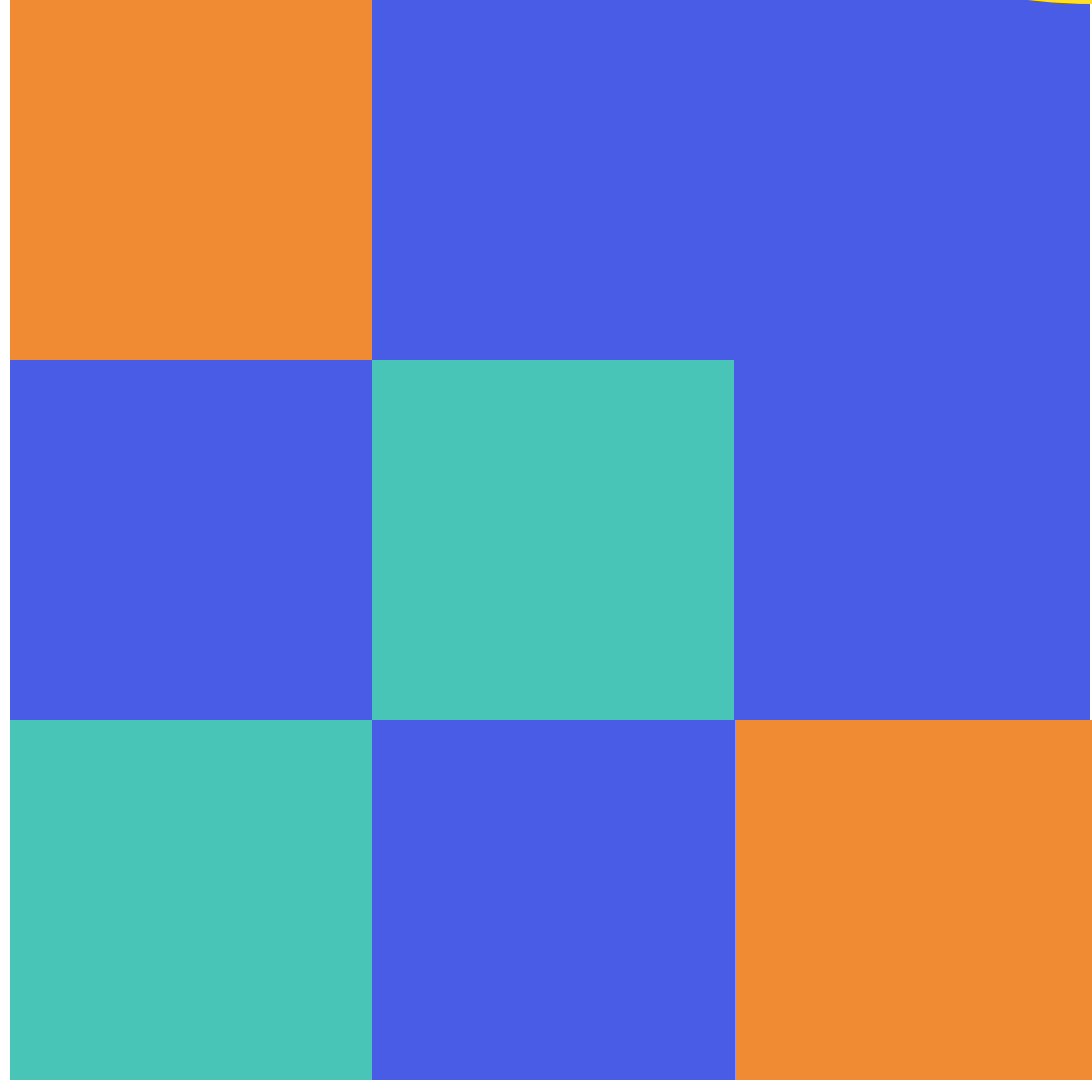




Information & Schedule

High School
STEPCON
Learning
Modules





Learning Modules

The STEP Board invites you to enjoy an amazing STEM virtual event October 5th-9th & 16th, hosted by the Marlan and Rosemary Bourns College of Engineering (BCOE) and the Center for Environmental Research & Technology (CE-CERT). During this week-long learning module series your class will interact with UCR researchers and students, and industry representatives. This hands-on series will teach high school students about smart cities & transportation, microgrids, clean air sensors, or AI and security. The series will be followed by a live awards ceremony on October 16th, highlighting the top projects!



Learning Modules + Faculty




● **Smart Cities & Transportation**


In this training module, students will learn about connected and automated vehicles, and the role they could play to eliminate congestion and improve air quality. They will learn about some of the fundamental “behaviors” that connected and automated vehicles need to have, for example, how to automatically stay in a lane (lane-keeping) and how to follow other vehicles without crashing (automated car-following). They will get a chance to interact and program these basic behaviors using an online vehicle simulator and see how this affects traffic flow. The students that have the best results using the vehicle simulator will get a chance to program real-world 1/10th scale connected and automated vehicles on a test track.

