Academic Course Description

SRM University
Faculty of Engineering and Technology
Department of Electronics and Communication Engineering

EC0309A Microprocessors and Microcontrollers
Fifth Semester, 2014-15 (Odd Semester)

Course (catalog) description
Microprocessor is a required course for under-graduate students in the ECE program. The purpose of this course is to teach students the fundamentals of microprocessor and microcontroller systems. The student will be able to incorporate these concepts into their electronic designs for other courses where control can be achieved via a microprocessor/controller implementation.

Topics include Semiconductor memory devices and systems, microcomputer architecture, assembly language programming, I/O programming, I/O interface design, I/O peripheral devices, data communications, and data acquisition systems. Several laboratory exercises will be based on both microprocessor (Intel 8086) and microcontroller (Intel 8051).

Compulsory/Elective course: Compulsory for ECE students

Credit hours: 3 credits

Course coordinator(s)
Mr. A.V. M. Manikandan, Assistant Professor (Sr. Grade), Department of ECE

Instructor(s)

<table>
<thead>
<tr>
<th>Name of the instructor</th>
<th>Class handling</th>
<th>Office location</th>
<th>Office phone</th>
<th>Email</th>
<th>Consultations</th>
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<tbody>
<tr>
<td>Mr. S. Yuvaraj</td>
<td>A</td>
<td>TP10S4</td>
<td></td>
<td>yuvaraj.s</td>
<td>Day-2: FN &amp; Day-4: AN</td>
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<td>Mr. R. Prithviraj</td>
<td>B</td>
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<td>prithviraj.r</td>
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<tr>
<td>Mrs. G. Suganthi Brindha</td>
<td>C</td>
<td>TP903A</td>
<td>2058</td>
<td>suganthibrindha.g</td>
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<td>Ms. S. Suhasini</td>
<td>D</td>
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<td>suhasini.s</td>
<td>Day-1: AN &amp; Day-5: AN</td>
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<tr>
<td>Mrs. V.K.Daliya</td>
<td>E</td>
<td>TP903A</td>
<td>2058</td>
<td>daliya.vk</td>
<td>7th period on all days</td>
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</table>
EC0309A Microprocessors and Microcontrollers: Course Description

Name of the instructor | Class handling | Office location | Office phone | Email | Consultations
--- | --- | --- | --- | --- | ---
Mr. A.V. M. Manikandan | F | TP12S2 |  | manikandan.m | Day-1: AN & Day-5: AN
Mr. A. Joshua Jafferson | G | TP1206A | 2075 | joshua.j | Day-2: AN
Mrs. Suvarnamma | H | TP1103A | 2062 | suvarnamm.a | 1" period on all days
Mr. Elavel Viswanathan | I | TP10S4 |  | elavelvisvanathan.g | Day-3: AN

Relationship to other courses

Pre-requisites: EC0205 Digital Systems
Assumed knowledge: Satisfactory completion of basic digital electronics courses, Ability to convert decimal number into binary, octal, hexadecimal and visa versa, Ability to perform arithmetic operations in binary, octal and hexadecimal, Ability to use a computer to prepare written reports
Following courses: Nil

Text book(s) and/or required materials


References


Computer usage

Students are expected to use the computer to write and assemble assembly language programs and also run them by downloading them to the target microprocessor. Students will also use a microprocessor software simulator that runs on the personal computer. Students will also prepare lab reports and conduct out-of-class assignments using the computer.
Class schedule: Four 50 minutes lecture sessions per week, for 14-15 weeks

<table>
<thead>
<tr>
<th>Section</th>
<th>Schedule</th>
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<tr>
<td>A</td>
<td>Day1-6, Day3-1, Day4-2, Day5-3</td>
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<td>B</td>
<td>Day1-6, Day4-2, Day5-2&amp;4</td>
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<td>C</td>
<td>Day2-1&amp;6, Day4-4, Day5-4</td>
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<td>D</td>
<td>Day1-1, Day2-7, Day3-2, Day5-4</td>
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<td>E</td>
<td>Day3-4&amp;6, Day5-1&amp;3,</td>
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<td>F</td>
<td>Day2-3, Day3-1&amp;2, Day4-6</td>
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<td>G</td>
<td>Day1-6, Day2-2, Day3-4, Day4-5</td>
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<tr>
<td>I</td>
<td>Day1-3, Day2-6, Day3-3, Day4-7</td>
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Professional component

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Broad area: Communication | Signal Processing | Electronics | VLSI | Embedded

Course objectives

<table>
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<th>The objectives of this course is to</th>
<th>Correlates to Program Objective</th>
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<tr>
<td>i. understand the main components and working principals of the Intel 80x86 microprocessor and Intel 80x51 microcontroller</td>
<td>(1), (5)</td>
</tr>
<tr>
<td>ii. program and debug in assembly language</td>
<td>(3), (4)</td>
</tr>
<tr>
<td>iii. understand the memory organization and memory interfacing</td>
<td>(2)</td>
</tr>
<tr>
<td>iv. Interface a microprocessor to external input/output devices and perform input/output device programming in assembly</td>
<td>(3), (4)</td>
</tr>
<tr>
<td>v. understand the hardware and software interrupts and their applications</td>
<td>(2)</td>
</tr>
<tr>
<td>vi. understand the properties and interfacing of the parallel and serial ports</td>
<td>(3), (4)</td>
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### Course Learning Outcome

