

# 2019 Community Science Academy 2 Syllabus

*Held at Caltech from June 17 to July 26, 10 am to 3:30 pm, Mon/Wed/Fridays*

*Moore, Lecture Hall B270; Field, Caltech Athletic Center; Biolab = Braun Lab B-115*

*Students can arrive any time after 9 am. Please account for cleaning time before leaving.*

## **Week 1: Environmental monitoring**

Monday, June 17		
10:00am – 11:45am	Moore	Computing basics: following directions
11:45am – 12:45pm	Moore	Lunch
12:45pm – 2:00pm	Moore	Computing basics: a simple C program
2:00pm – 3:30pm	Moore	Computing basics: more on printing

Wednesday, June 19		
10:00am – 11:45am	Moore	Doing math: data types
11:45am – 12:45pm	Moore	Lunch
12:45pm – 2:00pm	Moore	Humanities 1: writing polite emails
2:00pm – 3:30pm	Moore	Doing math: variables

Friday, June 21		
10:00am – 11:45am	Moore	Controlling program flow: conditional expressions
11:45am – 12:45pm	Moore	Lunch
12:45pm – 2:00pm	Moore	Controlling program flow: loops
2:00pm – 3:30pm	Moore	Hack-a-thon: interactive graphics program

## **Week 2: Environmental monitoring (continued)**

Monday, June 24		
10:00 am – 11:45 am	Moore	Introduction to electronic circuits
11:45 am – 12:45 pm	Moore	Lunch
12:45 pm – 2:00 pm	Moore	Humanities 2: Improvisational comedy
2:00 pm – 3:30 pm	Moore	Building electronic circuits I

Wednesday, June 26		
10:00 am – 11:45 am	Moore	Building electronic circuits II
11:45 am – 12:45 pm	Moore	Lunch
12:45 pm – 2:00 pm	Moore	Introduction to microcontrollers
2:00 pm – 3:30 pm	Moore	Creating microcontroller projects

Friday, June 28		
10:00 am – 11:45 am	Moore	Introduction to sensors
11:45 am – 12:45 pm	Moore	Lunch
12:45 pm – 2:00 pm	Moore	Building environmental monitors
2:00 pm – 3:30 pm	Moore	Disaster notification sensor

### Week 3: Remote sensing

Monday, July 1		
10:00am – 11:45am	Moore	Sensor projects and presentations
11:45am – 12:45pm	Moore	Lunch
12:45pm – 2:00pm	Moore	Simple model of drag and laminar versus turbulent flow
2:00pm – 3:30pm	Moore	How wings work + virtual wind tunnel

Wednesday, July 3		
10:00am – 11:45am	Moore	Build a wing
11:45am – 12:45pm	Moore	Lunch
12:45pm – 2:00pm	Moore	Measuring lift
2:00pm – 3:30pm	Moore	Build and fly a kite

Friday, July 5		
10:00am – 11:45am	Moore	Humanities 3: writing scientific abstracts
11:45am – 12:45pm	Moore	Lunch
12:45pm – 3:30pm	Moore	Design and build a remote controlled (RC) kite

### Week 4: Remote sensing (continued)

Monday, July 8		
10:00am – 11:45am	Moore	Revise and fly an RC kite (field open at 10am)
11:45am – 12:45pm	Moore	Lunch
12:45pm – 2:30pm	Field	Revise and fly an RC kite
2:30pm – 3:30pm	Field	Revise and fly an RC kite

Wednesday, July 10		
10:00am – 11:45am	Field	Revise and fly an RC kite (add servos/camera/GPS)
11:45am – 12:45pm	Moore	Lunch
12:45pm – 1:30pm	Field	Revise and fly an RC kite (add servos/camera/GPS)
1:30pm – 3:30pm	Moore	Write up SKIES flight presentation

Friday, July 12 (Career Day)		
10:00am – 11:45am	Kerckhoff	Career seminar ( <b>joint with SRC</b> )
11:45am – 12:45pm	Moore	Lunch + flight presentations
12:45pm – 3:30pm	Moore	Humanities 4: Poster presentations

## Week 5: Bacterial detection

Monday, July 15		
10:00am – 11:45am	Biolab***	Safety lecture @ Biomolecular lab – closed-toed shoes, long pants, no contact lenses, hair up! Pouring LB plates. (TAs need to make LB agar solution in advance)
11:45am – 12:45pm	Courtyard	Lunch
12:45pm – 2:00pm	Biolab	Collection and culturing of bacterial samples
2 pm – 3:30 pm	Biolab	Prokaryotes vs eukaryotes: making bread

Wednesday, July 17		
10:00am – 11:45am	Biolab	Isolating single colonies
11:45am – 12:45am	Steele	Lunch & Caltech faculty seminar ( <b>joint with SRC</b> )
12:45 pm – 1:30 pm	Biolab	Microscopy
1:30 pm – 3:30 pm	Biolab	Bacterial imaging

Friday, July 19		
10:00am – 11:00am	Biolab	Propagating to liquid and EMB plates
11:00am – 11:45pm	Biolab	Lesson on bacterial metabolism
11:45am – 12:45pm	Courtyard	Lunch
12:45 pm – 2:30 pm	Biolab	Yogurt
2:30 pm – 3:30 pm	Biolab	Lab prep

## Week 6: Bacterial detection (continued)

Monday, July 22		
10:00am – 11:45am	Biolab	Biochemical testing of bacteria using API test kits
11:45am – 12:45am	Courtyard	Lunch
12:45 pm – 1:30 pm	Biolab	Lesson on polymerase chain reaction
1:30 pm – 3:30 pm	Biolab	DNA extraction + polymerase chain reaction

Wednesday, July 24		
10:00am – 11:45am	Biolab	Humanities 5: threshold crossing
11:45am – 12:45pm	Biolab	Lunch ( <i>lecture during lunch</i> )
12:45pm – 3:30pm	Biolab	Gel electrophoresis + submission for sequencing

Friday, July 26		
10:00am – 11:45am	Biolab	Analysis of API test kit results; review of sequencing results + BLAST search.
11:45am – 12:45pm	Biolab	Lunch ( <i>students present</i> )
12:45pm – 2:00pm	Biolab	Continue biochemical and genetic analysis. Write up of bacterial results.
2:00 pm – 3:30 pm	CTLO	Final wrap-up and graduation