● **Matt Barth**

Matt Barth is the Director of CE-CERT, UCR. His research focuses on applying engineering system concepts and automation technology to Transportation Systems, Vehicle Activity Analysis, Transportation/Emissions Modeling, Electric Vehicle Technology, and Advanced Sensing and Control. He is also very active within IEEE Transportation System Society. He received his PhD in Electrical and Computer Engineering from UC Santa Barbara.



Learning Modules + Faculty



● **Artificial Intelligence & Security**

Machine learning is an essential component in today's decision making systems. In this training module, students will be introduced to the basic principles of machine learning, how machine learning is used in real-world applications, and their vulnerabilities. Finally, students will learn to train a simple machine learning model using Python programming language. This training modules requires a laptop with internet connection. All programs and datasets will be publicly available.

● **Basak Guler**

Basak Guler is an Assistant Professor of Electrical and Computer Engineering at University of California, Riverside. She has received her PhD from the Pennsylvania State University in 2017, and was a postdoctoral scholar at University of Southern California between 2018-2020. Her research interests include machine learning in wireless networks, information theory, distributed computing, and graph signal processing.



Learning Modules + Faculty




● Microgrids


California is utilizing more clean renewable energy for a sustainable future. Solar and wind are intermittent, which requires Battery Storage (BES) to make renewables a consistent source of electricity. To deploy renewable energy sources throughout the electrical grid, CE-CERT faculty and students use various microgrid configurations. In this module high school students will be introduced to functioning MicroGrids and use simulation software to play out various scenarios including rotating blackouts.

● Sadrul Ula

Dr. Sadrul Ula is a Research Faculty at CE-CERT, his area of expertise is electric power generation, transmission, distribution and utilization, including renewable energy integration into the grid. He is a PI and Co-PI of multiple ongoing and completed federal, state, and industry funded projects, which have received over \$12 million in funding. These projects have employed energy efficiency improvements in solar PV, battery energy system, electric vehicle chargers and industrial motor systems. Over the last 11 years at UCR, he designed and implemented a number of microgrid systems including a unique microgrid/smartgrid testbed with plug and play capability with the ability to implement and validate various Hardware in Loop (HiL) scenarios.



Learning Modules + Faculty



Clean Air Sensors *Registration Closed

In this training module, students will learn about air quality in the Southern California region and then they will build a low cost sensor that measures an important pollutant – particulate matter. This involves coding in a raspberry pi environment and various data collection activities. Participation in this learning module requires the purchasing of air quality kits.

*If your class would like to sign up for this module in the future please contact Nicole Cleary at nicole@enr.ucr.edu



Nicole Cleary

Nicole began her career as a research scientist at UCR, served as the vice-president for the International Sustainable Systems Research Center and as a consultant to the CEC. She now serves as the Deputy Director for CE-CERT where she oversees day-to-day operations, working towards CE-CERT's mission to solve the most pressing environmental issues in our region by innovating technology and educating the next generation of engineers.



Important Dates

Educator Orientation **September 16th 3:00-4:00**

The educator orientation will allow us to outline outcomes and expectations, as well as provide an opportunity to educators to ask any preliminary questions regarding the learning modules. This will be recorded for those who cannot attend.

Learning Module Website **September 28th**

The full learning module website will go live on September 28th to give teachers (and students) access to the materials before the kick-off.

STEPCON Week! **October 5th-9th**

During this week students will actively participate in their learning module through a pre-recorded introduction and lessons videos. Students will also have the opportunity to meet with UCR grad students to discuss their project.

STEPCON Live K-12 Platform **October 8th - All Day**

Your class can register for the all-day k-12 STEPCON event which is similar to the past conferences, just virtual! Please note that this is a separate registration. www.stepconference.org

Projects Due **October 9th**

Students will submit their final learning module project to their teacher.

Project Submission to Faculty **October 12th**

Teachers will submit their top 3 projects to their learning module faculty member, for a chance to be announced as the top 3 during the awards ceremony on October 16th.

STEPCON Awards Ceremony **October 16th 12:00 PM - 1:15 PM**

The awards ceremony will feature each faculty member from each learning module. The faculty will announce their top three picks from the project. We will also have an exciting guest speaker! This will be recorded for classes that cannot attend.



Sample Calendar

*Please note that these modules can be done at your own pace, and all materials will be available Sept. 28th - October 8th. This sample calendar's intention is to add context to the project. Please do not feel limited to this example.

Monday October 5

- Kick-off video
- First lesson
- Begin project:
Homework

Tuesday October 6

- Live Q&A with
Grad Students
- Continue to work
on project

Wednesday October 7

- Second lesson
- Homework

Thursday October 8

- Live Q&A with
Grad Students
- Work towards
completion

Friday October 9

- Projects due