EGR 190 – Digital Circuits
Syllabus
Fall 2017

Instructor Dr. Kumar Yelamarthi **(Dr. Y)**
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Office Hours Monday and Wednesday - 1:00 – 2:30 pm
Or any other time when the door is open

Teaching Assistant Daniel Bruce
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Lecture Monday and Wednesday - 3:30 – 4:45 pm (ET 224)

Prerequisites MTH 130 or MTH 132
Pre/Co-requisite EGR 120

Textbook (optional)
1) Digital Design: Principles and Practices
Authors: John F. Wakerly
Pearson Higher Education, 5th edition, 2017 (4th edition would work as well)

2) Reference material as provided by the instructor

Course Description

This course introduces students to the realm of digital circuits and systems used in everyday electronic gadgets (iPhone, iPad, Xbox, etc.,) through fundamentals in Boolean logic, logic gates, combinational logic circuits, microcontrollers, sensors, and actuators. Further, students will be exposed to the state-of-the-art research and design projects from across the world through online videos, classroom and online discussions, and team-based hands-on activities to reinforce innovation and creativity, thus reinforcing student learning.

Course Objectives Upon successful completion of this course, the students will be able to:

1. convert an number between different number systems
2. perform arithmetic operations using binary, octal, and hexadecimal numbers
3. describe the operation of logic gates
4. perform gate level minimization algebraically and with advanced methods
5. implement digital circuits utilizing electrical laboratory procedures
6. learn the history of electronics, current applications, and future development
7. understand the basics of computers, sensors, and actuators and the relationships between them in a smart-vehicle context

8. programmatically control vehicles using basic programming structures such as loops, conditionals, and functions
9. gain skills in engineering design through a supportive and cooperative environment
10. gain awareness of electrical and computer engineering career opportunities
11. reinforce their critical thinking and problem solving skills in engineering through team-based hands-on activities.

Grading

A letter grade based on the scale below is assigned based on the students ability to discuss issues, solve problems, and demonstrate understanding of how information is acquired, used and managed.

100-93%	A	82 – 80 %	B-	69 – 67 %	D+
92 – 90%	A-	79 – 77 %	C+	66 – 63 %	D
89 – 87%	B+	76 – 73 %	C	62 – 60 %	D-
86 – 83%	B	72 – 70 %	C-	Below 60%	E

The overall course grade will be a weighted sum from the following distribution

Quiz/Homework	
Pre-lecture quiz	10%
Post-lecture quiz	10%
Labs	30%
Project	15%
Exams	
Midterm 1	10%
Midterm 2	10%
Final Exam	15%
Total	100%

Exams

All exams will be close book, close notes and cover the syllabus covered till the pervious lecture. Make up exams will not be provided unless due to emergency.

Instructional Method

In order to increase student learning, while at the same time keep the amount of time commitment required by students low, different instructional strategies are used in this class. These requirements include:

1. Students have to watch the pre-lecture videos *(digital circuits concepts, and state-of-the-art research projects)* as listed in blackboard *(typically duration is less than 20 minutes)* before every lecture. This will help you prepare for topics that we are going to discuss during lecture.
2. Take the pre-lecture quiz before every lecture *(typically 3-5 questions).* This quiz is designed to evaluate your understanding of the concept, and find where

additional emphasis is required during class *(effective utilization of classroom meeting time)*

3. Active participation during class. This involves individual and group problem solving, collaborative hands-on based activities to reinforce theoretical concepts taught.
4. Take the post-lecture quiz after every lecture *(10 questions).* This quiz is designed to evaluate your understanding of concepts taught, and find which concepts require further revision.
5. Participate in a term project at end of the semester. This group project will be designed to bring together all concepts you learned during the semester, and reinforce your innovation and critical thinking skills.

Americans with Disabilities Act Accommodation

CMU provides individuals with disabilities reasonable accommodations to participate in educational programs, activities and services. Students with disabilities requiring accommodations to participate in class activities or meet course requirements should contact Susie Rood, Director of Student Disability Services at (800) 950-1144, extension 3018 or email her at sds@cmich.edu, at least 4 weeks prior to registering for class. Students may find additional ADA information and forms at http://www.cmich.edu/student_disability_services.htm.

Emergency Procedures

Notices will be posted on the CMU home page and on the CMU Information Line 989-774-7500. In addition, interested students, faculty and staff can register to receive emergency news alerts via phone, an alternate email address, or text message. To register, visit https://MyAccount.cmich.edu → "Emergency Notification".

Tentative Schedule

	Date	Topics
Week-01	08/28/17	Introduction, Number Systems & Conversion
	08/30/17	Addition & Subtraction
Week-02	09/04/17	No class – Labor Day
	09/06/17	Truth tables, logic gates
Week-03	09/11/17	Logic function, Boolean Algebra
	09/13/17	Combinational Logic Circuits
Week-04	09/18/17	Function simplification, K-Maps
	09/20/17	Sequential Logic Circuits
Week-05	09/25/17	Internet of Things/Vehicles Fundamentals
	09/27/17	*Midterm – 01*
Week-06	10/02/17	Microcontroller Fundamentals
	10/04/17	Sensor Fundamentals
Week-07	10/09/17	*Fundamental Programming with Raspberry Pi (RPi)*
	10/11/17	*Fundamental Programming with Raspberry Pi (RPi)*
Week-08	10/16/17	*Activation of Light Sequences with RPi*
	10/18/17	*Temperature Sensor*
Week-09	10/23/17	*Obstacle Detection Sensors*
	10/25/17	*Motors – Servo, DC*
Week-10	10/30/17	*Photo resistor*
	11/01/17	*Introduction to ThingSpeak*
Week-11	11/06/17	*Midterm - 02*
	11/08/17	*Connecting to ThingSpeak*
Week-12	11/13/17	*Project hands-on activity*
	11/15/17	*Project hands-on activity*
Week-13	11/20/17	*Project hands-on activity*
	11/22/17	*Project hands-on activity*
Week-14	11/27/17	*Project hands-on activity*
	11/29/17	*Project hands-on activity*
Week-15	12/04/17	*Project Presentations/Demonstrations*
	12/06/17	*Final exam review*