

# ***CS-350: Computer Organization, Spring 2004 Semester***

## **Course Syllabus**

© 2004 Charles Abzug

### **Summary Course Description:**

This course provides a solid theoretical foundation that furnishes the student with insight into the innermost workings of the modern digital computer, together with a thorough understanding of the organization and architecture of real computers. Students learn how a digital computer works through thorough study of the principles of operation of logic circuits of progressively increasing complexity. Number systems are reviewed, and various schemes for the digital representation of numbers are also discussed, as well as the principles of digital integer arithmetic, to provide insight into several different ways that arithmetic calculations can be made in digital computers.

The principal subsystems of a modern digital computer are surveyed, including the Central Processing Unit (CPU), system bus and subsidiary buses, primary storage (RAM and ROM), including both main memory and cache memory, secondary storage (Hard Disk Drive (HDD) and floppy drives, CD-ROM and DVD-ROM drives), input/output ports, and several types of input/output devices, including keyboard and video display terminal.

Basic electronics is reviewed, in order to convey an understanding of the operation of the fundamental logic circuits (AND gates, OR gates, NOT gates, buffer gates, XOR gates and XNOR gates) that constitute the building blocks for higher-level logic, and some more complex digital integrated circuits. The types of integrated circuits that are studied include simple combinational logic, such as latches, flip-flops, and registers, combinational logic of intermediate complexity, including multiplexors, demultiplexors, encoders and decoders, and several examples of more highly complex integrated circuits, such as an Arithmetic Logic Unit (ALU), a simple bus, "Random Access Memory" (RAM) and "Read-Only Memory" (ROM) modules.

Computer operations are introduced, along with the representation of computer operations in an Assembly Language. Implementation of program statements in a Higher Level Language, such as C or C++, is studied through the decomposition of each higher-level language statement into a sequence of machine or Assembly-Language instructions, and some of these are further decomposed into sequences of micro-operations. The operation of major subsystems of

the computer is examined through decomposition of a subsystem into an organized set of simpler circuit elements.

Additional critical subjects covered include the principles of hierarchical computer organization, machine instruction sets, addressing modes, CISC vs. RISC, input/output processing, and interrupt handling, as well as the application of many of these concepts to modern personal computers, and the boot process.

## Required Textbooks and Materials:

### Main Course Textbooks (REQUIRED):

- (1) NULL, LINDA; & LOBUR, JULIA (2003). *The Essentials of Computer Organization and Architecture*. Sudbury, MA: Jones & Bartlett Publishers, Inc. QA76.9.C643 N85 2003; 004.2'2—dc21; 2002040576; ISBN 0-7637-0444-X.
- (2) ANDREWS, JEAN (2003). *A+ Guide to Hardware: Managing Maintaining, and Troubleshooting. Second Edition*. Boston, MA: Course Technology. ISBN 0-619-18624-0.

### RECOMMENDED:

- (3) MAXFIELD, CLIVE RICHARD (2002). *Bebop to the Boolean Boogie. An Unconventional Guide to Electronics Fundamentals, Second Edition*. Boston, MA: Newnes (Elsevier). [TK7868.D5 M323 2003](#); 821.39'5—dc20; 2002038930; ISBN 0750675438. [This is a very readable book that provides further details on design and construction of computer chips and circuit boards. Recommended for students in the upper 25% of the class only, who may be able to find the time to enjoy the enrichment that it provides without compromising their ability to master the required course material.]

