MONTE VISTA CHRISTIAN SCHOOL
INTD 3520, Digital Electronics
Course Syllabus

Course Description:
From smart phones to appliances, digital circuits are all around us. This course provides a
foundation for students who are interested in electrical engineering, electornics, or circuit design.
Students study topics such as combinational logic and sequential logic and are exposed to circuit
design tools used in industry, including logic gates, integrated circuits, and microcontrollers.

Curricular Mapping:
This course will introduce students to the fundamentals of electronics. Students will learn about
logic design and how logic is applied in electronics to make digital electronic circuits. In
addition, students will learn how to implement microcontrollers to bring a level of control to
their designs and projects. This course will draw upon the skills learned in Principles of
Engineering (POE) and Introduction to Engineering Design (IED). The projects in this course
will reinforce concepts that are taught in Algebra and Physics. This course will prepare students
for future courses in computer science and in electrical, electronic, and computer engineering.

Course Objectives:
Upon the successful completion of this course the students will be able to:
1. Use logic gates to design combinational logic circuits to create dynamic control between
   outputs and inputs.
2. Utilize flip flops to design sequential logic circuits for designs that require memory.
3. Prototype circuit design using breadboards and integrated circuits.
4. Design custom printed circuit boards and use a milling machine to manufacture the
   custom board.
5. Describe the characteristics of circuit theory through a knowledge of Ohm's Law and
   Kirchoff's Law.
6. Apply circuit theory to describe how sensors and outputs are interfaced with
   microcrontrollers.
7. Program in a C based language using the Arduino IDE editor.
8. Apply the use of microcontrollers (like the Arduino) to bring control to a design and/or
   project.

Text:
There is no textbook for this course.

Prerequisite:
Principles of Engineering (POE) and Introduction to Engineering Design (IED)

Course Outline:
1. Introduction to Digital Logic
   a. Binary
   b. Gates

      c.   Transistors
2. Combinational Logic
      a.   Truth Tables
      b.   Boolean Equations and simplification
      c.   Simulaiton Software
      d.   Breadboarding and TTL Logic
3. Sequential Logic
      a.   Flip Flops
      b.   Asynchronous Counters
      c.   Synchronous Counters
4. Printed Circuit Board Design
      a.   Cad Software
      b.   Milling Machine
      c.   Soldering, testing, and troubleshooting
5. Basic Circuit Theory
      a.   Voltage vs. Current
      b.   Ohm's Law
      c.   Kirchoff's Law
6. Introduction to Microcontrollers
      a.   Learning Ardino IDE
      b.   Input exploration (multitude of sensors)
      c.   Output exploration (LEDs, motors, and servos)
7. Final Project

Grading:

Grade Book Categories	**Semester Weighted Grading Configuration**
Workspace Stewardship 10%	Quarter　　　　40%
Professionalism　　　　10%	Quarter　　　　40%
Classwork　　　　40%	Final Exam　　　20%
Projects　　　　40%	

All student quarter grades will be weighted as follows:
1. Workspace Stewardship 10%. Students are expected to keep their workspace clean and organized. Since we are dealing with many different types of tools (some of which are very small), it is expected that students take ownership in maintenance and care of their workspace and equipment. This includes the proper use, maintenance, and cleaning of classroom machines.
2. Professionalism 10%: Students will be expected to work together to troubleshoot and find problems with protoyped designs. Working in collaboration with your colleagues, it is expected that you work as a team to ensure that everybody is successful.

3. Classwork 40%: We will be doing many activities to facilitate the learning of the content. This will include exploration of new content as well as application of more familiar content. Activities that are done on a computer usually fall into this category.
4. Projects 40%: Projects will give students the opportunity to apply what they have learned to solve problems. Projects will be assessed based on the successful ability to meet the challenge at hand. Assignments that involve working prototypes usually fall into this category.

High School Standard Grading Policy:
Please refer to the policy and procedures posted online in our Parent-Student Handbook.

Class Policies:
The following class policies are non-negotiable. Please see the instructor if you have any concerns with your ability to follow these policies.
1. Tardiness: Class starts at the bell. Students are expected to arrive on time and be prepared to begin class. In many cases, we will be working on projects and we need to take advantage of all of the time that we have.
2. Absences: Making up classwork is the responsibility of the student. The policies set forth in the Parent-Student Handbook will be followed regarding make-up work for any excused absence. It is critical that each student find out what has been missed as soon as possible and plan accordingly.

School Policies and Expected Student Learning Results (ESLRs):
Students are subject to all academic policies of the school as found in the Parent-Student Handbook. Furthermore, it is each student's responsibility to read and follow all academic policies of Monte Vista Christian School. In addition to addressing each ESLR every year, we target a specific ESLR each academic year for particular focus

Tips for the Students:
1. Work together! There are many times when things don't work the way you might expect. Utilize your fellow students (colleagues) to help you troubleshoot the problems. Every time you find a problem and fix it, you get a little smarter and a little better at doing it the next time.
2. Have fun! The knowledge you will gain from this class is truly unique and incredibly powerful.