EELE 465 Microcontroller Applications Course Syllabus
Montana State University – Bozeman
Electrical and Computer Engineering Department

<u>Spring 2021</u> – 4credits
T/Th <u>9:30-10:15,</u> Online Meetings

Instructor: Mr. Cory Mettler
Office: COBL 514

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Email: cory.mettler@montana.edu (please do not use D2L email)

Website: use Brightspace/D2L site

Office Hours: MW 12:00PM – 1:00PM, other times by appointment, drop-in are welcome

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<u>Pre-Reqs:</u>   EELE 371

<u>Text:</u>   Embedded Systems Design Using the TI MSP-EXP430FR2355 Launchpad, 1th ed, Brock J. LaMeres, online copy provided on D2L/Brightspace.

<u>Description:</u>   Lecture/laboratory exposure to microcontroller hardware and software applications, serial and parallel I/O, timing, interrupts, LCD's, Keypads, A to D conversion and a project realizing a real time control problem.

<u>Student Outcomes</u>**:**   After completing this course, students should be able to:

   1) Design, breadboard, and program a microcontroller system;
   2) Design, write, and document assembly-language/C software for a microcontroller;
   3) Understand and use various IO devices such as: keypads, AtoD converters, LCD modules, mechanical relays, solid state relay, real time clock, temperature sensors;
   4) Design basic I/O drivers and microcontroller device interfaces, I2C, SCI;
   5) Understand the basic types of memory used in microcontrollers;
   6) Understand the hardware and software resources required for real-time microcontroller applications

<u>Course Outline:</u>   For a detailed schedule, refer to the posted course schedule on D2L.

1) Microcontroller instruction set;	7) Keypad scanning;
2) System clock and Power on Reset;	8) LCD module programming;
3) Addressing modes;	9) Analog to Digital and Digital to Analog Conversion;
4) I/O Ports;	10) Transistor switching circuits and I/O drivers;
5) Interrupts;	11) I2C Temperature Sensors and Real-Time Clocks;
6) Pseudo Data Bus and Address decoding;	12) Thermoelectric coolers.

<u>Grading:</u>

		Guaranteed	By discretion
Normal Projects (approx. 7-10)	100 pts	A > 92%	88% - 92% A-/B+
Advanced Project (approx. 1)	50 pts	B > 82%	78% - 82% B-/C+
Final Project or Exam	50 pts	C > 74%	68% - 74% C-/D+
Semester Total	200 pts	D > 64%	58% - 64% D-
(grades do not round, ie: $91.99\% \neq A$)		F < 60%	

Normal Projects: There will be 7-10 projects. These will be completed in 1 to 2 weeks. A memo report (5pts) will be submitted and a live demo (5pts) will be performed for each lab. However many project are assigned this semester, the total sum of points will be weighted as 100 semester points.

All projects must be completed in order to pass the course.

Advanced Project: The last regularly scheduled project is a longer, more in-depth project. It will require that you use much of the previous project material to complete. Therefore, it is weighted much heavier than the normal projects. A detailed rubric will be provided in advance.

A score > 70% on this exercise is required to pass the course.

Final Project/Exam: A capstone activity will be required at the end of the semester. Ideally, this will not be a written exam, but rather a lab practical. Collaboration with other students is not acceptable on this activity and does constitute academic dishonesty. Moreover, this exercise will be assessed on a bell curve – meaning if you assist classmates, you will directly reduce your own grade.

<u>Parts Kit</u>:   Each student must purchase a parts kit from the ECE Stockroom. We will be using the MSPEXP430FR2355 evaluation board for programming our microcontrollers. The approximate cost for the EELE465 kit is $66.00. Your program fees may cover all or most of this if you are a College of Engineering student. Students from other Colleges will have to purchase the kit on their own from the ECE Stockroom. A list of the parts in the kit is available on the class website.

<u>Emailing</u>:   If you need to email the instructor, please adhere to the following:
1. Email the instructor at the address provided above
2. Each email should have a subject in the following format:
   EELE 465 – topic (ex: EELE 465 – meeting request)
3. Salutation for every email should begin with **Mr. Mettler,** and provide sufficient detail in the message relating to your topic
4. Conclusion of every email should end with **your name and ID#**

Academic Misconduct: Unless group work is explicitly assigned, homework, quizzes, lab reports and exams must be prepared _individually_. Submitting the work of others is dishonest, constitutes academic misconduct, and is grounds for dismissal from the course. _Let there be NO MISUNDERSTANDING regarding the academic dishonesty policy for this course: Any academic misconduct will immediately result in a failing (F) grade for the semester – regardless on minor the infraction._

ADA Statement: Contact the instructor and the _MSU Office of Disability, Re-Entry and Veteran Services_ as soon as possible if you have a disability for which you will be requesting accommodations. **_Please know that you are welcome and encouraged to participate fully in this class!_**

Confidentiality: All records related to this course are confidential and will not be shared with any unauthorized people, including parents, without a signed, written release from the MSU Dean of Students. For more information contact the _Dean of Students office_ at 994-2826.