

<b>Course:</b>	<b>EGR 481</b>
<b>Term:</b>	<b>Spring 2012</b>
<b>Instructor:</b>	<b>Name: Arkan Kadum</b> <b>Email Address: <a href="mailto:akadum@wilberforce.edu">akadum@wilberforce.edu</a></b> <b>Phone Number: (937) 708-5682</b>
<b>Catalog Description:</b>	<b>Microprocessor architecture, memory, input/output, and interfacing</b>
<b>Prerequisites</b>	<b>EGR 441</b>
<b>Course Level Learning Outcomes:</b>	<p>Students must be able to</p> <ol style="list-style-type: none"> <li>1. Know developments of microprocessors from 8086 to Pentiums;</li> <li>2. Learn how the hardware and software components of a microprocessor-based system work together to implement system-level features;</li> <li>3. Students should understand the hardware/software tradeoffs involved in the design of microprocessor-based systems.</li> <li>4. Understand and design simple memory subsystems and interfacing, Isolated I/O subsystems Memory and I/O address decoding;</li> <li>5. Will have basic knowledge of the memory and I/O interfaces, address decoding, and bus transactions.</li> <li>6. use Programmable Peripheral Interface 8255 to design 7 segment display, switch, button, keypad, stepper motor interfacing, and D/A and A/D converter circuits;</li> <li>7. Will have working knowledge of the interrupt-based control model, including software and hardware interrupts.</li> <li>8. should be able to write programs in the laboratory to perform I/O using handshaking and interrupts</li> <li>9. Learn how peripheral devices are controlled</li> </ol>

	<p>by an assembly language program via polling or interrupts</p> <p>10. Learn the operating principles of, and gain hands-on experience with, common microprocessor peripherals such as UARTs, timers, and analog-to-digital and digital-to-analog converters; and</p>
<p><b>Materials:</b></p>	<p><b>Textbook:</b> The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4: Architecture, Programming and Interfacing by Barry B. Brey, Prentice Hall, 6th Edition, 2003.</p> <p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. D. V. Hall, "Microprocessor and Interfacing Programming &amp; Hardware" TMH – 2<sup>nd</sup> Edition</li> <li>2. Lice &amp; Gibson, "Microcomputer System 8086 / 8088" PHI, 2<sup>nd</sup> Edition.</li> <li>3. H. P. Messmer, "Family Architecture Programing &amp; Design: The Indispensible PC Hardware Book" Addison Wesley, 1997.</li> </ol>
<p><b>Grading:</b></p>	<p>Grading Scale</p> <p>Assignments: 40% (20% HW + 20% Quizzes and Class Participation)</p> <p>Test #1: 20%</p> <p>Test #2: 20%</p> <p>Final: 20%</p> <p>90 - 100% = A 89 - 90% = B 79 - 80% = C 69 - 70% = D Below 60% = F</p> <p>Show how students will earn each grade based on projects, labs, attendance, class participation and exams.</p>

