

ECE331

Microprocessors and Digital Systems

Spring 2019

Lecture: MWF, 1:50-2:40, 1145 Engineering Building
* Fri Jan 25 and Fri Feb 1 will be in B122 Wells Hall

Lab: EB 3230: (5) Tu 8am-10:50, (1) Tu 11:30-2:20, (2) Tu 3-5:50, (3) Tu 7-9:50pm,
(7) Th 8am-10:50, (4) Th 11:30-2:20, (6) Th 7-9:50pm, (8) We 7-9:50pm

Instructor: Dr. Andrew Mason, EB 1217, mason@msu.edu

Office Hrs.: Mon 11:30-12:30, Mon/Wed 3-4pm, or send email for appointment

Lab TAs: Jason Greenberg, green108@msu.edu; sections 3,6,8
Dhrubajit Chowdhury, chowdh48@msu.edu; sections 2,5,7
Haojun Wang, wanghao9@msu.edu; sections 1,4

Course Description:

Microcomputers. Microprocessor architecture. Addressing modes. Assembly language programming. Parallel and serial input and output. Interfacing. Interrupts. Peripheral device controllers. Applications and design.

Prerequisite:

ECE 230 and { (CSE 232 or CSE 220) or (EGR 102 and (CSE 251 or concurrently)) }

Course Materials:

Course materials will be hosted on MSU's Desire 2 Learn site (<https://d2l.msu.edu/>). This includes grades, lecture notes, active learning assignments & exercises, and examples. Please check regularly throughout the semester. In addition, lab materials will be posted on a shared directory on the engineering network at T:\courses\unix\ece\331. <\\filer1.egr.msu.edu\dfs\courses\unix\ece\331>. Note: the path is ...courses\unix\ece... not ...courses\ece... To access this folder outside of EB, you can map the DFS drive (T:) (<\\cifs.egr.msu.edu\dfs>) to your Windows or Mac OSX PC; instructions can be found at <https://www.egr.msu.edu/decs/help-support/how-to>.

iClicker:

This course will use **iClicker 2** remotes (<http://www1.iclicker.com/>) for in-class active learning exercises that contribute to your grade. By the second week of class, all students must have an iClicker 2 remote registered to ECE331 via D2L. iClickers can be purchased in bookstores, Amazon, etc.

Required Text:

None: Course notes and reference handouts will be posted on D2L.

Reference Texts:

J. Valvano, Introduction to ARM Cortex-M Microcontrollers (Embedded Systems Vol. 1), 4th Ed, 2013, ISBN: 978-1477508992. Available from [Amazon](#) (including Kindle edition) or [CreateSpace](#).

J. Yiu, The Definitive Guide to the ARM Cortex –M0, Elsevier, 2011, ISBN: 978-0-12-385477-3

Classroom Conduct:

Students are expected to attend and **participate** in class, including asking questions, engaging in discussions and actively listening to lectures and discussions. Taking notes is strongly encouraged to promote success in this course. I will try to maintain a relaxed and open classroom environment, and your questions and comments are always encouraged. Laptops, tablets and smart phones are permitted for taking/viewing notes, but **social media, emailing, web browsing, and otherwise disengaging from class is strictly prohibited during lecture** because it is disrespectful, disruptive to your classmates, and hurts your chance of success in the course. If you are caught misusing these devices you will be asked to leave the classroom. Similarly, newspapers, crossword puzzles, etc. are prohibited during lecture and may result in being asked to leave the classroom. Anyone violating this policy will receive a zero (0) score for all graded classroom activities that day.

Course Structure:

ECE331 will be presented using a “blended” format combining traditional lectures and online materials. Lecture notes, videos, and reference material will be periodically posted on D2L. You will be asked to **study a significant portion of the course material BEFORE it is discussed in class**. Preparation problems will focus on upcoming topics, requiring you to study and learn material on your own. A significant portion of class time will employ active learning, interactively discussing topics and working through problems and examples together.

Active Learning Components:

To create a participation-based learning environment, this course will utilize several Active Learning Components (ALC) carefully designed to help students engage with course material and assimilate new concepts and information through self-study and in-class **retrieval practice**. Each type of ALC is briefly described below, and the grade weight of each ALC is shown in the Grading table. Upcoming ALC due dates will be announced at the beginning of each lecture.

Preparation Exercises (“Preps”) will be given approximately weekly and serve as guides to self-study of new course material and practice exercises in problem solving. Preps are similar to traditional “homework”, but they will focus on *preparing* students for material that has not yet been covered in class. This self-preparation will allow more class time to be spent on examples, exercises, and discussion rather than presentation of factual material. Preps will be due at the beginning of class on the assigned due date. Late Prep assignments will not be accepted, but the lowest Prep grade will be dropped. Preps will be graded based on effort only, and solutions will be provided so students can check their own work (another form of retrieval practice).