## Supplementary Materials (NOT required):

### **Grammar and Writing:**

- (4) BRIANS, PAUL (2003). *Common Errors in English Usage*. Wilsonville, OR: William, James & Co. PE1464 .B75 2003; 421/.1 21; 2003044605; ISBN 1887902899. [Provides a list of common errors along with an explanation of each.]
- (5) GORDON, KAREN ELIZABETH (1993a). *The Deluxe Transitive Vampire: The Ultimate Handbook of Grammar for the Innocent, the Eager, and the Doomed*. New York, NY: Pantheon Books. ISBN: 0679418601. [This book is a concise, wittily written tutorial on the fine points of grammar.]
- (6) GORDON, KAREN ELIZABETH (1993b). *The New Well-Tempered Sentence: A Punctuation Handbook for the Innocent, the Eager, and the Doomed*. New York, NY: Pantheon Books. PE1450.G65 1993; 428.2—dc20; 93-18454; ISBN 0-395-62883-0. [This book is a concise, wittily written tutorial on the fine points of punctuation.]
- (7) DUPRE, LYN (1998). *Bugs in Writing Revised. A Guide to Debugging Your Prose*. Reading, MA: Addison-Wesley. ISBN: 0-201 37921-X. [The author specifically addresses the needs of computer professionals and other technical people to write clearly.]
- (8) STRUNK, WILLIAM, JR.; & White, E.B. (2000). *The Elements of Style. With Revisions, an Introduction, and a Chapter on Writing. Fourth Edition*. New York, NY: Longman. PE1408.S772 1999; 808'.042—dc21; 99-16419; ISBN 0-205-30902-X (paperback) or 0-205-31342-6 (casebound). [A classic on clarity in writing.]

### **Architecture & Maintenance of the “Wintel” PC (select at most one only):**

- (9) MESSMER, HANS-PETER (2002). *The Indispensable PC Hardware Book. Fourth Edition*. Boston, MA: Addison-Wesley Professional. ISBN 0-201-59616-4. List Price: \$52.99, available as of 11 Jan 2004 from Amazon.com for \$37.09 + shipping, or from Barnes and Noble for \$57.99 plus shipping: [www.barnesandnoble.com](http://www.barnesandnoble.com) or [www.amazon.com](http://www.amazon.com). [Available from Amazon.com for \$37.09 as of 11 Jan 2004]
- (10) MINASI, MARK (2004). *The Complete PC Upgrade and Maintenance Guide. Fifteenth Edition. With CD-ROM*. Alameda, CA: Sybex, Inc. TK7887.M56 2001; ISBN

0782143105. List Price: \$49.99, available as of 11 Jan 2004 from Amazon.com or from Barnes and Noble for \$41.99 + shipping: [www.barnesandnoble.com](http://www.barnesandnoble.com) or [www.amazon.com](http://www.amazon.com). [Available from Amazon.com or from Barnes and Noble for \$41.99 as of 11 Jan 2004]

- (11) MUELLER, SCOTT (2003). *Upgrading and Repairing PCs. Fifteenth Edition*. Que Corporation. TK7887.5.M84 2002; 2003103671; ISBN 0789727455. <http://www.barnesandnoble.com> or [www.amazon.com](http://www.amazon.com). [Available from Amazon.com or from Barnes and Noble for \$41.99 plus shipping as of 11 Jan 2004]
- (12) NORTON, PETER C.; & CLARK, SCOTT (2002). *Peter Norton's New Inside the PC. First Edition*. Indianapolis, IN: Sams Publishing Co. QA76.8.I2594.N67 2002; ISBN 0672322897. List Price \$39.99 (paperback), available as of 11 Jan 2004 from Amazon.com for \$27.99 + shipping, or from Barnes and Noble for \$37.99 plus shipping: [www.barnesandnoble.com](http://www.barnesandnoble.com) or [www.amazon.com](http://www.amazon.com).

### **Useful Software:**

- (13) Symantec Corporation's (formerly PowerQuest Corporation's) PARTITIONMAGIC software, version 8. URL for product information: <http://www.powerquest.com/partitionmagic/> [NOTE that this product for many years was produced by PowerQuest Corporation. However, Symantec Corporation acquired PowerQuest on 05 December 2003, which is why PartitionMagic is now listed as a Symantec product.]