	<p>A student's proficiency in course work is measured in terms of the following Alphabetical symbols. Minuses and pluses are not accepted.</p> <p>A: Excellent</p> <p>B: Good</p>
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	<p>C: Satisfactory (Grade C or better required in major courses).</p> <p>D: Poor (passing, except in major courses).</p> <p>F: Earned Failure. (Removed only by repeating the course). Upon successfully passing the course, the first grade is “excluded” from grade point average. The second grade is “included in the recalculation of the grade point average.</p> <p>I: Incomplete (student performing satisfactorily, but unable to complete coursework due to valid reason).</p> <p>N: Used in cases where grades are not yet submitted.</p> <p>W: Withdrew before course drop deadline.</p> <p>WP: Student withdraws from University. Withdrew passing after course drop deadline (2 weeks after mid-term).</p> <p>WF: Student withdraws from University. Withdrew failing after course drop deadline (2 weeks after mid-term. WF is treated as an F (punitive grade).</p> <p>CR: Credit/pass</p> <p>NC: No credit/fail</p> <p>Z: Failed course for non-attendance/unofficial withdrawal (treated the same as an F grade). Last date of attendance is reported by faculty.</p>
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<p><b>Activities:</b></p>	<ul style="list-style-type: none"> <li>• <b>Class participation:</b> Students are expected to attend classes and to be on time. <b>Attendance</b> will routinely be checked .</li> <li>• <b>Homework assignments</b> are due at the beginning of the class. No late assignments will be accepted without the prior authorization of the instructor. Homework not turned in will result in a grade of zero. <b>Quizzes</b> may be announced or unannounced.</li> </ul>
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	Absence from an quiz will result in a zero (if you cannot attend a lecture inform your instructor ).
<b>Policy Statements:</b>	<ol style="list-style-type: none"> <li>1. <b>American with Disabilities Policy:</b> Students are responsible information the instructor of any instructional accommodation and/or special needs at the beginning of the semester.</li> <li>2. <b>Final examination:</b> The final examination must be taken at the scheduled time, so make your travel arguments for after your final exam.</li> <li>3. <b>Make-up exams</b> will only be given for extenuating circumstances (acceptable reasons for missing an exam are: illness, family emergencies, or incarceration) and they must be arranged before the exam. Unannounced absence from an exam will result in a zero.</li> <li>4. <b>Academic misconduct:</b> Students are considered to have cheated if they copy the work of others during examinations or turn in assignments written, in whole or in part, by someone else</li> </ol>
<b>University Policies:</b>	<p><u>Academic Honesty:</u> Plagiarism and cheating are completely unacceptable in an institution of higher education and learning. Such behavior deprives the student involved of the desired education and development of an appropriate value system. It is extremely unfair to other students, and it severely diminishes the value and integrity of a University degree.</p> <p>Plagiarism occurs whenever another's work is submitted as one's own. This includes the use of information from an Internet site or from a published author's ideas and words without proper attribution or documentation. It also includes the copying of term papers, other unpublished works, homework, case reports, computer programs and spreadsheets, and any other course assignments which are submitted for course credit as the student's own effort.</p> <p>Each instructor shall state the specific penalties for plagiarism and cheating in the course syllabus. The instructor has final responsibility for assessing the penalty in such</p>

cases regarding the course grade.

All cases of plagiarism and cheating will be referred to the Vice President for Academic Affairs for possible further action. Additional penalties may be imposed for the egregious cases of plagiarism and cheating.

### Drops and Withdrawals

#### Dropping Courses:

A course may be dropped up through the end of the second week of the semester without any record on the transcript. After this date, a course may be dropped up to two weeks after mid-term grade reports are due, with a W appearing on the transcript. Withdrawals after mid-terms must be approved by the Vice-president of academic Affairs.

In certain General Studies core courses, students' assignments to course sections may be changed by faculty with written notification given to the Registrar. In all other cases, a student wishing to move from one section of a course to another must accomplish this by using a drop-add form to drop the old section and add the new section.

#### Withdrawal/Grading Policies

The following procedures will apply to all students withdrawing from the University. Grades will be given in regard to the time of withdrawal. Contact the Registrar's Office for forms and assistance.

- **W** (official withdrawal initiated by the student): To be given when a student withdraws between the first day of class/registration and the last day to drop courses, this is two weeks after mid-term exams.
- **AW** (unofficial withdrawal not initiated by the student): The student does not inform anyone that he/she is leaving campus ( the student walks out). The university may also administratively withdraw a student for disciplinary reasons, academic legal anytime during the semester.

#### Special Accommodations:

A student who is ill or who has or develops medical conditions including but not limited to illness, physical or other disability or pregnancy must notify the Director of Health Services immediately.



