CAFE Class Descriptions

Teacher: **Gordon Doughman**

Class Title: **Computer Hacking 101 (or Introduction to Microcontrollers)**

Age Range (circle): PreK-K 1st-3rd 4th-6th Jr. High (7th-8th) Lower HS (9/10) Upper HS (11/12)

Curriculum Used: **Based on the material in two out of print books, *Basic Microprocessors and the 6800* by Ron Bishop and *Understanding Small Microcontrollers* by James M. Sibigtroth.**

Books to purchase, if any, and approximate cost: **Both books mentioned above are available in pfd for free and will be provided to the students.**

Course Description: This class is a combination of lecture and lab.

**Computers are everywhere. Gigahertz processors, Gigabytes of memory and Terabytes of mass storage…the only computers with which most students are familiar are desktop PCs, tablets or smart phones. While each of these are powerful computing devices tailored for specific uses, the Central Processing Unit (CPU) speed, memory and mass storage of these devices eclipse the “home computers” of the mid 1970s by more than three orders of magnitude. Yet there is a class of “small” computers, known as *microcontrollers*, which have found their way into nearly every product containing electronics today. Microcontrollers can be found in cars, appliances, TVs, remote controls, A/V equipment…the list is nearly endless.**

**The goal of this class is *not* to teach the student how to “hack” into a personal computer or network, but rather teach the student the “low-level” technologies common to all computers from mainframes, to servers, to desktop PCs, to the tiny microcontrollers used in electronic products around the world. In addition, the student will learn enough of the specifics of a widely used microcontroller family to write some small programs.**

**Basic Course Outline**

1. **Basic Electronic Principles**
2. **Number Systems, Computer Numbers and Codes**
3. **Logic Elements**
4. **Digital Arithmetic**
5. **Computer Memory**
6. **Microcontroller Basics**
7. **Computer Architecture**
8. **M68HCS08 Instruction Set**
9. **Assembly Language Programming**
10. **M68HCS08 Initialization – Simple Programming Example, includes labs**
11. **Computer Peripheral Systems – Includes labs**

Approximate time (per week) required outside of class for homework: **One hour on average.**

Length of Course (circle): One semester Full Year Additional Class Meeting Day (HS only)

Are new students accepted second semester? **N/A**

Fee/semester: **$50; I wasn’t going to charge anything for this class, but I’d like to make sure that there is some level of commitment on the part of both the parents to make sure the students to attend the class and do the work.**

Maximum class size: **Twelve. This is mostly so that I can provide help to the students on the days we will have labs.**

Grade assigned?

Number of high school credit hours earned if all requirements are met: