

(CS 330) Microcomputer Architecture Syllabus

Winter 2017, 4 Credits

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Office Hours: See EduCat
Lecture/Lab Location: WS 2506/2508

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Class Time: 12:00-12:50 MWF
Laboratory Time: T 12 - 2:50

Required Materials: *Digital Electronics: Principles and Applications*, 7th Edition (ISBN 978-0-07-312634-0). http://highered.mcgraw-hill.com/sites/0073126349/student_view0/index.html

This textbook is a requirement of the course and laboratory. Each student is expected to read the text BEFORE class and use it as a reference for study. Students are responsible for reading the complete chapter material even if the instructor does not specifically cover it in lecture.

Other Requirements: NMU issued ThinkPad laptop computer or suitable substitute. MacBooks do not work with our software.

Course Description: *Study of how computer hardware responds to stored instructions. Construction projects with logic circuits lead to the conceptual designs of microprocessors. Assembly language programming is introduced in the context of the logic circuitry being controlled. Projects emphasize the software needed in common interfacing tasks. Prerequisite: An introductory laboratory course in a natural science or a computer programming course or instructor's permission.* - Undergraduate Course Catalog.

Course Objectives: The following are the course objectives. By the end of the semester, the successful student will be proficient at each one of the following objectives.

1. Through the successful completion of laboratory exercises students will demonstrate they can construct electronic circuits which employ Boolean logic concepts.
2. Through the successful completion of quizzes, exams, and laboratory exercises students will demonstrate their ability to represent a logical expression as a truth table, a logical equation, or a circuit.
3. Through the successful completion of quizzes, exams, and laboratory exercises students will explain and illustrate how components of a system work together to produce a more complex device.
4. Through the successful documentation of assembly languages students will demonstrate their understanding of how assembly language commands operate and how their proper use produces working assembly language programs.

Grading: The final course grade will be determined using the following breakdown.

Category	% of class grade
mid-term exam	20
Final Exam	20
Bi-Weekly Quizzes	20
Periodic Assignments	10
Lab Grade	30
Total	100

The final grade is a weighted calculation of the total points earned under each category. Grades of 90/80/70/60 are the letter grade cuts for the course. You must pass both the laboratory portion and the lecture portion of this course. If you receive a failing grade in either portion you fail the entire course regardless of you grade in the other portion.

Bi-Quizzes: Bi-Weekly quizzes will be given every other Friday lecture except for weeks which have a scheduled exam. **If weather should force the cancellation of a quiz it will be moved to the next scheduled lecture period or canceled. Check your email for updates.** Each quiz will cover concepts from the most recent material and will have questions which are representative of the types of questions that will be on exams. The quiz must be taken during the lecture time unless arrangements are made in advance. Make-up quizzes are not typically given unless serious illness or family matters are evident. The lowest quiz of the semester will be dropped from the calculation at the end of the semester. The quizzes are, in total, worth 20% of the total course grade. No calculators are allowed during quizzes.

Periodic Assignments: There will be some periodic assignments from the textbook or other sources to be handed out in-class. Due dates will be posted on the assignments. A 10% penalty on the score will be applied for turning in the assignment late.

Exams: There will be a mid-term and a final exam in this course and both worth 20% of the final course grade. The mid-term exam is scheduled for Wednesday, March 1, 2017. In case of bad weather it will be moved to March 3, 2017 (Friday). The final exam is scheduled for Monday, May 1, 2017 from 12 noon to 2:50 PM. If there is bad weather on this day then the scheduled make-up day is Friday, May 5, 2017 at the same time. Exams are closed notes, closed book, and no calculators are allowed. All students must be present in class for each exam. Any make-up exams must fit the missed exam policy.

Missed Exams: If a student must miss an exam and knows before hand they are to approach the Professor before the exam day to arrange for a make-up exam date. If a serious illness or emergency comes up on the exam date then the student is responsible for contacting the Professor as soon as possible to make arrangements for a make-up exam. Note that ALL changes in the exam date and make-up exams are subject to approval of the Professor and are handled on a as-need basis. There is no standard "make up date". The Professor reserves the right to refuse the administration of a make-up exam if they feel the reason given is unacceptable. Note that travel for family vacations or NMU holidays on **scheduled class days** is not considered acceptable.

Laboratory: Laboratory meets once a week for three hours **but** the student should expect to spend time outside of regular lab time complete assignments. Laboratory is worth 30% of the final course grade. Class attendance in laboratory **IS** taken and points will be deducted for being late to laboratory or missing a laboratory all together. **Labs cannot be made up without special approval.** The Professor retains the right to determine if your excuse is reasonable or not. Wanting to leave early for University holidays or family gatherings is NOT a reasonable excuse.

