NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ELECTRICAL AND ELECTRONICS ENGINEERING
TELECOMMUNICATIONS ENGINEERING PROGRAM

SYLLABUS - IT134 MICROPROCESSORS

I. GENERAL INFORMATION

CODE	**:**	IT134
SEMESTER	**:**	
CREDITS	**:**	3
HOURS PER WEEK	**:**	4 (Theory – Practice)
PREREQUISITES	**:**	EE635 Digital Systems I
CONDITION	**:**	Elective
INSTRUCTOR	**:**	Mauricio Galvez

II. COURSE DESCRIPTION

This course is theoretical and practical. Its aim is to provide students with criteria so that they are able to understand internal architecture and microprocessors programming, as well as design and develop applications based on microprocessors. The course encompasses the following subjects: Basic architecture of a microprocessor, evolution, addressing modes, instructions, programming, memory interfaces, interfaces with input and output devices, microprocessor-based systems design and microcontroller.

III. COURSE OUTCOMES

1. Learn fundamental concepts of microprocessors.
2. Work out a flowchart as a graphical tool to interpret the control program logic.
3. Program the microprocessor through assembly language.
4. Computer-aided analyze and simulate the operation of control programs.
5. Learn concepts related to microprocessor's interfaces.
6. Establish differences among several types of Input-Output interfaces.
7. Design and implement microprocessor interface systems with Input-Output memory and devices.
8. Work out, design and implement projects based on microprocessors, assessing the importance of these devices in the solution of problems of practical application.
9. Learn concepts of microprocessors and establish differences among systems based on microprocessors and systems based on microcontrollers.

IV. LEARNING UNITS

1. MICROPROCESSOR ARCHITECTURE

Basic architecture of a microcomputer / basic architecture of a microprocessor / Register description / Microprocessors evolution / CISC and RISC microprocessors.

2. MICROPROCESSORS PROGRAMMING

Addressing modes / Instruction formats / Instruction sets / Data transfer instructions / Arithmetic and logic instructions / Branch instructions / Call and subroutine return instructions / Input and output instructions / Practical applications / Applications programming.

3. MICROPROCESSSOR INTERFACES

Memory interfaces / Decoding and mapping / Interfaces with parallel Input-Output peripherals / Interfaces with serial Input-Output peripherals / Interface design and practical applications.

4. MICROCONTROLLERS

Basic concepts of microcontrollers / Internal architecture / Instructions set / Programming applications / Applications.

5. PROJECTS AND PRACTICAL APPLICATIONS

Development of projects based on microprocessors / Development of projects based on microcontrollers.

V. LABORATORY EXPERIENCES

Lab 1: Applications with 8085 INTEL microprocessor.
Lab 2: Applications with 8088 INTEL microprocessor.
Lab 3: Applications with PIC 16F84 microprocessor I.
Lab 4: Applications with PIC 16F84 microprocessor II.

VI. METHODOLOGY

The course is carried out in computing lab, theory and practice sessions. In theory sessions, the instructor introduces concepts and applications. In practice sessions, several programming problems are solved, and their solutions are analyzed. In lab sessions, EMU 8086 microprocessors and Proteus and MPLAB microcontrollers software programs and MASM and TASM programs are used to program and implement practical applications. At the end of the course students must hand in and expose an integrating paper or project. In all sessions student's active participation is encouraged.

VII. EVALUATION FORMULA

The average grade PF is calculated as follows:

PF = (EP + EF + (P1+P2+P3+P4) / 4 + (L1+L2+L3+L4) / 4) / 4

EP: Mid-Term Exam EF: Final Exam P#: Quizzes L#: Labs

VIII. BIBLIOGRAPHY

1. **BARRY, BREY**
   INTEL Microprocessors (Spanish)
   Prentice Hall Editorial, 2008

2. **ANGULO, JOSÉ MARÍA**
   PIC Microprocessors (Spanish)
   McGraw Hill Editorial, 2006