CISC 235: Computer Logic Design

Springfield College - Fall 2005 - Tu/Th 1:00-2:15

Instructor: Andrew B. Perry, Ph.D.

Office: Schoo 118

Office Hours:

Mon/Wed/Fri 12:00- 1:00 PM
Wed/Fri 2:00-3:00 PM
Also available by drop-in or appointment

Phone : 748-3193

Email: perryand@yahoo.com

Course Description : This course gives an essential knowledge of modern computers at the level of logic circuitry design. Topics include arithmetic of various number systems, mathematical logic, Boolean algebra, gate networks, flip-flops, and circuit design.

Prerequisites: Introduction to Computer Science with C++ and Java, or permission of instructor

Textbook: M.M. Mano and C.R. Kime, *Logic and Computer Design Fundamentals*, **2nd edition**, Prentice Hall

Grading Procedures: Final grades will be computed as follows:

Three Tests . . . 60 % (each worth 20 %)
Final Exam . . . 30 %
Homework . . . 10 %
Attendance . . . may affect grade - see below

Students will be guaranteed minimum grades according to the following schedule: 95 % = A ; 90 % = A- ; 87 % = B+ ; 83 % = B ; 80 % = B- ; 77 % = C+ ; 73 % = C ; 70 % = C- ; 67 % = D+ ; 63 % = D ; 60 % = D-

Class Web Sites:

We will use the **Manhattan** course management system . At the beginning of the semester please go to www.spfldcol.edu , and follow the links to this class (current students-manhattan online classwork- etc.) . Log in, using the first letter of your first name and first seven letters of your last name as your login name (for example, Tom Brady would use tbrady). The last 4 digits of your student ID are your password. During the first week of classes, please go to the Post Office module and send me (Andrew Perry) an email for practice.

I also have my own web site **www.professorperry.com** , which has various useful information about myself and this class, as well as useful links.

College Attendance Policy :

In accordance with the Springfield College Student Handbook: "Students who incur legitimate unavoidable absences because of participation in certain official and approved College activities, or because of illness, should be granted an "excused" absence according to the following guidelines.

- Participation in athletic activities away from campus which are approved by the athletic director and on record at the Office of the Dean of Students.
- Participation in other curricular or co-curricular activities approved by a faculty or staff member and the Dean of Students. This also must be on record at the Office of the Dean of Students.
- An illness confirmed by documentation of the Student Health Center, on record at the Dean of Students.
- Personal emergency reported to the Dean of Students within twenty-four hours of return to class.

If a student misses a class meeting for any reason, he or she is still responsible for the material covered. If a student is aware that circumstances will prevent class attendance on a particular day, she or he should contact the faculty member directly in advance of the absence. If the faculty member is not available, the student should contact the appropriate department and leave a message either through voice mail for the faculty member or with the department chairperson or secretary. Students are responsible for explaining their absences to their professors. In case of absences for circumstances other than illness or unforeseen emergency, the student is required to make arrangements for make up of assignments (or exams) with the professor in advance of the absence."

Specific Attendance Policy For This Course: In addition, the course in which you are enrolled is subject to the following attendance guidelines.

- Students must be prompt. Once the lecture has started, students who enter must do so quietly without disrupting the class. Repetitive tardiness for class will be reported to the Dean of Students.
- Tardiness of 10 minutes or more will count as an absence
- Make-up exams will be given only to those students who can provide written documentation that justifies the student's absence at the scheduled time for the exam. If the student is unable to supply written documentation for his/her absence at a scheduled exam, then the student will receive a zero for that exam. The same policy applies to in class labs.

Penalties for excessive absences are as follows.

- The first four (4) physical absences of each individual student will have no direct effect on the calculation of a student's grade. Students are not required to explain or justify these absences. I will assume that you would not miss class without a good reason.
- **Any absence beyond the first four (4) physical absences must be excused with proper documentation, or otherwise a full letter grade penalty will be imposed- regardless of the circumstances surrounding the first four absences**.
- Example: Suppose you miss class October 1,3,5,15,17, and 19. Suppose the October 1,3,5,15, and 17 absences were for approved athletic events, and the October 19 absence was due to sleeping late. No documentation is required for the October 1,3,5, and 15 absences. The October 17 absence is excused as long as documentation is provided. The October 19 absence is unexcused and results in a full letter grade penalty applied to the semester grade, even though it is the first unexcused absence.

Perfect or nearly perfect attendance will be considered when final grades are assigned, especially in the case of borderline grasdes.

Late Submission of Homework Assignments: Students may submit up to three (3) homework assignments late during the semester for full credit, but **only** if these assignments are received by the **beginning of the next class meeting** after the due date. If more than three assignments are submitted (no more than one class period late), they may be subject to a small penalty at the discretion of the instructor, depending on extenuating circumstances.

Any work submitted more than one class period late will receive a grade of ZERO PERCENT (0 %) unless prior arrangements had been made with the instructor in advance of the due date.

