EET 263

DIGITAL TECHNOLOGY - Introduction to Microprocessors and Assembly Language

COURSE DESCRIPTION

Introduces the operation of a simple computer at the physical (electrical) level using gates, registers and other basic circuits introduced in the prerequisite course. Students gain experience building and programming a simple computer. Covers memory, basic microprocessor architecture, assembly language programming, analog to digital converters and digital to analog converters. 3 lecture/3 laboratory hours.

<table>
<thead>
<tr>
<th>Text(s):</th>
<th>HCS12 Microcontroller and Embedded Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By Muhammad Ali Mazidi and Danny Causey</td>
</tr>
<tr>
<td></td>
<td>Publisher: Prentice Hall</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Prerequisites:</th>
<th>EET251</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-requisites:</td>
<td>None</td>
</tr>
</tbody>
</table>

| Credits: 4 | Lecture Hours: 3 | Studio/Lab Hours: 3 |

<table>
<thead>
<tr>
<th>Coordinator:</th>
<th>Dominick T. Defino</th>
</tr>
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<tbody>
<tr>
<td>Latest Review:</td>
<td>Spring 2014</td>
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</table>

Instructor:                               Office Hours:

Office No.:                               E-mail:

Attendance Policy

Mercer County Community College does not have a “cut system.” Students are expected to attend all classes of every course on their schedules. Only illness or serious personal matters may be considered adequate reasons for absence.

It is the prerogative of the instructor to excuse absences for valid reasons, provided the student will be able to fulfill all course requirements.

Student performance in classes is formally verified at the middle of each full semester. If a student’s attendance has been infrequent or performance unsatisfactory, he or she may receive notification in the mail. At any time, the instructor may withdraw the student from class for insufficient attendance.
**Academic Integrity**

Students are required to perform all the work specified by the faculty and are responsible for the content and integrity of all academic work submitted, such as papers, reports, and examinations. A student will be guilty of violating the Rule of Academic Integrity if he or she:

- Knowingly represents the work of others as his or her own;
- Uses or obtains unauthorized assistance in any academic work;
- Gives fraudulent assistance to another student.
- Intentionally damages any contents of the lab or classroom
- Is found to have stolen anything from the lab or classroom

**Penalty**
- First violation for stealing or damaging is F in the course.
- First violation on test or project is an “F” grade for the test or project.
- Second violation is “F” in the course.

**Temporary Grade Policy**

If you do not complete the course requirements by the end of the semester, and you have a prior agreement with the instructor, you may be given an INC (incomplete). INC indicates that the instructor is affording extra time to earn a grade in the course. The amount of extra time is determined by the instructor, up to a maximum of 16 calendar weeks after grades are submitted. An INC grade which has not been resolved within 16 calendar weeks is changed to an F or NC (no credit) grade, as appropriate to the course.

**Audit**

If you audit the course, you will receive an “AU” grade—this cannot be changed to a letter grade.

**Withdrawal Course Requirements: Deadline: See Campus Calendar**

To receive a W grade for any course, a student must consult with the course instructor or an appropriate division representative and then withdraw officially before two-thirds of the course has been completed by submitting a withdrawal form to the Office of Student Records. Withdrawal after this point results in a grade other than W (usually F). At any time before two-thirds of the course has been completed, the instructor may also withdraw with a W grade any student who has been absent excessively. A student thus withdrawn will not be entitled to any refund of tuition or fees. The student may appeal this action.
### Method of Instruction

Learning will take place via classroom instruction, demonstrations, and student activities, as well as through textbook reading and homework assignments. Lab activities will augment this.

Use of equipment and manual skills will be developed in the lab.

### Grading

The final grade will be based on three test grades, lab reports, in class and homework assignments.

