

Cross-curricular Robotics Summer Camps

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Who are we?

The Southeastern Center of Robotics Education (S.C.O.R.E) is a partnership between the College of Sciences and Mathematics and Samuel Ginn College of Engineering at Auburn University.

We aim to inspire and prepare future generations of STEM professionals by developing and delivering student robotics programs, online robotics resources, and professional development for educators.



Why teach with Robots?

- **Using robots hits on the four critical areas 21st Century Skills**
 - **Collaboration and teamwork.**
 - **Creativity and imagination.**
 - **Critical thinking.**
 - **Problem solving.**



- **Encompasses the ISTE Standards for Students**

- **Empowered Learner**
- **Digital Citizen**
- **Knowledge Constructor**
- **Innovative Designer**
- **Computation Thinker**
- **Creative Communicator**
- **Global Collaborator**



- **And so much more**
 - **Prepares them for the future**
 - **Failure**
 - **Caters to a wide range of students**
 - **Engagement**
 - **Perseverance**
 - **Workforce development**
 - **Increases rigor**



So you want to run a robotics camp? Where to start?

Pre-camp

- **Logistics planning**
 - **Choose dates**
 - **Plan daily schedule**
- **Book location**
 - **Classroom type environment**
 - **Be sure to have the proper equipment**
- **Hire staff**
 - **Instructors**
 - **Room directors**
 - **Counselors**

So you want to run a robotics camp? Where to start?

Pre-camp

- **Meet with instructors to discuss lesson plans and activities**
 - **Potential robotics camp ideas include**
 - Rube Goldberg
 - VEX-IQ
 - Drone
 - 3D Printing

So you want to run a robotics camp? Where to start?

During camp

- **Daily schedule**
- **Give your staff staggered scheduled breaks**
- **Effective communication**
 - **Parents: Remind App, calls home when necessary**
 - **Staff: Walkie Talkies/Texting/Phone calls**
- **Keep a positive attitude!**

Half Day Rube Goldberg Day Camp

- Engage students in creative thinking to solve simple tasks with common materials
 - **Focus: Encourage collaborative and creative thinking to develop the future STEM workforce**



Half Day Rube Goldberg Day Camp Agenda

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8:30am	Morning Drop-off				
9:00am	OK-go Music Video & Rube Goldberg Kits	OK-go Timing Is Everything Challenge & Data Collection	OK-go Flipbook & Paper Flipbook	Rube Planning & Rube Sketch	Finish Rubes/Merge Cubes/ Free Play
10:00am	Break with Snack				
10:30am	Dash Safety Crash Course	Spheros	Motors & Simple Machines & VEX Freeze Tag	Individual Rube	Combining Rubes
12:00pm	Morning Pick-up				
12:30pm	Afternoon Drop-off				
1:00pm	Ok-go Music Video & Rube Goldberg Kits	OK-go Timing Is Everything Challenge & Data Collection	OK-go Flipbook & Paper Flipbook	Rube Planning & Rube Sketch	Finish Rubes/Merge Cubes/ Free Play
2:00pm	Break with Snack				
2:30pm	Dash Safety Crash Course	Spheros	Motors & Simple Machines & VEX Freeze Tag	Individual Rube	Combining Rubes
4:00pm	Afternoon Pick-up				

Full Day VEX IQ Day Camp

- **VEX IQ is a snap-together robotics system**
 - **Focus: Students learn the basics of designing a robot with open-ended challenges and competition**



Full Day VEX IQ Day Camp Agenda

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8:30am	Morning Drop-off				
9:00am	Introduce camp staff, play get to know you games, organize into pairs, rotation assignments	Intro to program robot, how to set robot in RobotC, download code, driving system, programming robot to move autonomously.	Free build - work on tournament design, check before break	Drivers skills and free build for 30 mins each	Rotation assessment, post-test and Free build for 30 min
10:00am	Break with Snack				
10:30am	Intro Squared Away, show video, go over rules, explain three areas of competition, Record in eng. notebook	Autonomous maze, intro pseudocode, after maze program robot to pick up game piece and move to scoring position, try from both starting boxes.	Brainstorm autonomous strategy, estimate what tasks can be done in each 20s time interval	Free build	Free build and practice
11:00am	Brainstorm strategy for clawbot between partners, estimate what tasks can be done in each of (3) 20 sec intervals.		Program autonomous skills		
11:30am	Lunch				
12:15pm	Modify training bots into claw bots. Steps 1-38, 49-57 pre-made, 58-87, stop for build check at step 52 and 63	Mechanisms: build 4 bar, 6 bar linkages, Linear slide (30 min), Intakes: rubber band drum, two-motor intake, passive rubberband intake	Free build	Teamwork strategy: brainstorm - estimate what tasks can be done in each 20s time interval, think of different strategies based on what robots you expect to see	Qualification Matches

