



## Course Syllabus

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|---|--|---|
| <b>Course Code</b><br>ECE-221                   | <b>Course Title</b><br>Microprocessors Lab | <b>ECTS Credits</b><br>2                  |
| <b>Prerequisites</b><br>ECE-111, ECE-211        | <b>Department</b><br>Engineering           | <b>Semester</b><br>Spring                 |
| <b>Type of Course</b><br>Required               | <b>Field</b><br>Engineering                | <b>Language of Instruction</b><br>English |
| <b>Level of Course</b><br>1 <sup>st</sup> Cycle | <b>Lecturer(s)</b><br>Andreas Serghiou     | <b>Year of Study</b><br>2 <sup>nd</sup>   |
| <b>Mode of Delivery</b><br>Face-to-face         | <b>Work Placement</b><br>N/A               | <b>Corequisites</b><br>ECE-220            |

### Course Objectives:

The main objectives of the course are to:

- Help the students bridge the gap between the idealized situations presented in the associated theoretical course and the real world of the laboratory by carrying out selected hardware/software experiments using 8088 and 80386 microprocessor circuit board trainers and a personal computer.
- Provide the student with practical experience that relate to microprocessor architecture, programming, and interfacing techniques in realistic applications.
- Develop the skills in measuring and analyzing bus signals and acquire hands on experience on the 8/32-bit microprocessors and associated chip sets.
- Provide the students with the fundamental knowledge on how to read and understand microprocessor's technical drawings and do fault finding.
- Enable the students to use the Microsoft Macro Assembler to develop assembly programs for the Intel family of microprocessors.

### Learning Outcomes:

After completion of the course students are expected to be able to:

- Demonstrate in depth practical knowledge and understanding of the hardware architecture of INTEL microprocessor systems.
- Demonstrate knowledge and analyze the principles and practical applications of 8/32 bit microprocessors.

- Analyze bus signals.
- Demonstrate competency in troubleshooting circuit faults.
- Read and understand microprocessor's technical drawings and do fault finding.
- Use microprocessors to communicate with and control devices in the outside world.
- Demonstrate competency in developing software using Assembly language programming.

### Course Content:

- A. Introduction to BGC-8088 System Microengineer
  - *Hardware architecture*: CPU and clock circuit, reset control logic, clock generator, memory, status port.
  - *Monitor commands*: numerical treatment commands, memory management commands, assembler commands, program control commands.
  - *Program examples*: Controlling the blinking of LED through status port, controlling the speaker through status port.
- B. Introduction to Lab-Volt 32-bit Microprocessor Trainer
  - Trainer Familiarization
  - Bus Operation
  - Memory Interfacing
  - I/O Interfacing
  - Interrupt Processing
  - Programming: Addressing Modes
  - Programming: 80386 CPU Instructions
  - Troubleshooting
  - Microprocessor Applications ( DC Motor Control, Temperature Control )
- C. Introduction to MASM
  - Introduction to DOS commands
  - Using DEBUG
  - Introduction to the Programmers WorkBench and CodeView. Program example:
    - Decomposition and display of an ASCII coded character enter on the keyboard in hexadecimal format
  - Introduction to Assembly Language Programming. Program examples:
    - DOS functions 02H and 06H to display characters
    - DOS function 09H to display a string of characters
    - Changing Character and Screen Background Colour
    - BIOS INT 10H to access the video display (positioning the cursor)
    - Develop a program requesting a password

### Learning Activities and Teaching Methods:

The student is given a direct contact with the instructor, and thus the advantages of close direction and personal discussion of ideas, experimental methods and techniques.

**Assessment Methods:**

Methodology, reports, computerized unit tests, final exam.

**Required Textbooks / Readings:**

| <b>Title</b>   | <b>Author(s)</b>                   | <b>Publisher</b>                   | <b>Year</b> | <b>ISBN</b> |
|--|------------------------------------|------------------------------------|-------------|-------------|
| User's Guide and Experiments, Introduction to BGC-8088 MicroengineerV3.0 | Microport Computer Electronics Inc | Microport Computer Electronics Inc | 2001        |             |
| Lab-Volt 32-Bit Microprocessor Lab Manuals                               | Lab-Volt Systems Inc               | Lab-Volt Systems Inc               | 1998        | 0866570896  |

**Recommended Textbooks / Readings:**

| <b>Title</b>  | <b>Author(s)</b> | <b>Publisher</b> | <b>Year</b> | <b>ISBN</b> |
|---|------------------|------------------|-------------|-------------|
| Laboratory Manual to Accompany 8086/8088, 80186/80188, 80286, 80386, Pentium, and Pentium Pro Microprocessors | Barry B. Brey    | Prentice Hall    | 1995        | 023142545   |
| The Intel Microprocessors   | Barry B. Brey    | Prentice Hall    | 2009        | 0137140940  |