	<p>with me before the exam is given.  I expect that all homework, and exams to represent individual effort. Each student should turn in her own work.  All sources of answers to homework should be paraphrased and not copied directly.  Homework are due as hardcopies in class at the beginning of class on the due date, unless I specify otherwise.  While the amount of time required of the student to successfully complete this course varies from student to student plan on spending at least 6-8 hours per week outside of class.</p>
<p><b>Weekly Schedules:</b></p>	<p><b>Week 1</b> Week 1 . Course review.  Introduction to the 80386, 80486, and Pentium® Processor Families.  Architecture and Software Model of the 8088 and 8086 Microprocessors: Registers, the Stack, <i>Physical</i> and <i>Logical</i> Memory Addresses.( Chapter 1)  <b>Weeks 2-3:</b> Microprocessor Control Signals and Bus Cycles. 80x86 Processor Architecture: 8086 hardware details, Clock generator 8284A, Bus buffering and latching, Processor Read &amp; Write bus cycles, Ready and wait state generation, Minimum versus Maximum mode operation. (Chapter 7)  <b>Week 4</b> Introduction to Memory Subsystem Design: Memory Banks. Memory Devices: EPROM, SRAM and DRAM devices, Memory internal organization, Memory read and write timing diagrams, DRAM Controller (Chapter 8)  <b>Week 5:</b> Memory Interfacing :80x86 processor-Memory interfacing, Address decoding techniques, address decoding circuits, ISA bus memory interfacing. Memory mapped and Isolated I/O methods and memory interfacing. (Chapter 8)  <b>Week 6:</b> The difference between <i>Real-Mode</i> and <i>Protected-Mode</i> Memory models and Memory Paging.</p>

**Week 7:** Introduction to Input/Output Interface Circuits and IN/OUT instructions, ISA bus I/O address decoding and simple I/O ports, PC bus standards & interfaces – PCI, USB, Firewire, AGP

**Weeks 7-8:** Basic I/O Interfacing :Parallel I/O, Programmed I/O, I/O port address decoding, The 8255A Programmable Peripheral Interface(PPI), programming 8255, Operation modes, Interface examples – Keyboard matrix, LCD/7-Segment Display, Printer, stepper motor, A/D and D/A converter. (Chapter 9)

**Week 9:** Introduction to the Interrupt Interface of the 8088/8086 Microprocessors. Interrupt driven I/O, Software & Hardware interrupts, NMI and INTR pins, interrupt servicing, Interrupt vectors and vector table, Interrupt processing, (Chapter 10)

**Week 10-11:** The 8259A Programmable Interrupt Controller(PIC)- cascading of 8259s, programming 8259, Interrupt examples – Printer, Real-Time Clock, PC Keyboard. (Chapter 10)

**Weeks 12-13:** Timer Interfacing :The 8254 Programmable Interval Timer(PIT), Timing applications.

**weeks 14:** Serial I/O Interface :Asynchronous communication, Physical communication standard-EIA RS232, Programmable Communication Interface - UART 8251, Interfacing serial I/O devices- mouse, modem, PC Keyboard.

**weeks 15-16** Direct Memory Access :Basic DMA operation, DMA Controlled I/O, The 8237 DMA Controller, Disk Memory Systems- Floppy disk, Hard disk, optical disk memory systems, video displays

Week 17 : Course Summary and Review

**Advising & Tutorial Support:**

**Suggestion on how to study for  
Microprocessor:**

1. Spend some time on this course between every two consecutive class meetings. The time spend should follow a regular schedule as to time and place. Expect to put in at least two hours of study for each 50 minutes of class time.
2. Try to work the problems unassisted. If your early attempts at solving a problem are unsuccessful, you should seek help from your instructor. Look at the answer in text only after you have exhausted all of your resources in solving a problem.
3. The value of the class time will be greatly enhanced if you look over the portion of the text to be discussed before attending class. When homework problems are to be discussed, it is also important to have attempted the assigned problems before the discussion in the class. Even if the attempts are unsuccessful, you will find the discussion in the class far more valuable as a result of your earlier attempts at solutions.