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Nominal %</th>
<th>Definition</th>
<th>Quality Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93-100</td>
<td>Superior achievement</td>
<td>4.0</td>
</tr>
<tr>
<td>A-</td>
<td>90-92</td>
<td></td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td>87-89</td>
<td></td>
<td>3.4</td>
</tr>
<tr>
<td>B</td>
<td>83-86</td>
<td>Above average achievement</td>
<td>3.0</td>
</tr>
<tr>
<td>B-</td>
<td>80-82</td>
<td></td>
<td>2.7</td>
</tr>
<tr>
<td>C+</td>
<td>77-79</td>
<td>Average achievement</td>
<td>2.4</td>
</tr>
<tr>
<td>C</td>
<td>70-76</td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>D</td>
<td>60-69</td>
<td>Minimally passing</td>
<td>1.0</td>
</tr>
<tr>
<td>F</td>
<td>0-59</td>
<td>Academic Failure</td>
<td>0.0</td>
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### Student Evaluation

Students’ achievement of the course objectives will be evaluated through the use of the following:

Three unit tests assessing students’ comprehension of terminology, calculations and practices related to the unit objectives.

Lab grade based on individual reports on experimental results

In class participation, homework and attendance.

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>3 – Unit Exams</td>
<td>50%</td>
</tr>
<tr>
<td>Lab Assignments and Reports</td>
<td>25%</td>
</tr>
<tr>
<td>Homework and Class Assignments</td>
<td>25%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
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</table>
GENERAL OBJECTIVES
Course Competencies/Goals

Students will be able to:
1. Describe the basic operation (on a block diagram level) of a simple computer that adds and subtracts 8-bit binary numbers.
2. Describe the operation of digital to analog converters and analog to digital converters for interfacing with a microprocessor.
3. Describe how to properly connect memory IC’s or modules to a computer system.
4. Converse with understanding about ADC’s, DAC’s, memory systems and basic microprocessors.
5. Program in assembly language.

General Education Knowledge Goals [ GEKG ]

Goal 1. Communication. Students will communicate effectively in both speech and writing.
Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

MCCC Core Skills [ CS ]
Goal A. Written and Oral Communication in English. Students will communicate effectively in speech and writing, and demonstrate proficiency in reading.
Goal B. Critical Thinking and Problem-solving. Students will use critical thinking and problem solving skills in analyzing information.
Goal D. Information Literacy. Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.
Goal E. Computer Literacy. Students will use computers to access, analyze or present information, solve problems, and communicate with others.
Goal F. Collaboration and Cooperation. Students will develop the interpersonal skills required for effective performance in group situations.
Unit Objectives

Unit I  Memory

The student will be able to:

1. Identify the three main buses that connect memory to a CPU.
2. Create a memory circuit having expanded capacity (address and/or word size) using lower capacity memory IC’s.
3. Properly wire a memory IC into a circuit given a schematic diagram and/or datasheet.
4. Communicate information about memory circuits including being able to read and understand parameters on datasheets for memory devices.
5. Describe the control signals and machine timing that results in the computer performing the functions it is being asked to perform.
6. Communicate device abilities and limitations through the use of a datasheet.

Unit II  Freescale HCS12 Microcontroller and Digital to Analog Converters

The student will be able to:

1. Describe how microcontroller adds and subtracts binary numbers.
2. Learn HCS12 instruction set for an assembly language programming.
3. Write programs for the microcontroller using assembly language code.
4. Work with fellow students to complete a joint programming project.
5. Describe the input and output signals involved in operating a DAC or ADC.
6. Describe how a basic digital to analog converter or analog to digital converter systems operate.

Unit III  Intel 8088 Microprocessors and Analog to Digital Converters

The student will be able to:

1. Calculate the expected output of a DAC or ADC given the input to the system.
2. Communicate information about converters including being able to read and understand parameters on datasheets for these devices.
3. Describe the operation of the sections of the Intel 8088 computer.
4. Learn the Intel 8088 instruction set for an assembly language programming.
5. Write an assembly language program for the Intel 8088 computer.
6. Understand the use of flags and jump commands and subroutines as a part of a computer program.