



# Teaching Extraordinary Students Lessons in Aerospace Arduino Uno/RedBoard and Avionics

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Name \_\_\_\_\_

Co-pilot's Name \_\_\_\_\_

Date started \_\_\_\_\_ Date Completed \_\_\_\_\_

**Materials:** Internet access, Composition book, Arduino, a computer

**Prerequisites:** The more electronics a student understands the easier this course will be.

**How to use this course checksheet:** The materials are carefully arranged in an exact sequence so you smoothly progress at your own pace. It is therefore important to follow the checksheet as closely as possible.

When you finish an item mark it off on the checksheet with your initials and the date and go on to the next one. Your initials beside an item on the checksheet means you know and can apply the material contained in that step or that you have done and can do that action or that your co-pilot is competent on that item.

**Build time:** You are expected to make stuff with arduino. Computers are only valuable if you can make them work. Your instructor may have a set goal or you can branch out and try interesting projects after completing this checksheet.

**Course Product:** A person who understands some basics of physical computing and has had fun building a project

**Additional Note:**

It is very important that students look up words they encounter as they study as this is known to bog down students. A student who has no misunderstood words will progress smoothly.

**Tips for successfully getting through this checksheet:**

Leave no word misunderstood. It is only misunderstood words that make a subject incomprehensible (not understood).

Take responsibility for yourself and your co-pilot.

Responsibility is very closely related to knowledge.

This is an exciting field to be part of and it starts with the fundamentals of electronics. Robotics and electronics takes problem solving skills and reasoning skills. The challenge of Arduino and making machines do stuff starts with getting lights to blink and can stretch out to colonizing Mars and beyond. Ready for blast off 3... 2... 1...!!!

**Section One**

1. Read the above and make sure it is well understood.

2. Define and clear the word “Physical Computing”

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Physical computing takes a hands-on approach, which means that you spend a lot of time building circuits, soldering, writing programs, building structures to hold sensors and controls, and figuring out how best to make all of these things work the way you want them to. There are a lot of projects possible when you understand physical computing, from making lights blink to landing a rocket vertically.

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3. Watch a SpaceX video of the first vertical landing. This is “avionics”. Which means electronics applied to aviation. If you did a project where you applied electronics to flight you are doing a specialized field called avionics. This is another example of physical computing.

4. Watch: <https://www.youtube.com/watch?v=60xluTO9waQ> This video explains some of the uses in exploring Mars.

5. Watch at least 10 minutes of video of Arduino projects. Write down three projects that you would consider doing.

6. Explain to your co-pilot your understanding of what an Arduino can do

7. Read:

[https://learn.sparkfun.com/tutorials/redboard-hookup-guide?\\_ga=1.249872070.1192952886.1487385800](https://learn.sparkfun.com/tutorials/redboard-hookup-guide?_ga=1.249872070.1192952886.1487385800) This read is essential to understanding Arduino. There are possibly many misunderstood words. Have fun with it and challenge yourself and your co-pilot to know them all.

8. Get ready, this can be the most frustrating part, installing software. Read <https://learn.sparkfun.com/tutorials/installing-arduino-ide> The great thing about this is you only have to do it once. Because there are a variety of Operating Systems in use and they are always updating them it is important to read the most up to date articles. Install the Arduino Integrated Design Environment (IDE program) and get an LED to blink. Show your

instructor that you can control LED patterns. This may also be added as an extension from the web.

Instructor Signature \_\_\_\_\_

9. Find 10 words in electronics that are misunderstood and fully clear them. List them in the space below:

9. Congratulations! Making LED's follow a pattern and turn on and off is a fundamental to turning on motors and sensors. This is what NASA does to make their rovers and avionics function on spacecraft. Research another sensor or motor that you would like to control. **Demonstrate** that you can program and control another sensor (input) or motor (output).

Instructor signature \_\_\_\_\_

10. Build an Arduino project or take on an instructor challenge.

Instructor signature \_\_\_\_\_

## Student Completion

I have completed the requirements of this checksheet and I know and can apply this material.

Student attest \_\_\_\_\_ Date \_\_\_\_\_

I have trained this student to the best of my ability. The student has completed the requirements of this checksheet and knows and can apply the checksheet data.

Teacher  
attest \_\_\_\_\_ Date \_\_\_\_\_