## **Learning Objectives:**

By the end of this course, the student should:

- (1) understand the operational characteristics of computer hardware, including basic machine subsystems and their principal components;
- (2) understand the principles of positional number representation, and be able to convert a number represented in any possible radix to the equivalent number represented in any other radix;

- (3) understand the difference between information and its representation on a machine, and be able to interpret a sequence of bits differently according to whether it represents an integer in any of several different representational schemes, a floating-point number in any of several possible formats, a text character, a machine instruction, a memory address, etc.;
- (4) understand how data are moved around and manipulated inside a computer, and also inside representative major subsystems, and be able to describe the operation of the machine in terms of both machine language instructions and micro-operations;
- (5) understand the operation both of floppy disk drives and of hard drives;
- (6) explain how a disk is organized to hold data;
- (7) install or replace a disk drive or an adapter card in a PC;
- (8) understand how memory is organized in a modern digital computer, explain the memory map of a PC, ascertain the memory configuration of a PC, and replace/reconfigure the memory as needed;
- (9) understand the principles of integer computer arithmetic, and be able to specify what would be the register contents and status flag conditions resulting from addition or subtraction of two numbers using the rules of unsigned numbers, signed-magnitude numbers, ones' complement and two's complement numbers, and saturation arithmetic;
- (10) understand the basic principles of machine operations, addressing modes, and assembly language, and be able to write a simple assembly language program that could be used to implement a single instruction in a higher-level-language program, making use of one or more of the addressing modes of the assembler;
- (11) understand the sequence of steps that takes place when a computer is booted up, and be able to partition a hard disk drive and install an alternative operating system, so that at boot-up time one of the operating systems installed on the machine can be selected to run.

## Instructor:

[Dr. Charles Abzug](#) (sections 1 and 2)

## Course Coverage:

1. Integer numbers and their representation (positional number systems)
  - a. Decimal Numbers
  - b. General Number Representation: the Radix
  - c. Binary Numbers
  - d. Octal Numbers
  - e. Hexadecimal Numbers
  - f. Interconversion among Number Representations
    - i. Other radices to decimal
    - ii. Decimal to other radices
    - iii. Binary to Octal and Octal to Binary
    - iv. Binary to Hexadecimal and Hexadecimal to Binary
2. Logic Circuits
  - (a) Individual Logic Gates:
    - (i) NOT
    - (ii) Buffer
    - (iii) AND and NAND
    - (iv) OR and NOR
    - (v) XOR (odd function)
    - (vi) XNOR (even function)
  - (a) Simple Logic Circuits: Small-Scale Integration (SSI)
  - (b) Complex Logic Circuits: Medium-Scale Integration (MSI)
3. Basic Electronics
4. Principal Elements of a Computer
  - a. Central Processing Unit (CPU) or Microprocessor
  - b. Bus
    - i. Power Bus
    - ii. Data Bus
    - iii. Address Bus
    - iv. Control Bus
  - c. Memory
    - i. Rewritable Memory (“Random Access Memory”, or RAM)
    - ii. Not-Readily-Rewritable Memory (“Read-Only Memory”, or ROM)
      - (1) simple ROM
      - (2) Programmable “Read-Only Memory” (PROM)
      - (3) Erasable Programmable “Read-Only Memory” (EPROM)

- (4) Electrically Erasable Programmable “Read-Only Memory” (EEPROM), also known as “flash memory”
    - iii. Memory Size
    - iv. Memory Addressing
    - v. The Memory Map
    - vi. Direct Memory Access (DMA)
  - d. Input and Output, and Data Storage:
    - i. HDD (Hard Disk Drive)
    - ii. Floppy Disk
    - iii. "ZIP", "JAZ", etc.
    - iv. CD-ROM
- 5. Computer Operations
  - a. What does a bit sequence represent?
    - i. Instruction
    - ii. Address in memory or elsewhere
    - iii. Data
      - (a) Number: Multiple schemes for representing binary numbers
        - (1) Unsigned Integer
        - (2) Signed-Magnitude
        - (3) Ones' Complement
        - (4) Two's Complement
      - (b) Text
      - (c) Other forms of data
  - b. Controlling the computer
- 6. Integer Arithmetic
  - a. Understanding Decimal Addition and Subtraction
  - b. Addition and Subtraction in Binary
  - c. Integer Arithmetic in Digital Computers
    - (i) Limitation in the Number of Bits Represented
    - (ii) Addition and Subtraction using each representation
      - (5) Unsigned Integer Arithmetic
      - (6) Signed-Magnitude Arithmetic
      - (7) Ones' Complement Arithmetic
      - (8) Two's Complement Arithmetic
      - (9) Saturation Arithmetic
- 7. Writing and storing programs, retrieving programs from storage, and running programs
  - a. Source Code
  - b. Object Code
- 8. Understanding the CPU

