Ph 131—Microcontrollers and Aerospace Winter 2020

**Instructor: Course Materials:**

|  |  |
| --- | --- |
| Greg Mulder  MH 109 541-917-4744  [mulderg@linnbenton.edu](mailto:mulderg@linnbenton.edu)  Office Hours:  **(in MH109, 106 and/or 113)**  MW 10-10:50am;  T noon-1pm | All course reading materials are kept at <http://minirov.info>  You will need to purchase a miniRocket kit from the LBCC bookstore. |

Welcome to “Microcontrollers and Aerospace” at Linn-Benton Community College. The goal of this class is to learn the uses of microcontollers in a hands-on format.

A microcontroller is a small computer on a single integrated circuit with programmable input/output peripherals. Physicists are interested in microcontrollers as these tend to be a main tool we use to collect data from the universe and to the control the devices that make up our experimental apparatus.

A complimentary goal of this class is to increase the skill level of students wishing to take part in a Research and Design Cohort (RDC) during Winter and Spring term. Our RDCs include: the LBCC Remotely Operated Vehicle team which will compete in the Summer 2020 Marine Advanced Technology Education Center (MATE) competition in Philadelphia; the LBCC Space Exploration Group, and a new group to be announced soon.

In this class we will build a sensor payload for an model rocket that will be able to measure physical parameters such as acceleration, pressure and temperatures. The skills that you gain here in this class will help with all the above RDCs.

There are many microcontrollers on the market. For this class we have chosen the Adafruit Feather with Arduino programming. The advantages of the Adafruit Feather include a large global and an Arduino community with whom you can share work, its low cost, and its small size.

**Course Format:** There are 10 Checkpoints everyone in class is expected to accomplish by the end of Week 8. Following Adafruit/Arduino spirit, everyone in the class is expected to assist others in the class in their development of their rocket and rocket payload. We will work in groups of two where each group will get two sets of Adafruit equipment. If your group finds yourself ahead of the class, you should offer assistance to others. Likewise, if you find yourself struggling to understand a concept then you should seek elucidation from the instructors or other students in the class.

**Course Checkpoints:**

Checkpoint 1: Download software from http:// arduino.cc.

Checkpoint 2: Make the light blink and read a blinking light.

Checkpoint 3: Solder headers and sockets and payload sensor parts

Checkpoint 4: Use the Adafruit Accelerometer to measure acceleration.

Checkpoint 5: Calibrate the Adafruit pressure and temperature sensor.

Checkpoint 6: Combine components to complete the rocket payload.

Checkpoint 7: Rocket safety and rocket construction.

Checkpoint 8: Installation of the payload.

Checkpoint 9: Rocket launches.

Checkpoint 10: Data analysis.

**Grading:** Each day you attend class you should write up a short description of what you did that day in your DropBox Technical Report Journal. You receive 5 points for each days’ entry. Make sure that you sign yourself into class each day on the class list. When you complete a Checkpoint, you should check yourself off on the Checkpoint Sheet also kept in our classroom. 

**Students in need of accommodations:** Students who may need accommodations due to documented disabilities, who have medical information which the instructor should know, or who need special arrangements in an emergency, should speak with the instructor during the first week of class. If you have not accessed services and think you may need them, please contact Disability Services, 541-917-4789.

**Student Basic Needs Assistance:** Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Single Stop Office for support at [SinglestopatLBCC@linnbenton.edu](mailto:SinglestopatLBCC@linnbenton.edu) or 541-917-4877.