Approximate Examination Dates:
Regular exams: October 4; October 27; November 22.
Final exam: Wednesday December 21, 2:45 p.m.
(Exact examination dates will be announced in class.)

Classroom Format: Lecture, Problem Solving

Course Outcomes:

1. Students will be able to do arithmetic in various number systems (including binary, decimal, and hexadecimal).
2. Students will be able to convert between different number systems.
3. Students will be able to simplify Boolean function algebraically or with the aid of Karnaugh maps.
4. Students will be able to analyze the behavior of combinatorial and sequential circuits.
5. Students will be able to design combinatorial and sequential circuits to accomplish specific tasks.

Assessment of Outcomes: Homework, Exams

Course Outline:

1. Digital Information and Number Systems (3 weeks)
   (a) Binary,Decimal, and Hexadecimal Number systems
   (b) Arithmetic Operations
   (c) Conversion Between Bases
   (d) BCD, ASCII, and other codes
2. Combinatorial Logic Circuits (3-4 weeks)
   (a) Boolean Algebra
   (b) Algebraic Manipulation
   (c) Minterms; Maxterms
   (d) Standard Forms
   (e) Karnaugh Maps
   (f) NAND, NOR, XOR gates
   (g) Parity Generation and Checking
3. Combinatorial Logic Design(3-4 weeks)
   (a) Analysis of Combinatorial Circuits
   (b) Design Procedure
   (c) Encoders; Decoders; Multiplexers
   (d) Half Adder; Full Adder
   (e) Circuit Design
4. Sequential Circuits (3-4 weeks)
   (a) Latches
   (b) Flipflops
   (c) Sequential Circuit Analysis
   (d) Sequential Circuit Design
5. Registers And Counters (as time permits)

Statement on Academic Honesty : Academic dishonesty of any sort will not be tolerated. Students cheating on exams or engaged in any other improper behavior will be reported to the Dean of Students for appropriate disciplinary action, and at the instructor's discretion, will normally receive a grade of F for the course.

Statement on Classroom Decorum : Students are expected to behave in an adult manner during class time. No eating or drinking is permitted. If students must talk to one another during a lecture, it should be very quiet. Students creating a disturbance will be asked to leave class.

Class cancellation due to inclement weather: IF THERE IS INCLEMENT WEATHER ON A DAY THAT AN EXAM HAS BEEN SCHEDULED, THEN THE EXAM WILL BE ADMINISTERED AT THE NEXT CLASS MEETING. Check for class cancellations by calling the school closing information line at 748-5999, or by referring to the SC Cable TV station, or by checking announcements aired on radio stations WHYN, WAQY, WTTT, WNNZ, WHMP, and WMAS or television stations Channel 22 and Channel 40. You may also be able to find class cancellation information on our Manhattan web site.

Statement on Special Needs: If you have a documented physical, learning, or psychological disability on record with the Director of Student Support Services (748-3768), you may be eligible for reasonable academic accommodations to help you succeed in this course. It is your responsibility to request such accommodations in advance and to provide appropriate documentation to the Director of Student Support Services. Please let me know of your request as soon as possible, so that I can work with you and the director to arrange for reasonable accommodations.

College Policies on Attendance and Academic Honesty: See the *College Catalog* or the *Student Handbook* for the complete text of these policies.

Required Homework- To Be Submitted For Grading
Tentatively, ten (10) problem sets will be required of all students.
Ch.1 Set 1A # 3,6,8b
Ch.1 Set 1B # 20*,21,22
Ch.2 Set 2A # 3b,4,6bcd.8b
Ch.2 Set 2B # 11,13bd14b,16b,17b
Ch.2 Set 2C # 20b,21b,23,24b,26b,27b, 29b, 32b, 33b
Ch.3 Set 3A # 1,4
Ch.3 Set 3B # 12,19,21
Ch.3 Set 3C # 31,34,36
Ch.3 Set 3D # 39,42,47(has typo),50
Ch.4 Set 4A # 14,18,23

Suggested Homework
By the end of the course you should be able to do the following exercises.
Some of these will be solved in class. Do others on your own as needed.
Ch.1 (Number Systems)1*,3,4*,6,7,8,9,11,15
Ch.1 (Codes) 20*,21,22,23,24,25
Ch.2 (Identities) 1*,2*,3,4,6,7
Ch.2 (Complements) 8,9
Ch.2 (Minterms/maxterms)10*,11,12,13
Ch.2 (Karnaugh Maps) 14,15*,16,17,18*,19*,20,21,22*,23
Ch.2 (K-Maps/ don't care condition) 24,25*,26,27,28*,29,30*,32,33
Ch.3 (Circuit Analysis) 1,2,3,4,6,7
Ch.3 (Circuit Design) 10,11*,12,13,15,19,20,21
Ch.3 (Circuit Design) 31,32,34,35*,36,37
Ch.3 (1's,2's,9's,10's complement) 38*,39,40,41*,42,45,47(has typo),49,50,51
Ch.4 (Sequential Circuits) 10,11,12*,13,14,15,16,17,18,19*,20
Ch.5 Homework To Be Announced