- a. Accumulator
  - b. Basic Addressing Modes: Implied, Immediate, and Indirect
  - c. Status Flags
  - d. Basic Arithmetic-Logic Unit (ALU)
  - e. Arithmetic Instructions
  - f. Shifter/Rotator
  - g. Internal Communications Paths
  - h. Instruction Register
  - i. Control Logic
  - j. Program Counter and Auxiliary Program Counters
  - k. Simple Control Instructions:
    - i. Unconditional Jump
    - ii. Conditional Jumps
  - l. Intermediate Addressing Modes:
    - i. Indirect
    - ii. Indexed
    - iii. Autoincrement and Autodecrement Indexed Addressing
      - (1) Pre-indexed
      - (2) Post-indexed
  - m. Stack and Stack Pointer
  - n. Intermediate Control Instructions
    - a. Jump to Subroutine
    - b. Return from Subroutine
  - o. Interrupt Vector
9. Input and Output
- a. Numeric Keypad and Display
  - b. Keyboard
10. Simple Video Display
11. Basics of Assembly Language

## Course Practices:

**Attendance Policy, and Relationship of Course Sessions to Readings:** In class, announcements are sometimes made of new or changed course policies, requirements, modifications to assignments, etc. Information provided in such announcements may not appear anywhere in the course documentation. Furthermore, course sessions will cover *some* of the



material in the readings, but will also include some material not covered by the readings. Therefore, students **must** not only do all of the readings, but must **also** attend **all** classes.

There are only three acceptable grounds for a student's missing a class: (1) grave medical or (2) serious personal problems affecting the student him/herself, or in some cases affecting a member of the student's immediate family. Immediate family is defined for the purpose of this policy as father/grandfather, mother/grandmother, sister, brother, spouse, or fiancé to whom you are formally engaged. (NOTE: I do **not** consider your girlfriend/boyfriend to be a member of your immediate family.) The other acceptable excuse for a student's missing a class is (3) *force majeure* (overpowering force due to an unexpected and uncontrollable event). An example of *force majeure* is the occurrence of a flat tire or of a motor vehicle accident involving your vehicle while you are traveling to class. If you want to claim exemption on one of these three grounds, be prepared to submit evidence (e.g., a note from a licensed physician on physician's stationery, or copy of police accident report).

I normally take attendance at every class. Attendance does not get factored directly into the grading process. Why, then, do I take attendance? The purpose is two-fold: (i) attendance data sometimes provide me with advance information that a student may be experiencing academic difficulty because of medical or personal problems, or for some other reason. In addition, I may also consult attendance records in deciding how much I am willing to extend myself in providing help should you get into academic difficulty during the semester. You are in a much better position to get a "break" if you have been conscientiously attending class.

Note that if you do miss out on a class, it is **your** responsibility to find out what we covered in class, as well as what announcements might have been made. It is also your responsibility to obtain the missed material. "I wasn't in class when you made that announcement" is **not** an acceptable excuse for your failure to comply with any directives issued in class. Please see the companion to this section entitled, ["Policy on Classes Missed by Students"](#).

**E-mail on Course-Related Matters:** All E-mail messages related to the course must be identified by a Subject header of the form: **CS-xyz-n {additional subject identification}**, where **xyz** is the three-digit course number, **n** is the section number, and additional subject identification is appended following the course and section numbers. Thus, a submission of homework assignment 47 for course CS-789 Section 13 would have a Subject header: **CS-789-13-Assignment-47**.

