**Arduino for Neuroscientists (2018)**

***NBHVGR7040\_001\_2017\_3 - RESEARCH SKILLS FOR NEUROSCIENTISTS***

**Instructors:**

Clay Lacefield, Ph.D.

[col8@cumc.columbia.edu](mailto:col8@cumc.columbia.edu)

Wes Gruber (sponsor)

[wg2135@cumc.columbia.edu](mailto:wg2135@cumc.columbia.edu)

**Time/location:**

Fridays, 3-5pm

NYSPI Kolb Annex, 7th floor conference room

**Course Github (all course materials):**

<https://github.com/claylacefield/AfN.git>

**Syllabus**

***Oct. 12, 2018***

**AfN#1: Introduction, Simple Input/Output**

* Open-source hardware and software
* Why Arduino?
* Anatomy of an Arduino, “Blink”
* Simple Digital and Analog Inputs and Output
* IR beam break detector
* Open-Maze shields

***Oct. 19, 2018***

**AfN#2: Advanced Input/Output, communication protocols**

* Sensor input
  + Communications protocols: serial, I2C, SPI
* Analog output: PWM, tone()
* Digital output
  + Relays
  + Transistors
  + H-bridges
* Solenoid valves
* DC motors

***Oct. 26, 2018***

**AfN#3: Motors, computer interface, data logging**

* Motors:
  + DC motors
  + Position sensing
  + Servo motors
  + Stepper motors
* Data logging and plotting
  + SD card
  + Serial interface
  + String parsing and plotting (Python)
  + Internet protocols

***(NOTE: no class Friday, Nov. 2, for SfN)***

***Nov. 9, 2018***

**AfN#4: Advanced computer communication, behavioral setup demo**

* Webcams/video
  + Computer vision, motion tracking
* Visual stimuli (PsychoPy)
  + Bar grating visual discrimination task
* Behavioral setup demo
  + Freely moving operant box
  + Headfixed sensory operant
  + Headfixed treadmill/wheel

***Nov. 16, 2018***

**AfN#5: Student presentations**