Full Day VEX IQ Day Camp Agenda

1:00pm				Teamwork scrimmages	
1:45pm	Break with Snack				
2:00pm	Finish claw bot	Finish and share mechanisms	Free build	Free build, program, practice	Finals
2:30pm	Try different strategies from the brainstorm above, record all runs in eng. notebook, experiment with different driver order.	Engineering design process: functional decomposition, physical decomposition			Clean-up
3:00pm		Brainstorm 3 different ideas, sketch them out, how to sketch (include dimensions, labels, different views), pro/cons list	Brainstorm driver's skills strategy: estimate what tasks can be done in each 20s time interval		Awards
3:30pm	Freezetag	Free build	Drivers skills	Skills runs	
4:00pm	Afternoon Pick-up				

Full Day Drone Camp

- **Introduces the world of drones in a fun, engaging and collaborative environment**
 - **Focus: Teaching students basics of drone flight, piloting and programming**



Full Day Drone Camp Agenda

Time	Monday	Tuesday	Wednesday	Thursday
8:30am	Morning Drop-off			
9:00am	Introduce camp staff, initial assignments, eng. design/sci. method	Drone anatomy, drones and engineering fields, angle of attack vs speed inquiry	Drone choreo	Practice course
10:00am	Break with Snack			
10:15am	Drone safety/rules, explore drone app, free fly, gliders center of gravity inquiry activity	Angle of attack vs speed cont., practice manually docking ISS	Obstacle practice/build new obstacles/perform choreo	Stations
11:30am	Lunch			
12:15pm	Drone center of gravity, introduce obstacle course challenge, tool safety, build landing pads, practice landing in pads	Program in Tynker to land/dock on ISS, build obstacles	Robotics lab tour and activities, FPV flying for return campers	Obstacle course
2:00pm	Break with Snack			
2:15pm	ISS Engineering docking challenge	Load vs. battery life inquiry	Drone recon and camera	Final assessments/ awards
3:30pm	Wrap up/clean up/charge batteries			
4:00pm	Afternoon Pick-up			

Full Day 3D Printing Camp

- **Introduces 3D printing to students in a collaborative environment.**
 - **Focus: Students develop the ability to use 3D Printing as a tool for designing and prototyping a product.**



Full Day 3D Printing Camp

Agenda

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8:00am	Morning Drop-off				
8:30am	Intros: Name, grade, favorite Avenger/Robot; Parts of a 3D printer, Coordinate system, safety and rules	Check overnight prints and free design in TinkerCAD			
9:00am	Intro to Prusa MK3: LCD, parts, navigating menu, first layer calibrations (take turns)	Filament change tutorial	Explore Thingiverse for medium print for Thurs.	Printing infills	Creating 3D images from pictures
9:30am		Color change tutorial: Make two-tone coin with initials			
10:00am	Break with Snack				
10:30am	PrusaControl: How to navigate slicer, quality settings, slicing test cube	Print Troubleshooting	Printing with supports, print support test file	Design fidget spinner	3D Pen Collage
10:45am	Spatial Assessment				
11:15am		Explore Thingiverse No supports	Explore Thingiverse	Explore Thingiverse	
11:45am	Lunch				
1:00pm	Select print from fast print list. Slice and print.	3D Printing Pens: Techniques, explore, cube	Editing STLs in TinkerCAD	Lithophanes: Preparing pictures	How thermistors work: Multimeter activity
1:30pm	Creast TinkerCAD accounts/7 basic tutorials				

Full Day 3D Printing Camp

Agenda

2:00pm	Break with Snack				
2:15pm	Headphone wrap tutorial; Print second fast print; Change filament and print headphone wraps	Thingiverse/TinkerCAD; Overnight print (6 hours for 2 person group, 4 hours for 3 person group)	Thingiverse/TinkerCAD/3D Printing pens; Overnight print (6 hours for 2 person group, 4 hours for 3 person group, including supports)	Print Lithophanes	3D Pens/MAKE Magazine/TinkerCAD
2:30pm					Zombie Freeze Tag
3:00pm					
3:30pm	Clean up	Clean up	Clean up	Clean up	Clean up
4:00pm	Afternoon Pick-up				

So you want to run a robotics camp? Where to start?

Post-camp

- **Surveys**
 - **Staff: What worked? What didn't?**
 - **Parent: Favorite classes? Suggestions?**
- **Keep in contact with staff for future**
- **Clean up**
 - **Restock supplies for next time**
 - **Shred paperwork with sensitive material**