Participation Activities (PAs) encourage active participation in the learning process and keeping up with course material. In-class activities will utilize iClickers to poll student responses during lectures, and these will be graded on a combination of participation and correctness; at least 50% of the grade will be for participation (responding to at least 75 of the questions asked that day) regardless of response correctness. Online exercises will award PA points for completing a given tasks (e.g., survey) on DL2 within a specified timeline. Approximately 25 PAs will be issued throughout the semester. PAs missed due to absence for any reason cannot be made up, but the lowest three (3) scores will be dropped to allow for occasional absence or forgetting iClickers.

Checkpoint Evaluations are short in-class iClicker exams designed to provide retrieval practice between the main written exams. Checkpoint questions will be discussed in class immediately following the evaluation to help students identify and learn from their mistakes. Checkpoint dates are listed in the Course Topic Schedule, and any schedule changes will be announced at least one week in advance. Each of the four (4) Checkpoints will cover 2-3 weeks of material, with two Checkpoints prior to the midterm exam and two prior to the final exam. Checkpoints will be graded on a combination of correctness and participation. No makeups are allowed for Checkpoints; for excused and documented absences, email the instructor *prior* to the exam to discuss options.

Examinations:

The midterm and final exams form the largest factor of your course grade. Exam dates are shown on the Course Topic Schedule (posted on D2L). Makeup exams will only be allowed for extreme cases (major illness, death in immediate family, etc.), which must be documented and communicated to the instructor as early as possible and *prior* to the exam. The final exam will focus on material following the midterm exam but will also include semester-cumulative material.

Grading:

30% Active Learning Components
10% Preparation exercises (“Preps”)
10% Participation activities (PAs)
10% Checkpoint evaluations

45% Examinations
20% Midterm
25% Final

25% Lab Assignments

Final grades will typically be assigned as >90% = 4.0, >85% = 3.5, >80% = 3.0, etc. with each 5% adjusting grade point by 0.5. However, grades may be curved upward to meet the historical average for 300-level ECE courses.

Lab Assignments: (4% Pre-lab, 13% In-lab activities, 8% Lab report)

Laboratory assignments (tentatively 12) will introduce valuable computer-aided design tools and provide students with supervised hands-on learning experiences. Labs will be directed by a TA under supervision of the instructor. Laboratory deliverables will be defined for each assignment. Most labs have pre-labs that must be completed before coming to the lab; Students who have not completed the pre-lab will not be allowed to participate in the lab and will receive a zero grade for that lab, so be sure to complete the pre-lab assignment each week. Most labs will begin with a short quiz to recall pre-lab material, so please arrive to your lab section on time or risk missing the quiz. Weekly laboratory reports will be collected and graded. Lab report format will be discussed at the first lab meeting and a guide will be provided. Professionalism is expected in the lab reports. Due dates will be specified by the TA, and late reports will not be accepted. Labs reports will be graded by the TA based on 1) completion of lab steps, 2) response to Discussion Points, and 3) report quality. Grades for each lab will also include completion of pre-lab exercises, lab quizzes, and individual effort as assessed weekly by your TA.

Labs will begin on the [second week of class, starting Jan 14](#). Lab material will be posted in a network directory managed by DECS. Students will be assigned a user folder within this class directory and are required to use these class user folders to complete all ECE331 lab computer work.

Important: You must complete the Lab 0 Prelab on lab safety BEFORE coming to the lab or you will not be allowed to participate in the lab session.

Grade Minimums:

To pass this course, students must achieve >75% average on labs and >75% average on PAs.

Course Notifications:

Unexpected events often happen that result in altering class plans and schedule. Please check the [D2L Announcements](#) panel and your [@msu email](#) for important announcements such as postponing due dates, lecture cancelations, update of lab documents, etc.

Absences:

Policies for missing graded course components and are summarized below. In general, if you have a real reason to miss class, notify me (mason@msu.edu) **in advance** and I will try to work with you to minimize the impact on your grade. However, there is little tolerance for unexcused absences or missing an excessive number of courses/labs. Most importantly, please mark your calendars for the two exams shown on the Course Topic Schedule (posted on D2L) and avoid missing these exams.

ALC absences: ALCs missed due to absence cannot be made up, however: the lowest (1) Prep score will be dropped and the lowest three (3) PA scores will be dropped. For absences due to major illness or professional travel, Preps can be submitted via email with prior approval from the instructor.

Checkpoint dates are shown on the Course Topic Schedule and, due to their in-class nature, cannot be made up.

Lab absences: For any excused absence (including major illness, job interviews, etc.) of a lab session, please contact your TA via email to see if a make-up lab can be arranged *before your next lab session*. We will work to fit you into another lab session to avoid falling behind.

Cheating:

Cheating in any form will not be tolerated! You are permitted to work on Prep assignments and Pre-labs in small groups, but **directly copying someone's paper is cheating**; it will result in a zero-point score for all people involved. The same is true for lab reports. All Checkpoint evaluations should be completed individually and doing otherwise is considered cheating. During exams, use of any notes (other than what may be expressly permitted for a specific test), using any smart device for any reason, looking at anyone else's paper, etc. is considered cheating and will result in a zero-point score for the assignment and notification of the Dean's office.

Student may only use their own individual iClicker. Responding to Checkpoint or Participation questions using someone else's iClicker is considered cheating and will result in a zero-point score for all students involved.