Instructor: Jeffrey Horn, email: jhorn@nmu.edu
office: 2202 JXJ
phone: 227-1607
Office Hours: http://euclid.nmu.edu/~jeffhorn/Schedule/scheduleFall2014.html

Classroom: John X. Jamrich (JXJ) 3103
Meeting Times: 4:00-5:40pm Tu Th
Prerequisites: CS 120 (or equivalent programming experience), MA 103 or equivalent

Our web page: http://euclid.nmu.edu/~jeffhorn/Classes/MA240/Fall2014

(I will use the web page EXTENSIVELY, posting everything I can up there as soon as possible. This includes all electronic forms of handouts, assignments, solutions, sample tests, etc. Also I will post announcements, links to interesting, topic-related sites, etc. So please check our page regularly! At the very least, once a week. Also, our textbook has an associated web page which we will also use extensively, at http://highered.mcgraw-hill.com/sites/0073383090/information_center_view0/. I will link to appropriate pages from ours, but I suggest you browse it on your own too! I will also use your nmu email address for notices, and our class WebCT page for grade posting.)

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**COURSE OBJECTIVES:**

Learn, and become comfortable with, the range of discrete mathematical structures that are fundamental to the further study and application of computation. Acquire the conceptual tools for modeling real-world situations as abstract problems amenable to computational solution.

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**LEARNING OUTCOMES:**

Upon successful completion of this course, a student should be able to:

- model real world situations in propositional and predicate logic,
- quantify realistic computational problems using general, closed form, combinatoric formulae,
- solve fundamental combinatoric equations and simplify basic combinatoric expressions,
- model real world relations using abstract graphs and interpret graph representations of real world situations,
- reason with and explain graphs using fundamental graph theory, and
- compute reasonable tight bounds on the run-time complexity of simple algorithms.

Evaluation of these learning outcomes will be done through homeworks, quizzes, and exams.
TOPICS: (tentative)

LOGIC (propositional, proof by induction)

BOOLEAN ALGEBRA
propositional calculus
switching (combinational) circuits
minimization/cannonical forms

RELATIONS and FUNCTIONS
equivalence relations, partial orders

COMBINATORICS
permutations
combinations
orderings (full, partial)

GRAPH THEORY
trees, directed graphs, lattices
cycles, circuits, tours, cut sets, etc.

GRAPH ALGORITHMS
shortest paths, spanning trees,
network flow optimization

COMPLEXITY ANALYSIS
order notation, O(n), etc.

COMPUTATION MODELS
finite state machines (automata, Mealy/Moore machines)
push-down automata

RECURRANCE RELATIONS
modeling with difference equations

GRADING:

30% Homeworks. Drop the lowest homework grades (only if >7 HWs)
20% Quizes. Drop the lowest (ONE) grade, if > 5 quizzes.
20% Topic exams.
20% Final exam, comprehensive.
10% Instructor's discretion.
**Late Policy:** For homeworks, 5% off for each day late (counting only days that the university is open; e.g., not weekends or snow days). But of course I cannot accept them after solutions are handed out! As for exams, those cannot be made up except under the most severe and extenuating emergencies! Don't take a chance if you don't have to!

**COMPUTING FACILITIES:**

We might use a program like Mathematica for symbolic manipulation and graphing of numerical results. If so, a notebook computer issued by NMU should be sufficient for running the software.

**DISABILITY SERVICES**

If you have a need for disability-related accommodations or services, please inform the Coordinator of Disability Services in the Dean of Students Office at 2001 C. B. Hedgcock Building (227-1700). Reasonable and effective accommodations and services will be provided to students if requests are made in a timely manner, with appropriate documentation, in accordance with federal, state, and University guidelines.

**LAPTOP (and mobile device) CLASSROOM USE POLICY**

As a computer scientist I am of course devoted to mobile computing and communication devices (that is, gadgets). However, this course involves some deep concepts concerning the nature of computation, information, and communication, and indeed even human nature. My experience is that most people, myself most especially, cannot be expected to really grasp these concepts in the classroom without long periods of unbroken attention. As much as I value electronic-based multi-tasking (and I do think that we need to multi-task throughout the modern day), I have now come to the conclusion that certain insights into the universe cannot be conveyed while multi-tasking. Period.

Therefore, my policy is to allow laptop use during certain portions of the class period, as I announce them. So there will be times, every class meeting, when I will demand that all laptop covers be closed (at least lowered so that they cannot be seen by anyone). Such times will last perhaps 20-30 minutes, after which students will be allowed to open up and use their laptops for class exercises or lab work (the current assignment). If a student absolutely needs to use his or her laptop for note-taking during the "deep lectures," then he or she can request individual permission from me.

As for cell phones, PDAs, handheld game-consoles, iPods, etc., use of such devices will also not be allowed during "deep lecture" (cell phones can be set to "vibrate" or to some other inaudible notification mode) for receiving emergency calls. There will be break times of five to ten minutes every half hour or so for students to check for messages, make short calls, etc.