

# ARRL Teachers Institute on Wireless Technology

**Igniting STEM and taking advantage of new opportunities for Amateur Radio in the classroom.**

Emphasis on STEM (science, technology, engineering, and mathematics) is generating much interest and investment in education today. Teachers and schools are looking for ways to provide students with hands-on, project-based learning in these content areas, creating new opportunities for Amateur Radio in classrooms throughout the US.

ARRL's Teachers Institute on Wireless Technology ([www.arrl.org/ti](http://www.arrl.org/ti)) is an expenses-paid professional development experience that equips teachers with tools and strategies to introduce basic electronics, radio science, satellite communication, remote sensing and data analysis, an introduction to microcontrollers, and basic robotics in their classrooms.

## Sessions in 2016

In the summer of 2016, the ARRL Education & Technology Program (ETP — [www.arrl.org/education-technology-program](http://www.arrl.org/education-technology-program)) will offer three introductory Teachers Institute (TI-1) sessions and one advanced (TI-2) workshop. "Introduction to Wireless Technology" (TI-1) workshops will be hosted by Parallax, our robotics partner, in Rocklin, California, and at ARRL Headquarters in Newington, Connecticut. A third donor-sponsored session will be hosted by the Douglas County STEM School and Academy in Highlands Ranch, Colorado, for teachers along the Denver front range.

### 2016 Teachers Institute Schedule Application Deadline for All Sessions is May 1, 2016

Date	Location
<b>TI-1 Introduction to Wireless Technology</b>	
June 20 – 24, 2016	Parallax, Inc, Rocklin, CA
July 25 – 29, 2016	ARRL Headquarters, Newington, CT
<b>TI-2 Remote Sensing and Data Gathering</b>	
July 18 – 21, 2016	Dayton Amateur Radio Association, Dayton, OH

This year, we are expanding the TI-1 training to 5 days to offer greater opportunities for participants to share ideas and strategies for integrating content into their classrooms (or curriculum).

An advanced "Remote Sensing and Data Gathering" (TI-2) seminar will also be offered, hosted by the Dayton Amateur Radio Association in Dayton, Ohio. The introductory TI-1 course is a prerequisite.

The 4-day TI-2 course begins with a discussion of analog-to-digital conversion and data sampling. It includes a demonstration of gathering telemetry data from the Fun-Cube satellite and a discussion of applications of the data to math and science topics.

TI-2 participants will each construct a marine research buoy outfitted with sensors for measuring air and water temperature and pressure. The buoy also includes a GPS receiver and an Amateur Radio transceiver, all managed by a PICAXE microcontroller. Participating teachers will learn how sensor measurements are converted to usable information about the environment, as well as how to program the microcontroller to sample the data, configure it for Automatic Packet Reporting System (APRS) transmission, and receive and upload it to *Excel* for evaluation and analysis.

The buoy is designed for classroom use as well as for easy deployment in local bodies of water. Teachers can reconfigure the buoy system components for use in other remote sensing scenarios, such as weather stations and balloon launches.

TI-2 attendees also learn to use the Boe-Bot® robot provided in the introductory workshop for MAREA — Mars Lander Amateur Radio Robotic Exploration Activity — operation. (Read more about MAREA at [www.arrl.org/marea](http://www.arrl.org/marea).)

After attending the Teachers Institute, one teacher said, "This is an excellent experience for instructors at any level. The exposure to potential curriculum content, coupled with



Teachers program their robots to participate in a "conga line" exercise. [Andy Lindsay, photo]

real world applications that add a grounding to what can at times be difficult, dry, and/or boring topics, is priceless."

## How to Apply

The Teachers Institute is open to teachers of grade levels 4 – 16. We look for teachers who have a vision of how to apply Teachers Institute training in their classroom. Interested teachers will find more details and an application to download on our website at [www.arrl.org/ti](http://www.arrl.org/ti).

## Support ARRL's School Outreach

To date, the ARRL's Education & Technology Program has provided resources, including radio equipment and training, to more than 650 teachers and 570 schools. Sustaining support from the Dayton Amateur Radio Association and in-kind support from Ham Radio Outlet, Yaesu, and Parallax, as well as individual donors, makes this program possible. Your contribution in support of ARRL's efforts to promote Amateur Radio in schools and to provide professional development for teachers in wireless technology is welcome ([www.arrl.org/education-and-technology-fund](http://www.arrl.org/education-and-technology-fund)).