



# Summer 2015



The Teacher Research Academy (TRA) offers middle school, high school and community college faculty unique professional development experiences at Lawrence Livermore National Laboratory (LLNL). TRA teachers participate in instruction, aligned with the Common Core and Next Generation Science Standards, enabling them to progress from novice to mastery in exciting scientific disciplines while they apply real-world science and engineering practices.

## TRA Teacher Outcomes:

- Gain increased understanding of science, technology, engineering and math aligned with NGSS requirements
- Improved ability to provide students a context to understand how science is applied
- Improved ability to guide student research

## TRA Activities:

- Meet LLNL scientists
- Visit research laboratories
- Learn how to apply Common Core technical communication skills
- Learn how to use cutting edge science equipment, processes, practices found in research laboratories

## TEACHER RESEARCH INTERNSHIPS:

- 8 week program, Jun-Aug, in any workshop area
- Register online: [education.llnl.gov](http://education.llnl.gov)
- You must be a US citizen to attend
- \$20 fee/workshop

Graduate course credit available through CSU East Bay  
Continuing education credit available through CSU Chico

## LOCATION:

Edward Teller Education Center (B6675)  
Off Greenville Rd at East Gate Drive  
Lawrence Livermore National Laboratory  
Livermore, CA 94550

## TIME:

8:30AM – 3:30PM DAILY

## CONTACT US:

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## Biotechnology



Level I Jun 15-18  
Level II Jun 22-26  
Level III Jul 6-10

## Fusion/Astrophysics



Level I Jul 6-8  
Level II Jul 13-17  
Level III Jul 6-10

## Technical Writing



Jun 18-19

## Computational Modeling



Level I Jun 15-19  
Level II Jun 22-26  
Level III Jul 27-31

## 3D Print & Design



Jul 13-15

## TEACHER RESEARCH ACADEMY DESCRIPTIONS



**BIOTECH Level-I** provides an overview of the field of biotechnology with instruction on basic biotechnology tools to include: DNA extraction, Gel Electrophoresis, Restriction Digest, Bacterial Transformation, and Protein Chromatography.

**BIOTECH Level-II** This workshop provides teachers with skills and knowledge in evolution, genetics and immunology through inquiry, investigation and experimentation. The instruction includes PCR, Protein analysis using Western Blotting, and Bioinformatics.

**BIOTECH Level-III** This workshop prepares teachers to work as members of a research team. Participants develop their understanding of the nature of science, research strategies and methods, and technical writing.



**FUSION ASTROPHYSICS Level-I** This workshop provides an overview of the fields of fusion research, astrophysics, and atomic physics. Through hands-on activities, teachers will learn the properties of electromagnetic radiation and spectroscopy to develop knowledge about the Sun and fusion reactors.

**FUSION ASTROPHYSICS Level-II** This program provides instruction in intermediate and advanced astrophysics such as classical gravitational physics and General Relativity. Teachers will develop an understanding of electromagnetism and nuclear physics through hands-on activities using tools employed in research laboratories.



**COMPUTATIONAL MODELING Level-I** This program is designed to introduce the concepts behind computer modeling and simulation with real-world applications. Participants will interact with LLNL scientists and learn about how simulation is used in their work. NetLogo will be introduced as a modeling tool.

**COMPUTATIONAL MODELING Level-II** This program is designed to build upon the prior knowledge of programming with NetLogo. The participant will be encouraged to develop computer applications that will enhance their STEM curriculum and present the model(s) and associated lesson plans to the group.

**COMPUTATIONAL MODELING Level-III** This workshop is designed for participants who have previously completed Levels I and II. They will be encouraged to bring 2 students to join them for a 1-week workshop. During this workshop the students will develop their skills using NetLogo and prepare to train other students at the school site to use this software and create modeling solutions to their science projects.



**3D PRINT & DESIGN** This workshop is designed for those looking to incorporate modeling, design, and three-dimensional printing into their curriculum or clubs. Participants will learn how to create and print everyday objects from their own computational models. Tinkercad will be introduced as a development tool.



**TECHNICAL WRITING** This two-day workshop prepares teachers to build the technical-writing skills of their science students to meet CCSS learning goals. Participants in this workshop learn how to explain usability and text-design techniques to their students, then apply these techniques to improve the effectiveness of lab instructions, technical descriptions, note taking, project abstracts, and science posters.

**TEACHER RESEARCH INTERNSHIPS** Teachers participating in a mentored research internship contribute as a member of a research team. Each teacher receives a \$4000 stipend when they complete an 8-week internship. At the completion of the summer research experience each teacher is expected to create and present a research poster at the LLNL Summer Research Symposium. They are required to create a lesson plan that will extend their research experience into the classroom.