Computer Science 330: Microcomputer Architecture (Winter 2019)

Instructor: Dr. P. W. Mengyan   **Office**: West Science 2513   **Phone**: 906.227.2183
Email: pmengyan@nmu.edu [preferred comm. method]. Begin subject line with "*CS 330:*"

Office Hours: {M,W}: 13:00 – 14:55 in *WS 2513*. Other times by appointment, ***just ask me***!!

Class Meetings Lecture: {M,W,F} 12:00 to 12:50 in *West Science 2506/2508*
Lab: Tuesday 12:00 to 14:50 in *West Science 2508*
Webpage: Educat will be used for any online course content.

Recommended Text: R.L. Tokheim, *Digital Electronics: Principles and Applications* (8th, ISBN: 978-0-07-337377-5). 7th ed. of this particular text is a reasonable alternative.

Other requirements NMU issued laptop or something capable of running the required software.
Only NMU issued computer running the NMU image will be supported.
Other configurations may be used but compatibility is the sole responsibility of the user.
Computer compatibility or stability issues are not an automatic basis for leniency or special treatment for any course related material.
Software and lab equipment is provided by the instructor and the Department of Physics.

Course Description (outline and expected outcomes): This experiment-based course includes content relating to understanding topics such as how electronic hardware responds to stored instructions, logic circuits that form the basis for microprocessors and assembly language programming to control and interact with hardware.
More information is available via the teaching section of the instructor's webpage.

Course Objectives: By the end of semester, a student who is successful in lecture and the laboratory component will demonstrate competency in:
- Building circuits based in Boolean logic (laboratory)
- Using a truth table, logical equation or circuit to represent a logical expression
  (lecture: assessed via quizzes, exams, homework, projects and in class participation)
- Explain and illustrate how individual components of a system contribute to an overall device
  (lecture: assessed via quizzes, exams, homework, projects and in class participation)
- The core components of assembly language programming
  (assessed through submitted projects, documentation of self-authored functional programs)

Homework: Assigned periodically during the course and may include suggested questions, readings and other activities to supplement lecture and laboratory. Due date, time and assignment description will be indicated on each assignment. Late assignments are *not* typically accepted.
The homework will take time and effort to work and may be difficult. Do yourself a favor, start the homework as soon as it is available, and allow plenty of time to work through each question. Be warned that some questions may go quickly and others may take a significant amount of time.

Quizzes: May be administered during the regularly scheduled class time and may include content from lecture, homework, exams, labs or any other relevant course related information. Please note that quizzes may or may not be announced during lecture and will *never* be announced via email. Make up quizzes will *not* be administered. In general, examples of what quizzes aim to do are (1) provide students the opportunity to check their understanding of relevant material and receive feedback from the instructor (2) provide the instructor with feedback as to how well students are understanding the material (3) encourage students to continue to stay on top of the material, develop sound study habits, regularly attend class, etc

Exams: There will be two (2) scheduled exams: One mid-term exam and the final exam. The mid-term exam will be scheduled with a minimum notice of 5 business days. The final exam will be administered in the same room as lecture and at a time pre-determined by NMU. **Make up exams will not be administered**. If an exam is to be missed due to extenuating circumstances, contact me via email BEFORE the scheduled exam time to see about making the appropriate arrangements.

Use of notes, books or electronic gizmos of any sort will not be permitted on the exams unless otherwise specified by the instructor.

TENTATIVE ** **Exam Schedule**:

Mid-term**	Normal class time	Fri	~22 Feb 2019	
Final	12:00 to 13:50	Mon	29 Apr 2019	All material covered in class

**Mid-term exam *time* and *content* will be adjusted appropriately to accommodate the course schedule.
Deviations from this tentative schedule will be discussed, *in class*, as they become relevant. Exam dates will typically be finalized a minimum of one week before the exam is administered.
The final exam time is predetermined by NMU and will *not* be modified by the instructor.