**Grading of Tests and Assignments, and the JMU Honor Code:** You will eventually be assigned an overall course grade. The course grade will be based principally upon your

performance on quizzes, exams, homework assignments, projects, etc. Integrity of the grading process requires that you be graded on the basis of **your own work** and not on someone else's. Yet, sometimes a student may get stymied and not be able to complete an assignment on his/her own. ***If you find it necessary to obtain help from someone else in completing your assignment, you are required to indicate that by clearly marking it on your assignment.*** Thus, if one of your colleagues contributes a line of code to your computer program, you should plainly mark that via a comment inserted into the text of the program, as in the following example:

```
//Hieronymous Johnson kindly contributed the following line of code to my program:  
for (int i=0, k=4-I; i<10; k=Math.abs(4-++I+(i>4?1:0)));
```

Similarly, non-programming assignments should be clearly footnoted or annotated to indicate where someone else's help contributed to the product. In the absence of a clear annotation in your submitted assignment, you will be assumed to be the sole author of all work that you submit. Should that turn out not to be the case, it will be accounted as an honor code violation and will be dealt with severely. Details of the JMU Honor Code are to be found at: <http://www.jmu.edu/honor/>

The JMU Honor Code specifies that every assignment, whether written or electronically submitted by a student, is submitted pursuant to the Honor Code, and **must contain a declaration** stating that "This work complies with the JMU Honor Code.", together with your signature. I personally require that you place this signed declaration **on the first page** of your assignment. If the Honor Code declaration is not included *at the time that the assignment was submitted*, your grade for that assignment will be a zero.

**Assignment, Homework, and Term Project Policy:** All work submitted must be machine-generated (i.e., not hand-written), and must be submitted **both** in hard- and in soft-form.

**Format:** The source code of your program and the program's output should be on separate sheets of paper. The hard copy must be **stapled together**<sup>1</sup>, and **both** hard and soft copies must have, in the upper left corner of the first page:

- (a) your name
- (b) course number
- (c) section number
- (d) semester (e.g., Fall 1776)
- (e) date of submission, and
- (f) Honor Code declaration, with your signature.

---

<sup>1</sup> If you do not own a stapler, there is one available for student use in the Copy Center (HHS Room 1002).

Please note that I have no trouble remembering my own name. Therefore, you do not need to write my name on your homework assignments.

**Content:** All written work should be thoroughly professional in accordance with the highest standards. Your writing should be clear, should comply with the rules of grammar of the language in which it is written (for most of my courses, this will be English), as well as with good writing practice, and should be correctly spelled and punctuated and free of both slang and jargon.

**Late Submissions Policy:** All work is due at the designated date and time. Under some circumstances, I might be willing to accept a late submission. If so, then late submissions are subjected to the following penalties:

<b>Date Submitted</b>	<b>Penalty from Maximum Credit</b>
One day late	10%
Two days late	20%
Up to one week late	40%
Up to two weeks late	60%
Over two weeks late	100%

## Grading Policy:

**Overall Meaning/Definition of Grades:** A grade of **A**, either on an individual assignment or for the entire semester, indicates work that is truly outstanding in the opinion of the instructor, demonstrating excellent mastery of the material covered. A grade of **B** indicates very good work, above the instructor's level of expectation for an undergraduate student, or meeting minimum expectation for a graduate student. An undergraduate grade of **C** indicates work that is satisfactory, although not outstanding, demonstrating sufficient comprehension of the material to merit the student's receiving credit for achieving the course objectives. A graduate grade of **C** indicates work that is not satisfactory, although adequate to receive credit for passing the course. At the undergraduate level, a grade of **D** indicates work less than satisfactory but nevertheless sufficient to merit receipt of undergraduate credit for the class. This grade cannot be awarded for graduate study. A grade of **F** indicates work far below the minimum level considered to be satisfactory, demonstrating insufficient achievement in the skills or level of knowledge required even at the undergraduate level, and certainly at the graduate level.

**Extra-Credit Opportunities.** Grades are based only on assignments given to every student in the class. Opportunities to earn extra credit may be announced to the entire class at various times during the semester, but extra-credit assignments will NOT be custom-crafted for the sake of an individual student. Your best strategy is to learn the course material by conscientiously studying and doing your assigned homeworks throughout the semester. If you wake up only at the end of the semester and suddenly realize that you are in trouble, there may not be anything that you can do.

