PASSAIC COUNTY COMMUNITY COLLEGE
CIS/Engineering/Graphics
Programming the Microcontroller for Applications (with Lab)
COURSE SYLLABUS

PART I GENERAL INFORMATION

1. **Course Title**: Programming the Microcontroller for Applications

2. **Course Designation:** ET-228

3. **Semester:** Spring

4. **Course Instructor:** TBA

5. **Number of Credits:** 4 credits

6. **Number of Hours:** 3-hour lecture, 3-hour lab

7. **Pre / Co-requisites:**
   Prerequisite: ET-226 Digital Electronics
   Co-requisite:

8. **Course Description:** This course provides students with the knowledge and skills necessary to understand and program 8-bit microcontrollers used for a variety of applications. Hands-on training includes coding for microcontroller applications in graphical, assembly and C programming languages. Integrated laboratory work provides practical experience with industrial hardware for testing and troubleshooting.

9. **Course Intended Learning Outcomes & Means of Course Assessment and Criteria for Success**

Certificate Intended Learning Outcomes: Upon **successful** completion of the course students will…..	**Means of Assessment and Criteria for Success:** Outcomes will be assessed by:
1 Describe microcontrollers and their applications. 2 Develop programming skills in graphical and assembly programming languages 3 Program microcontrollers for industrial applications.	A. Embedded Questions: selected questions related to learning outcomes 1, 2, and 3 will be embedded in all examinations. [70% of the students must achieve 70% or higher on the embedded questions] B. Technical Projects: ET-228 Technical laboratory works addressing learning outcomes 2 and 3. [70% of the student must achieve 70% or higher on the required technical projects.

PART II REQUIRED TEXT, MEDIA, AND RECOMMENDED MATERIALS

1. Required Texts and Media:

Course material delivered with the Lab-Volt Microcontroller Development System with E-Blocks^{R} and PICmicro^{R}.

Texts: Microcontrollers: From Assembly Language to C Using the PIC24 Family, R.B.Reese, J.W.Bruce, B.A.Jones, Cengage Learning, **ISBN-13:**978-1-5845-0583-9.

Resource Bibliography: PIC Microcontrollers - Programming in C, Milan Verle, Publisher: mikroElektronika; **ISBN-13:** 978-86-84417-17-8

PART III COURSE OUTLINE

WEEK	Lecture TOPICS	LAB Topics
1	µ-Processor Hardware Architecture Core, I/O, and Memory	Introduction to Electronic Measurement Instrumentation
2	Instruction Set Commands	FlowCode Programming Environment and E-Block^{R} Hardware Architecture
3	Binary Number System	LAB - Input Ports
4	Looping and Go-To Commands	LAB - Output Ports
5	Interrupts – External and Internal	LAB – Looping/Calculations
6	Input from Keypad	**Test #1 MID-TERM**
7	Creating Messages on the LCD	LAB - LCD Message Output
8	Output Ports 7-Segment Display	LAB - LCD Message Output
9	Processing Analog Inputs (A/D)	LAB - Keypad Input
10	Introduction to Assembly Coding	LAB - Keypad Input
11	Internal Register(s) Display	LAB Analog Input
12	Programing in Assembly	LAB Analog Input
13	Programing in Assembly	LAB - Student Project
14	Programming in C	LAB - Student Project
15	Project Presentations - Final	**Final EXAM**

PART IV METHODS OF EVALUATION

Estimated # of multiple choice & written tests	2
Estimated # of written in-class exams	2
Estimated # of lab projects	6
Final Project	yes
Classroom Performance	yes
Laboratory work	yes
Midterm	yes
Final	yes

PART V GRADING FACTORS

Grading Criteria:

	Criteria	**Grade**
1.	Mid-Term	20
2.	Final Exam	25
3.	Student Project (with Presentation)	20
4.	Laboratory Work	35
		100 %

.PART VI ADDITIONAL INFORMATION FOR A NEW COURSE.

1. Rationale

The Engineering Advisory Board recommended that enhanced skill courses which reflect the changing electrical and electronic systems in today's digital world be added.

Courses needed by electronic technicians are the fundamental understanding of Embedded Processor Design and Programming. This hands on courses will enable electronic technicians to integrate the use of microcontrollers and their application in various electronic systems.

This course will help students for employment with job titles such as 17-3023 Electrical and Electronic Engineering Technicians, 49-2097 Electronic Home Entertainment Equipment Installers and Repairers, 49-2098 Security and Fire Alarm System Installers, and 17-3026 Industrial Engineering Technicians.

2. Programs in which the course is required
This course is required to complete the requirements for the Certificate of Achievement for Field Service Technician.

3. Course replaced if any
N/A

4. Number of courses now required in discipline
Five (5) courses are required to complete the Certificate of Achievement for Field Service Technician.

5. Suggested offering cycle

Course offered in Spring Semester

6. Special equipment needed

The following list summarizes the the Lab-Volt Microcontroller Development System with E-Blocks^{R} and PICmicro^{R} required for the course.

Item#	Qty	Description	Part#	Unit Cost	Extended
1	1	EBK MICRO PROG 10 USER	48113-B0		
2	1	EBK FLCDPIC 10 USER	48107-B0		
3	10	MICROCTRL SYS DEV	91030-20		
4	10	COMP BASE UNIT 120V	91000-50		
5	1	EBK C PIC 10 USER	48120-B0		
6	1	EBK A SMBPIC 10 USER	48101-B0		
			Sub-Total		

7. Additional faculty

Department faculty has limited experience and continuous training may be required as applications will change. Adjunct may be necessary.

9. Projected enrollment

10-12 Students

10. Overload

Possible

11. Projected additional operational costs

Maintain and Upgrade of Lab equipment.
Additional Lab space is required in the Engineering Lab.

12. General Education (Yes/No)

No