The specific course outcomes supporting the program outcomes are:

<table>
<thead>
<tr>
<th>Correlates to program outcome</th>
<th>H</th>
<th>M</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Students should be able to solve basic binary math operations using the microprocessor. / microcontroller</td>
<td>a</td>
<td>c</td>
<td>j</td>
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<tr>
<td>2. Students should be able to demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor / microcontroller.</td>
<td>e</td>
<td>d</td>
<td>j</td>
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<tr>
<td>3. Students should be able to program using the capabilities of the stack, the program counter, and the status register and show how these are used to execute a machine code program.</td>
<td>d</td>
<td>e</td>
<td>j</td>
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<tr>
<td>4. Students should be able to apply knowledge of the microprocessor’s internal registers and operations by use of a PC based microprocessor simulator.</td>
<td>f</td>
<td></td>
<td>j</td>
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</table>

H: high correlation,  M: medium correlation,  L: low correlation

### Weekly teaching plan

<table>
<thead>
<tr>
<th>Session #</th>
<th>Topics</th>
<th>Text / Chapter</th>
<th>Problem Solving (Y / N)</th>
<th>Correlation of topics with IOs &amp; POs</th>
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<tbody>
<tr>
<td><strong>MICROPROCESSOR- 8086</strong></td>
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<tr>
<td>1</td>
<td>Register Organization</td>
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<td>Y</td>
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<tr>
<td>2</td>
<td>Architecture</td>
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<td>3</td>
<td>Signals</td>
<td>[1] chapter(s) – 1, 4</td>
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<td>iii.</td>
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<td>Memory Organization,</td>
<td>[2] chapter(s) -</td>
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<td>5</td>
<td>Operation Bus</td>
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<td>6</td>
<td>IO Addressing</td>
<td></td>
<td>Y</td>
<td>ii.</td>
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<tr>
<td>7</td>
<td>Minimum Mode</td>
<td></td>
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<td>8</td>
<td>Maximum Mode-Timing Diagram</td>
<td>[1] chapter(s) – 1, 4</td>
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<td>Addressing Modes</td>
<td>[1] chapter(s) – 2, 3</td>
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<td>11-14</td>
<td>Instruction Format-Instruction Set</td>
<td>[2] chapter(s) -</td>
<td>Y</td>
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<tr>
<td>Session #</td>
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<td>Text / Chapter</td>
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<td>Correlation of topics with IOs &amp; POs</td>
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<td>15-17</td>
<td>Assembly language Programs in 8086</td>
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<td><strong>INTERFACING DEVICES</strong></td>
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<td>18</td>
<td>IO and Memory Interfacing concepts</td>
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<td>Programmable Interval Timer (8254)</td>
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<td>Stepper Motor Interfacing</td>
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<td><strong>MICROCONTROLLER-8051</strong></td>
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<td>Instruction Set, Addressing Modes</td>
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<td>Interfacing to ADCs, Sensors</td>
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<td><strong>HIGH PERFORMANCE RISC ARCHITECTURE- INTRODUCTION</strong></td>
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<td>a, d, j</td>
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<td>41-43</td>
<td>ARM organization and implementation</td>
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<td>Basic ARM ALP (32-bit addition, subtraction, multiplication, binary sorting)</td>
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### Evaluation methods

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<td>Cycle Test – II</td>
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**Prepared by:** Mr. A.V.M. Manikandan, Assistant Professor (Senior Grade), Department of ECE  
**Dated:** 25-June-2014  
**Revision No.:** 00  
**Date of revision:** NA  
**Revised by:** NA

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**Addendum**

*ABET Outcomes expected of graduates of B.Tech / ECE / program by the time that they graduate:*

- a. Graduates will demonstrate knowledge of mathematics, science and engineering.
- b. Graduates will demonstrate the ability to identify, formulate and solve engineering problems.
- c. Graduate will demonstrate the ability to design and conduct experiments, analyze and interpret data.
- d. Graduates will demonstrate the ability to design a system, component or process as per needs and specifications.
- e. Graduates will demonstrate the ability to visualize and work on laboratory and multi-disciplinary tasks.
- f. Graduate will demonstrate the skills to use modern engineering tools, software’s and equipment to analyze problems.
- g. Graduates will demonstrate the knowledge of professional and ethical responsibilities.
- h. Graduate will be able to communicate effectively in both verbal and written form.
- i. Graduate will show the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues.
- j. Graduate will develop confidence for self education and ability for life-long learning.
- k. Graduate will show the ability to participate and try to succeed in competitive examinations.
Program Educational Objectives

1. To prepare students to compete for a successful career in Electronics and Communication Engineering profession through global education standards.

2. To enable the students to aptly apply their acquired knowledge in basic sciences and mathematics in solving Electronics and Communication Engineering problems.

3. To produce skillful graduates to analyze, design and develop a system/component/ process for the required needs under the realistic constraints.

4. To train the students to approach ethically any multidisciplinary engineering challenges with economic, environmental and social contexts

5. To create an awareness among the students about the need for life long learning to succeed in their professional career as Electronics and Communication Engineers.

Professor In-Charge            Academic Coordinator            Course Coordinator