**Extra Tutorial Assistance:** I will be pleased to provide extra help in most instances to any student who requests it. However, the student who needs help must **both:** (i) take the initiative on his/her own to seek me out, **and** (ii) seek help in a timely manner and not wait until the last minute, when the examination or assignment due date is already imminent. You must also understand that I am willing to help when your own assiduous efforts to learn the material prove to be inadequate. I **cannot** provide tutorial assistance to a student who cannot find the time to do the assigned readings and homeworks.

**Quizzes and Examinations:** There will be one in-semester examination (mid-term), plus a term project and a final examination. In addition, there will probably be several brief in-class quizzes given at irregular intervals throughout the semester, usually without warning. The quizzes, as well as the Mid-Term and Final Examinations, will be based **both** upon the reading assignments, regardless of whether or not the readings were covered in class, that were due up to **and including** the date of the quiz or examination, **and** also upon the material covered in class up to the moment of the quiz or examination, regardless of whether or not the assigned readings also cover the same material. *Occasionally* a student may have a bad day and will therefore not perform on a quiz up to his/her full level of knowledge. Alternatively, circumstances may come up either that prevent him/her from covering the day's assignment on time, or that preclude his/her attendance on the particular day when a quiz is given. In either case, this will result in a quiz grade below the norm for that student, or in an automatic grade of zero if the quiz is not taken, regardless of reason. To avoid excessive anxiety on the part of a student who experiences a rare bad day, and to avoid having to take up students' and instructor's time with the giving and judging of explanations and excuses, as a matter of policy the lowest **two** quiz grades for each student will be dropped. Students are warned not to use up their two opportunities frivolously (e.g., don't miss class without grave cause). Preserve your allotment of excused low quiz grades for circumstances of real need.

**Class Participation:** Vigorous student participation in class discussion makes for a much more lively and interesting class for all. To encourage participation in class discussion, the grading mechanism includes the opportunity for the student to earn a reward (details given below) for participating both **vigorously and constructively** in class. Note that your mere attendance can **not** be considered to be "class participation", and will **not** be rewarded with class participation points. Attendance is mandatory, and therefore rewards will not be meted out merely for attendance. However, your vigorous and constructive participation in class discussion

will certainly make the class more interesting both for me and for your fellow students as well as for yourself, and this therefore can possibly result in an enhancement to your grade, as well.

**Assignment of Grades:** Makeup of overall grade for the semester will be as follows: First, a numeric score will be calculated based upon your performance on all the examinations, on the quizzes and homeworks, and on the term project. The basis for calculating the numeric score is:

Collected Homeworks and In-class Quizzes:	20 pts
In-semester (mid-term) Examination	20 pts
Term Project:	30 pts
Final Exam:	30 pts
TOTAL:	100 pts
Opportunities to be announced, and participation in class discussion can earn extra points :	
	≤10 pts

After the numeric scores have been determined, letter grades will be assigned, based upon the distribution of the numeric scores. I make **no** commitment in advance regarding the letter-grade equivalent of specific numeric grades. The standard cutoff scores for grades are: 90 for **A**, 80 for **B**, 70 for **C**, and 60 for **D**. However, I reserve the right to lower the cutoff points in accordance with my judgment after studying the actual distribution of numeric scores.

**Enhancement of Grades for Vigorous Class Participation:** An initial assignment of letter grades is made to all members of the class as described above. After making the initial assignment of letter grades, I then dispense additional points to those students, usually few in number, who participated vigorously and effectively in class discussion. This may result in improvement of the grades for such students. Thus, your non-participation in class discussions will **not** lower your grade, but high-quality participation may **possibly** raise it.

