

Syllabus for Community Science Academy 3

Held at Caltech from June 19 to July 28, 10 am to 3:30 pm, Mon/Wed/Fridays

Week 1: Digital signals and sensors

Monday, June 19		
10:00 am – 11:30 am	Spalding	Safety lecture and lab tour -- <i>closed-toed shoes, long pants, no contact lenses, hair up!</i>
11:30 am – 12:30 pm	CTLO	Lunch
12:30 pm – 1:30 pm	Spalding	How noses work
1:30 pm – 3:30 pm	Spalding	Your first electronic nose

Wednesday, June 21		
10:00 am – 11:30 am	Spalding	Review of circuits
11:30 am – 12:30 pm	CTLO	Lunch
12:30 pm – 2:30 pm	Spalding	Measuring a resistance and voltage dividers
2:30 pm – 3:30 pm	Spalding	Humanities 1: TBD

Friday, June 23		
10:00 am – 11:30 am	Spalding	Amplifying a signal
11:30 am – 12:30 pm	CTLO	Lunch
12:30 pm – 1:30 pm	Spalding	Fiber optic communications
1:30 pm – 3:30 pm	Spalding	Optical telegraph challenge

Week 2: Digital signals and sensors (continued)

Monday, June 26		
10:00 am – 11:30 am	Spalding	Analog to digital conversion
11:30 am – 12:30 pm	CTLO	Lunch
12:30 pm – 2:00 pm	Spalding	Building an A/D converter
2:00 pm – 3:30 pm	Spalding	Students create video explanations of core concepts

Wednesday, June 28		
10:00 am – 11:30 am	Spalding	Humanities 2: TBD
11:30 am – 12:30 pm	CTLO	Lunch
12:30 pm – 3:30 pm	Spalding	Project: portable chemical detector

Friday, June 30		
10:00 am – 11:30 am	Spalding	Project: portable chemical detector
11:30 am – 12:30 pm	CTLO	Lunch (<i>students present</i>)
12:30 pm – 3:30 pm	Spalding	Prepare + give chemical detector presentations

Week 3: Patterns and recognition

Monday, July 3		
10:00 am – 11:30 am	Spalding	Arduino microcontroller review (incl. voltage regulator)
11:30 am – 12:30 pm	CTLO	Lunch
12:30 pm – 3:30 pm	Spalding	Arduino-based chemical detector

Wednesday, July 5		
10:00 am – 11:30 am	Spalding	Dew point generator
11:30 am – 12:30 pm	CTLO	Lunch
12:30 pm – 2:00 pm	Spalding	Creating a humidity meter with Honeywell sensor
2:00 pm – 3:30 pm	Spalding	Humanities 3: TBD

Friday, July 7		
10:00 am – 11:30 am	Spalding	Calibrating a DIY humidity sensor; resistance-humidity relations
11:30 am – 12:30 pm	CTLO	Lunch
12:30 pm – 3:30 pm	Spalding	Creating a humidity meter with nose-type sensor

Week 4: Patterns and recognition (continued)

Tuesday, July 10		
10:00 am – 11:30 am	Spalding	Fabricating multiple sensors
11:30 am – 12:30 pm	Chandler	Lunch
12:30 pm – 3:30 pm	Spalding	Multiple sensor chemical detector

Wednesday, July 12		
10:00 am – 11:30 am	Spalding	Chem-o-dex challenge: multiple sensors + event triggers
11:30 am – 12:30 pm	Chandler	Lunch
12:30 pm – 1:30 pm	Spalding	Chem-o-dex challenge

Friday, July 14 (Career Day)		
10:00 am – 11:30 am	CTLO	Career seminar (joint with SRC)
11:30 am – 12:30 pm	CTLO	Lunch
12:30 pm – 3:30 pm	Spalding	Humanities 4: TBD

Week 5: Molecules and engineered sensors

Monday, July 17		
10:00 am – 11:30 am	Spalding	Flavor molecules and functional groups
11:30 am – 12:30 pm	Courtyard	Lunch
12:30 pm – 2:00 pm	Spalding	Molecular recognition and binding
2:00 pm – 3:30 pm	Spalding	Lab tour (TBD)

Wednesday, July 19		
10:00 am – 11:15 am	Spalding	Introduction to polymers: nylon experiment
11:30 am – 12:30 am	Noyes	Lunch & Caltech faculty seminar (joint with SRC)
12:45 pm – 2:15 pm	Spalding	Instant snow and molecular gastronomy
2:15 pm – 3:30 pm	Spalding	Polymer dissolving trials and molecular thermodynamics

Friday, July 21		
10:00 am – noon	Spalding	Humanities 5: related to design of project
12:15 am – 1:15 pm	Spalding	Lunch
1:30 pm – 3:30 pm	Spalding	Custom molecular sensor project

Week 6: Molecules and engineered sensors (continued)

Monday, July 24		
10:00 am – 11:30 am	Spalding	Custom molecular sensor project
11:30 am – 12:30 pm	Courtyard	Lunch
12:30 pm – 3:30 pm	Spalding	Custom molecular sensor project

Tuesday, July 25		
1 pm – 5 pm	Spalding	Free lab day

Wednesday, July 26		
10:00 am – noon	Spalding	Custom molecular sensor project
Noon – 1 pm	Courtyard	Lunch
1 pm – 3:30 pm	Spalding	Custom molecular sensor project

Friday, July 28		
10:00 am – 11:30 am	Spalding	Custom molecular sensor project
11:30 am – 12:30 pm	Courtyard	Lunch
12:30 pm – 2:00 pm	Spalding	Custom molecular sensor project
2:00 pm – 3:30 pm	CTLO	Final wrap-up and graduation