understanding
- E. Practical Experiments for emphasis of known principles
- F. Project Construction

X. METHOD OF EVALUATION

A. Lecture presentation will be tested using the written test
Laboratory evaluation will be rated based on the following criteria.

1. Accuracy
2. Appearance
3. Completion
4. Techniques

B. The components with corresponding weight in percent included in the
Computation of Midterm and Final grades are:

Participation	10%
Portfolio	10%
Quizzes/Homework	10%
Midterm/Final Examination	20%
Laboratory Performance/Project.....	<u>50%</u>
	TOTAL = 100%

The transmutation of total percent to letter grade is as follows:

90% - 100%	A
80% - 89%	B
70% - 79%	C
65% - 69%	D
0 - 64%	F

TASK LISTING SHEET

MICROPROCESSOR TECHNOLOGY

Course Title

GE 116

Dep't. & Course No.

Credits: 2 1 48
Lec Lab Total Lab Hrs

<i>Laboratory Objectives</i>	<i>Time Allotment</i>
1. Assemble a microcontroller circuit board.	9
1. Prepare the materials for the microcontroller assembly	
2. Mount and solder the microcontroller board	
3. Test the microcontroller operation	
2. Troubleshoot and repair a microcontroller Circuit	
1. Trace the architecture and pin configuration of the microcontroller	9
2. Trace the presence of four essential signals in microcontroller	
3. Replace defective parts of the microcontroller.	
4. Develop programs for a microcontroller circuit	18
1. Controlling the LED	
2. Integrating Input Pushbutton Switch	
3. Controlling the Motion	
4. Measuring the Rotation	
5. Controlling the Digital Display	
6. Measuring the light	
7. Controlling the frequency and sound	
3. Interface Input/output devices to microcontroller Circuit.	12
1. Prepare the I/O devices	
2. Construct I/O interface circuit board	
3. Connect and wire the I/O interface circuit board to Microcontroller/	
4. Test the operation using the developed program	

CLO 3: Develop programs for a microcontroller circuit.

5	Write different programs to control and measure different input/output devices with 90% to 100% accuracy.
4	Write different programs to control and measure different input/output devices with 80% to 89% accuracy.
3	Write different programs to control and measure different input/output devices with 70% to 79% accuracy.
2	Write different programs to control and measure different input/output devices with 65% to 69% accuracy.
1	Write different programs to control and measure different input/output devices with below 65% accuracy.

CLO 4: Interface Input/output devices to microcontroller circuit

5	Hook up input/output devices to microcontroller circuit and operate it with no instruction or assistance from the supervisor.
4	Hook up input/output devices to microcontroller circuit and operate it with no instruction but limited supervision.
3	Hook up input/output devices to microcontroller circuit and operate it with some instruction and more than limited supervision.
2	Hook up input/output devices to microcontroller circuit and operate it with considerable instruction and close supervision.
1	Unable to interface input/output devices to microcontroller circuit even with close instruction and supervision. Little to no experience and knowledge in the area.