**Legibility and Clarity-of-Communication Requirements for Quizzes, Examinations, Homeworks, and Term Papers:** It is up to you, the student, to demonstrate to my satisfaction that you have mastered the course material. I know that at the time of your birth you knew nothing about the subject matter of this course. If a change has occurred between then and now, then *you* must demonstrate through your performance on quizzes and exams that learning has taken place. Therefore, your writing and drawing must be clear and unambiguous, and your answer to each question should be obviously correct on its own, without benefit of any *post hoc* verbal explanation that you may provide of your answer. What this means is that:

- (i) your handwriting must be legible to me;
- (ii) you must, yourself, bear the burden of choosing the correct words and technical terms that answer the question;
- (iii) your drawings must be neat, technically correct, and properly labeled;

- (iv) your sentences must be properly structured, and paragraphs must be correctly and logically organized;
- (v) you must thoroughly address **all** the specific issues raised by the question; and
- (vi) for multiple-choice, fill-in-the-blank and other short-answer type questions, you are responsible for marking the answer in the correct place on the answer sheet. The grader will **not** be responsible for searching for the correct answer in other places, nor can credit be given after the fact for notations made on your question booklet that were not reflected in the answer marked on your answer sheet. Be careful, and check what you are doing. It can be very frustrating for student and instructor alike when a student who knows the material has to take a lower grade than he or she could have earned, because of the student's carelessness in marking the answer properly on the answer sheet. Nevertheless, Computer Science, like airline piloting, is notoriously unforgiving of mistakes, and minute attention to detail is one of the personal properties that the faculty tries to inculcate in our students.

**Errors in Grading:** Unclear answers will be marked **wrong**. Instructors are human and sometimes make mistakes, too. You are entitled to complain politely after class if you honestly feel that your answer is both clear and correct, but was misunderstood at grading time by the instructor. If the instructor agrees that a mistake was made, then your grade will be cheerfully corrected.

### Rules for Examinations:

- (1) **No calculators, no books, no notes.**
- (2) The JMU Honor Code must be scrupulously observed.
- (3) All work **must** be shown on your examination paper. You will certainly be given extra paper if you ask for it.
- (4) You must provide exactly ONE answer to each test question. In the event that you should provide more than one answer, the answer that is **wrong** is the one that will be graded.
- (5) All examinations **must** be taken at the scheduled time. If you miss the scheduled examination, you are responsible for providing **timely** documentation to support a medical or other *bona fide* emergency to avoid getting a grade of zero for the examination. Medical exemption requires certification from a licensed medical practitioner or facility. The documentation must be provided on the practitioner's letterhead and must be dated and signed by the practitioner, and must clearly certify the time range over which you were incapacitated. The practitioner's telephone number must also appear on the document.

**Note** that there is a deadline for submitting your documentation to support medical or other excused absence. The deadline is one calendar week after you return to class.

## Homework Assignments:

**Educational Philosophy:** There are three ways for a student to learn complex technical subject matter, such as you will encounter in this course. First is by reading. Second is by coming to class and both watching and listening **interactively**. Third is by working selected problems and examples. This course has been carefully designed to integrate at least the first two, and perhaps all three modes of teaching and learning. There may be some material covered in the reading assignments that will **not** also be covered in the classroom, and there is other material **not** covered in the reading assignments that will be covered **only** in the classroom. Students will be held responsible **both** for the content of all assigned readings, **whether or not covered in class, and** also for all classroom material, **whether or not covered in the assigned readings**. To assist you in reviewing both the readings and the classroom materials, and in preparation for the examinations, review questions covering the main points may be provided, and in some cases answers as well. Students are **well advised** to answer review questions in writing, and, where applicable, also to work out solutions to assigned problems in detail before peeking at the answers. The reason for this recommendation is that in first crafting your own answers or your own solutions you will be much more seriously stress-testing your own level of comprehension of the material. Then, when you compare your own answers with those provided to you, you will gain much better insight into any deficiencies in comprehension that you may have. If you look at the answers first, it will go much faster for you, but you will suffer in the depth of learning that you will attain. I treat you as adult by providing the answers up front in some cases and by trusting you to use good judgment in working through the problems before consulting the answers. Please don't disappoint me.

