

2019 Community Science Academy 1 Syllabus

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

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

Week 1: Water quality and marine ecosystems

Monday, June 17		
10:00 am – 10:30 am	CTLO	Introduction + nitrogen cycles
10:30 am – 11:30 am	CTLO	Nitrogen cycles + building molecules
11:30 am – 12:30 pm	CTLO	Lunch
12:30 pm – 1:30 pm	CTLO	Finish nitrogen cycle
1:30 pm – 3:30 pm	CTLO	Design + build aquariums, and take first measurements

Wednesday, June 19		
10:00 am – 11:30 am	CTLO	Dye challenges 1, 2, and 3: baking cookies
11:30 am – 12:30 pm	CTLO	Lunch + aquarium measurement demo
12:30 pm – 1:30 pm	CTLO	Finish dye challenges
1:30 pm – 2:30 pm	CTLO	Students create video explanations of core concepts
2:30 pm – 3:30 pm	CTLO	Take aquarium measurements

Friday, June 21		
10:00 am – 11:30 am	CTLO	How color works + DIY colorimetry
11:30 am – 12:15 pm	CTLO	Lunch
12:15 pm – 2:00 pm	CTLO	More DIY colorimetry + aquarium measurements
2:00 pm – 3:30 pm	CTLO	Humanities 1: organizing ideas into a story

Week 2: Water quality and marine ecosystems (continued)

Monday, June 24		
10:00 am – 10:45 am	CTLO	Beer's Law
10:45 am – 11:30 am	CTLO	Logarithms and standard curves
11:30 am – 12:15 pm	CTLO	Lunch
12:15 pm – 1:15 pm	CTLO	How many drops of dye are in a packet of Kool-Aid?
1:15 pm – 2:00 pm	CTLO	Aquarium measurements
2:00 pm – 3:30 pm	CTLO	Humanities 2: creating a persuasive argument

Wednesday, June 26		
10:00 am – 11:30 am	CTLO	Collect samples; clean aquariums; analyze samples
11:30 am – 12:30 pm	CTLO	Lunch + making a great presentation
12:30 pm – 2:00 pm	CTLO	Finish analyzing samples + record video explanations
2:00 pm – 3:30 pm	CTLO	Prepare aquarium presentations

Friday, June 28 (Aquarium Theme Park)		
9:00 am – 10:00 am	CTLO	(optional) Quantitative watercolors
10:00 am – 11:30 am	CTLO	Humanities 3: aquarium theme park
11:30 am – 12:30 pm	CTLO	Lunch + aquarium presentations
12:30 pm – 3:30 pm	CTLO	Humanities 3: aquarium theme park

Week 3: Pest control

Monday, July 1		
9:00 am – 10:00 am	CTLO	Theme park tours and cleanup
10:00 am – 11:30 am	CTLO	Designing an ant farm; collective behavior
11:30 am – 12:30 pm	CTLO	Lunch
12:30 pm – 3:30 pm	CTLO	Plan experiments, build ant farm, take initial data

Wednesday, July 3		
9:00 am – 10:00 am	CTLO	(optional) DIY microscope + telescope
10:00 am – 11:00 am	CTLO	Principles of refractive optics
11:00 am – 11:30 am	CTLO	Imaging with lenses (pinhole materials = homework)
11:30 am – 12:00 pm	CTLO	Lunch
12:00 pm – 12:30 pm	CTLO	Camera lenses and film chemistry
12:30 pm – 3:30 pm	CTLO	Optics exercises + human camera

Friday, July 5		
10:00 am – 11:10 am	CTLO	Principles of diffractive optics
11:10 am – 11:30 am	CTLO	Pedagogy basics
11:30 am – 12:30 pm	CTLO	Lunch
12:30 pm – 3:30 pm	CTLO	Create lessons on interference, diffraction, and holography

Week 4: Pest control (continued)

Monday, July 8		
10:00 am – 11:30 am	CTLO	Students teach each other
11:30 am – noon	CTLO	Lunch
Noon – 12:30 pm	CTLO	Making holograms demo
12:30 pm – 2:00 pm	CTLO	Making holograms (A) + analyze ant colonies + telling a story (B)
2:00 pm – 3:30 pm	CTLO	Making holograms (B) + analyze ant colonies + telling a story (A)

Wednesday, July 10		
9:00 am – 10:00 am	CTLO	Hologram open seating
10:00 am – 11:30 am	CLTO	Prepare ant presentations + extra time for holograms
11:30 am – 12:30 pm	CTLO	Lunch
12:30 pm – 1:30 pm	CTLO	Ant colony presentations
1:30 pm – 3:30 pm	CTLO	Humanities 4: jobs of the future

Friday, July 12 (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 – 2:00 pm	CTLO	Humanities 5: creating a job description
2:00 pm – 3:30 pm	CTLO	Humanities 6: creating a cover letter

Week 5: Plant processing

Monday, July 15		
10:00 am – 11:30 am	Mead	Safety lecture @ Mead labs – closed-toed shoes, long pants, no contact lenses, hair up!
11:30 am – 12:30 pm	Mead	Lunch
12:30 pm – 3:30 pm	Mead	Theory of extraction + isolate dyes from blueberries and carrots

Wednesday, July 17		
10:00 am – 11:15 am	Mead	Theory of chromatography + student video skits
11:30 am – 12:30 am	Noyes	Lunch & Caltech faculty seminar (joint with SRC)
12:45 pm – 3:30 pm	Mead	Spinach chromatography

Friday, July 19		
10:00 am – 11:30 am	Mead	Growing crystals
11:30 am – 12:30 pm	Mead	Lunch + liquid nitrogen ice cream
12:30 pm – 3:30 pm	Mead	Distillation of orange oil

Week 6: Plant processing (continued)

Monday, July 22 (Free Lab Day)		
10:00 am – 11:30 am	Mead	Complete orange oil + crystals. Free lab day!
11:30 am – 12:30 pm	Mead	Lunch
12:30 pm – 3:30 pm	Mead	Free lab day

Wednesday, July 24		
10:00 am – 11:30 am	Mead	Salicin digestion with willow bark
11:30 am – 12:30 pm	Mead	Lunch
12:30 pm – 3:30 pm	Mead	Extraction of salicylic acid

Friday, July 26		
10:00 am – 11:30 am	Mead	Acetylation to produce aspirin
11:30 am – noon	Mead	Lunch
Noon – 12:30 pm	Mead	Free lab day presentations
12:30 pm – 1:45 pm	Mead	Acetylation to produce aspirin
2:00 pm – 3:30 pm	CTLO	Final wrap-up and graduation