Grades:

Mid-term exam	20%	A: ≥ 90%
Final exam	20%	B: ≥ 80%
Laboratory***, Homework, Quizzes, participation, etc	60%	C: ≥ 70%
		D: ≥ 60%
Total:	100%	F: < 60%

'+' and '−' grades are typically assigned when a grade is within ± ~2.0% of the letter grade cutoff.
***Minimum average score of 60% on the laboratory exercises, in addition to appropriate performance in the rest of the course, is *required* to earn an overall passing grade in this course.

Laboratory:
Lab is a separate course in which the student must be enrolled. A minimum score of 60% is *required* in order to qualify for a passing score in the lecture. To be clear, that means if a student's score is any less than 60.0%, the student will have earned a FAILING grade in lecture section. The laboratory section of this course is designed to provide hands on experience with and supplement the topics covered in lecture. Late assignments are not typically accepted. Attendance is required (including actions such as: in class ready to start at or before the scheduled start time; appropriate participation; not leaving before dismissal or the scheduled end time of the class, etc).

Attendance:
Attendance is required for all laboratory section meetings *and* lecture meetings.
'Attendance' includes (and is not limited to) actions such as a student being in their seat, ready for class no later than the scheduled start time; being present throughout the entire scheduled class period; active participation (as appropriate); being on task; being attentive and not being disruptive to others.
Absences relating to official university business will be addressed as the need arises provided the student contacts the instructor, in writing, no less than 3 business days prior to the expected absence. In accordance with NMU policy, any student missing any portion of a course for an officially excused activity are still responsible for the course content and assignments.
In the event that a student is unable to attend class due to an extenuating circumstance, the student is to contact the instructor prior to, or as soon as reasonable possible after, the absence through the official university email system. Arrangements relating to any course activity will be made at the discretion of the instructor, in accordance with NMU policy and confirmed by email.

Important Notes:

- **ADA Statement**:
  In compliance with the ADA and university policy
  "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 2101 C. B. Hedgcock Building (227-1700 or disserv@nmu.edu). 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."

- **Religious Holidays**:
  Pursuant to university policy, a student who intends to observe a religious holy day should make that intention known, in writing, to the instructor prior to an absence. A student who is absent from a class, exam or exercise for the observance of a religious holy day shall be allowed to complete an assignment or exam scheduled for that day within a reasonable time around that absence.

- **Academic Integrity**:
  Section 2.3.1 of the NMU Student Handbook discusses scholastic dishonesty; all of which will be upheld in all aspects of this course. Academic dishonesty will not be tolerated.
  While students are encouraged to work together, each student is expected to complete and submit their original work with appropriate citations for contributing information.

- **Appropriate behavior**:
  I expect students to behave in a respectful, considerate and courteous fashion in any activity related to this course (e.g. Lecture, lab, discussion, office hours etc).
  Rude, disrespectful or disruptive behavior will *never* be tolerated.

Tentative Outline of Course Content:

Topic	Content / Additional Detail
Introduction, Overview	Introduction to the course and general topics
Numbers for electronics	Number systems and relevant arithmetic
Binary Logic	e.g.: Logic functions; Boolean algebra
Device logic	e.g.: Gates, arithmetic logic, flip-flop circuit
Registers	e.g.: Counters, buffers, shift registers, memory, etc
Architecture	e.g.: Bus, sequential operations, programmed instructions, fetch and operation cycles Will look at organizations such as Intel 80x86, RISC, ARM, MIPS, etc…
Assembly	e.g.: Overview, syntax, data transfer, addressing modes, arithmetic, logic operations, flags, laboratory examples
Branching sequences	e.g.: Unconditional branching, conditional branching, relative addressing, subroutines, stacks, utility program
Interfacing	e.g.: Handshaking, data transfer (serial, parallel), 1650/8250 UART, A/D conversion
Special topics	Added as time and interest permits

Notable Dates:
14 Jan 2019: First official day of class
21 Jan 2019: Martin Luther King Day observance (No Class)
02 Mar 2019: Midsemester recess begins at 17:00
10 Mar 2019: Daylight savings time begins at 02:00 ('Spring' forward)
11 Mar 2019: Classes resume (end of midsemester recess)
11 Apr 2019: NMU *Celebration of Student Scholarship* (JXJ, first floor)
27 Apr 2019: Last day of regular scheduled class
29 Apr 2019: Final Exam (12:00 to 13:50)