Extra Credit: There is no extra credit given in this course either at the beginning, in the middle or after the course is completed. It is my policy to not offer extra work to replace or augment poorly done work from earlier in the semester.

Class Attendance: Official class attendance is not taken on a daily basis (except for quizzes since I have them in hand). Attendance in laboratory is required. Material cannot be repeated due to time constraints. If you are going to miss class please make every attempt to contact your Professor just in case there has

been any special instructions.

Calculators: Calculators are not allowed on exams or quizzes. This includes laptops, PDA's, cell phones, and any other device capable of storing data and manipulating numbers. Your brain, of course, is a requirement.

Laptop Computers: The use of laptop computers will be governed by the following policy:

- Computers are to be used during lecture and laboratory for course work only.
- Use of computers during exams is prohibited except as allowed/agreed upon for a documented disability.
- Displaying offensive or obscene material(viewable by the Professor or other students) during class on a computer will receive sharp discipline.
- The University is **NOT** responsible for your laptop or files/programs on the laptop. Backup your system! We do work with part of the system later and damage to the core operating systems is possible!!
- Do not utilize software in violation of licensing agreements. Beware of copyright laws and licenses on all programs and files you download or install on a computer.
- You must not use your computer for any malicious act of software or data stealing, copying, harassment, or other misuse.

All Other Electronic Devices: The use of electronic devices other than a calculator in the class room is prohibited except (1) if the device is necessary for an approved documented disability or (2) if the device does not interfere with the learning environment and is being used for coursework. The use of all other electronic devices during class is prohibited at all times and strictly enforced during exams.

Classroom Behavior: The environment of the college classroom is to be one of exploration and learning. Although various levels of success are achieved at different times, it is still expected that the students conduct themselves in a manner of respect to both the professor and the fellow students. Students should be in class on time and remain seated until the professor dismisses the class. Individuals needing to arrive late or leave early should do so by using the rear of the class room and take the first available seat with minimal disturbance to others. All other rules and regulations of Northern Michigan University and the State of Michigan will be enforced.

Class Cancellation: The university does not often cancel classes but if it does local television and radio stations are informed and information is posted on the NMU website. In the unlikely event that the Professor will be absent at the last minute a sign will be posted at the entrances to the classroom. Also, information concerning make up of the missed time and/or laboratory will be sent by email to all.

Academic Integrity: Northern Michigan University puts a very high value on academic integrity, and violations are not tolerated. Any violation of academic integrity will receive academic and possibly disciplinary sanctions in accordance with NMU policy. See your student handbook for more information.

While it is encouraged for students to work together, there are situations where work is expected to be the student's whose name appears on the work. Quizzes and exams are obvious examples of where cheating

will not be tolerated. However, using the same code and documentation (even if you change your name and modify some words), is also considered cheating. Each student is expected to learn how to create their own files. In lab work, it will often be the case that both partners will have identical work. However, both partners are to turn in lab sheets, and both partners are expected to participate equally in completing the lab tasks. It is not acceptable for one partner to do all the work, while the other merely watches and writes. Both partners are expected to understand the lab exercises. If you have questions on what is considered appropriate, ask your professor.

Students with Disabilities: 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.

Equal Opportunity: Northern Michigan University does not unlawfully discriminate on the basis of race, color, religion, sex, national origin, age, height, weight, marital status, familial status, handicap/disability, sexual orientation or veteran status in employment or the provision of services, and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford individuals with disabilities an equal opportunity to participate in all programs and activities.

CS 330 Tentative Topics

Topic	Description and Reading material	Duration
Course Introduction	Introduction to the course – includes laboratory	1 lecture
Numbers for Computers	Number Systems (Ch. 2), binary numbers as codes Binary arithmetic (Ch. 10)	
Binary Logic	Basic logic functions (AND, OR, EXOR, NAND, NOR) (Ch. 3) Introduction to Boolean algebra (Ch. 4)	
Electrical Devices (logic)	Basic logic gates (Ch. 3), Logic of arithmetic (Ch. 10) flip-flop circuit (Ch. 7)	
Registers	Buffers, counters, and shift registers (Ch. 9 & 8) Sync. operations, tri-state concept, registers, Memory (Ch. 11)	
Computer Architecture	Bus, sequential operations, programmed instructions fetch cycle, operation cycles	
Assembly language Programming	Data transfer, addressing modes, laboratory examples, arithmetic and logic ops., review flags	
Branching of program operation sequence	unconditional branching, conditional branching, relative addressing, subroutines and stack ops., utility program	
Interfacing Topics	Handshaking, parallel data transfer, serial data transfer 1650/8250 UART, digital to analog and analog to digital conversion	