

CISC 235: Computer Logic Design

Springfield College - Fall 2004 - Tu/Th 1:00-2:30

Instructor: Andrew B. Perry, Ph.D.

Office: Schoo 118

Office Hours:

Mon/Wed/Fri 9:00-10:00 AM

Tues/Thurs 9:30-10:30 AM

Also available by drop-in or appointment

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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.

Attendance: Attendance at all classes is required, unless you have arranged an excused absence BEFORE the class in question. See the *Student Handbook* for examples of excusable absences. Generally I will be quite flexible and lenient IF YOU INFORM ME IN ADVANCE that you will have to miss class. At the end of the day you missed class, if I still haven't heard from you, you may be marked as absent-unexcused. Of course, under certain circumstances (such as accidents), it may be difficult to request an excused absence in advance; in such cases, try to contact me as soon as possible after the class.

Lateness may count as $\frac{1}{2}$ of an absence, at the instructor's discretion.

Attendance will affect your final grade as follows:

Zero (0) unexcused absences: special positive consideration in case of borderline grades

Over 2 unexc. abs.: decrease final grade by 3 % for each unexc. abs. after the first 2

Late Submission of Assignments: Students may submit up to three (3) 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 5; October 28; November 23. Final exam: Wednesday December 22, 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.

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