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| **CMPE 323 Microprocessors** |
| **Department:** Computer Engineering |
| **Program Name:** Computer Engineering | **Program** **Code:** 25 |
| **Course Code** CMPE 323 | **Credits** 4  | **Year/Semester**2018-2019 Fall |
| [x]  Required Course [ ]  Elective Course (click on and check the appropriate box)  |
| **Prerequisite(s):** CMPE 224 **Digital Design** |
| **Catalog Description** Introduction to computing: CPU-RAM-ROM. 80x86 microprocessor: registers, program and data segments, logical and physical addresses, stack, push, pop, flag register, addressing modes. Assembly Language Programming: Directives, linking, and .exe files, data types and data definition. Data Transfer, Arithmetic Logic and Control Instructions unsigned, signed, bcd, packed-bcd and ascii number conversion, rotate and shift instructions. Bios and DOS function calls. Macro definitions. 8088 PC/XT expansion slot, 80286 and the ISA bus, Memory interfacing: EPROM, SRAM and DRAM devices, address decoding circuits, ISA bus memory interfacing. ISA bus I/O address decoding and simple I/O ports, Programmable Peripheral Interface 8255 and 7-segment display, switch, stepper motor interfacing. D/A converters, A/D converters.  |
| **Course Web Page** http://cmpe.emu.edu.tr/courses/cmpe323 |
| **Textbook(s)** M. Mazidi, J. Mazidi, D. Causey, The x86 PC, Assembly Language, Design, and Interfacing, 5th Ed, Pearson, 2010 |
| **Indicative Basic Reading List** M. Mazidi & J. Mazidi, The 80x86 IBM PC and Compatible Computers, Assembly Language, Design, and Interfacing, 4th Ed, Prentice-Hall, 2003.B. B. Brey, The Intel Microprocessors Architecture, Programming, and Interfacing. Ed.6, Prentice-Hall, 2003TASM Assembler, Proteus Circuit Simulator, KC51 8051 C compiler. |
| **Topics Covered and Class Schedule****(4 hours of lectures per week)**

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| **Week 1** | Introduction to computing: CPU-RAM-ROM.  |
| **Week 2****Week 3** | 80x86 microprocessor: registers, mov and add instructions, program segments, data segments.Logical and physical addresses, stack, push, pop, flag register, addressing modes. |
| **Week 4** | Assembly Language Programming: Directives, .asm, .lst, .obj, .map, linking, and .exe files, |
| **Week 5** | Control transfer instructions, data types and data definition. |
| **Week 6** | Arithmetic Logic Instructions: multiplication and division, unsigned, signed, bcd, packed-bcd and ascii number conversion, rotate and shift instructions. |
| **Week 7** | Bios and DOS function calls: bios display and  |
| **Week 8**  | keyboard interrupts. (Midterm Exam) |
| **Week 9** | 8088 PC/XT expansion slot, 80286 and the ISA bus.  |
| **Week 10** | Memory and memory interfacing: EPROM, SRAM and DRAM devices, address decoding circuits, ISA bus memory interfacing.  |
| **Week 11** | Memory mapped and Isolated I/O methods and device interfacing: ISA bus I/O address decoding and simple I/O ports, |
| **Week 12** | Programmable Peripheral Interface: 8255 and 7-segment-display, |
| **Week 13** | Switch, button, keypad, stepper motor interfacing. D/A converters, A/D converters.(Final Exam) |
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| **Laboratory Schedule:****(2 hours of laboratory per week)**

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| **Week 4** | Introduction to TASM, EDIT/DEBUG and Emu86 Assembler tools |
| **Week 5**  | TASM Data Types, and Effect of ALU instructions on Flags. |
| **Week 6** | Simple Virtual 8086 Development Board |
| **Week 7** | BIOS and DOS Service Interrupts, Macros, Subroutines, Signed Numbers, Look-up Tables. |
| **Week 10** | 8051 Microcontroller I/O and External Memory Interface, Simulation on ISIS. |
| **Week 11** | 8051 Memory Decoders and Memory Interface, Simulation on ISIS. |
| **Week 12** | 8086 and 8051 Memory Mapped I/O and 8255A Interfacing, Simulation on ISIS. |

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| **Course Learning Outcomes** Upon successful completion of the course, students are expected to have the following competencies:1. know 8086 microprocessor registers, program and data segments, logical and physical addresses, stack, push, pop, flag register, addressing modes.
2. use arithmetic-logic, data transfer, and control instructions in assembly programs
3. use BIOS and DOS programming in assembly programs
4. analyze and design simple memory subsystems and interfacing, Isolated I/O subsystems Memory and I/O address decoding.
5. analyze and Design Simple digital I/O ports
6. design 7-segment display, switch, button, keypad, stepper motor interfacing, and D/A and A/D converter circuits using Programmable Peripheral Interface 8255.
7. write programs to initialize, receive and transmit serial data using a USART device.
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| **Assessment** | **Method** | **No** | **Percentage** |
| Quiz 1 | 1 | 8% |
| Midterm Exam | 1 | 30% |
| Quiz 2 | 1 | 8% |
| Final Examination | 1 | 44% |
| Labs | 8 | 10 % |
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| **Policy on makeups:** For eligibility to take a makeup exam, the student should bring a doctor's report within 3 working days of the missed exam. Students may get NG if they miss both midterm and final exam. |
| **Policy on cheating and plagiarism:** Any student caught cheating at the exams will automatically fail the course and may be sent to the disciplinary committee at the discretion of the instructor. |
| **Contribution of Course to ABET Criterion 5**Credit Hours for: Mathematics & Basic Science : 0Engineering Sciences and Design : 4 General Education : 0  |
| **Relationship of the course to Program Outcomes**a) apply knowledge of mathematics, science, and engineering,e) identify, formulate, and solve engineering problems, k) use the techniques, skills, and modern engineering tools necessary for engineering practice, l) knowledge of probability and statistics, mathematics through differential and integral calculus, discrete mathematics, basic sciences, computer science, and ...  |
| **Prepared by:** Prof. Dr. Hasan Kömürcügil | **Date Prepared:** 26 September 2017 |