**Time and Manner of Homework Submission:** A hard-copy homework must be submitted at the class when it is due. It may **not** be submitted by leaving it at the instructor's office or mail box, or in any way other than by bringing it to class at the scheduled class time on the due date. A properly labeled soft-copy homework assignment must be received in the E-mail no later than the beginning of the class when it is due.

**Types of Assignments:** Details of homework assignments for this course are specified in a separate document. In general, a homework assignment may have three components: readings, review questions, and practical exercises. Readings **must** be done on time. Review questions are also extremely important for you to answer prior to the class when they are due. In most cases, your answers to review questions will *not* be collected and graded, but these questions are excellent preparation both for the brief quiz that you may encounter when you

come to class and for the lengthier scheduled examinations. Readings, review questions, and practical exercises must all be completed no later than the scheduled due date and must be ready for submission on the due date at the beginning of class. Only some homeworks will be collected. These will be graded **not** on the basis of whether the answers are correct, but merely on the basis of whether the homework was done completely and conscientiously.

**Group Projects:** Several projects during the semester, including the Term Project, may be assigned as Group Projects. Any project assigned as a group project **must** be done as a group project. Even if you prefer to work by yourself and are willing to do by yourself all the work required for the project, you must nevertheless join a group to work on any project designated as a group project, and you must also participate as a full partner with your fellow-students in the group. Group members are **advised** to exchange **both** telephone numbers **and** E-mail addresses immediately upon formation of the group, to facilitate inter-member communication (this is a **recommendation**, not a requirement). Each member of the group is responsible for cooperating fully with the other members of the group, and for doing his/her full agreed-upon share of the work *in concert with* the rest of the group. For every group project assignment, the group is required to deliver, along with their written project report, a written **Work Breakdown** statement, indicating precisely what contribution each member of the group made to the overall project.

## Philosophy Regarding Missed Classes:

In the university environment, there is an implied contract between students and faculty. You (students) expect us (faculty) to come to class. I, as a faculty member, also expect all of my students to come to class. Occasionally, you may find it necessary to miss a class. If you must miss an occasional class, I trust you, as a responsible adult, to do so only for adequate reason. Therefore, you don't need to seek my permission before skipping a solitary class, nor do you need explain to me afterwards why you were absent. However, even though you may have missed the class for good and valid reason, nevertheless you **are** responsible for making up the work you missed, as well as for complying with any announcements, directives, or instructions that might have been issued during the missed class. Therefore, if you must miss a class, it is up to **you** both to find out what was covered or announced, **and** to make up any missed work in a timely fashion.

You should prepare, on the very first day of the semester, for the possible occurrence of sudden brief acute illness (stomach ache, head ache, etc.), or of other, non-medical emergency, such as a flat tire, traffic jam, family emergency, or the like. I suggest that you exchange phone numbers and E-mail addresses on the first day of class with several of your classmates. If at all possible, give notice to one of your colleagues prior to the class you will miss. Follow up as soon as possible after the missed class, so that you will be able to stay abreast of what is happening in class. Also, if you know in advance that you must miss a class, you should arrange



to have someone hand in for you any assignments you may have done that are due that day. If you did not make advance arrangements, then it is even more important that you follow up rapidly to find out what you missed and that you make up for missed work.

Do **not** send me E-mail, either asking in advance of the class you must miss what do I intend to cover, or querying me subsequently to the class on what did I cover. I teach many students each semester, and I just don't have the time to answer a blizzard of "What will I miss?" or "What did I miss?" E-mails. In the fortunately rare case that a student encounters a serious health problem or an issue in his/her personal or family life that spans several consecutive classes, it is my experience that I have almost always been able to make a special accommodation to try to help the student through the crisis, and I will certainly make every effort to do so in the future, as well. But I must insist that you take care of the onesies and twosies on your own.

## **Class Meetings:**

Classes meet during the Spring 2004 semester on Monday, Wednesday, and Friday mornings in ISAT/CS Room 243 from 0905 to 0955 hrs (Section 1) and from 1010 to 1100 hrs (Section 2).