Research Experience for Teachers (RET)

Nebraska Nanoscale Facility

Experience the excitement of nanotechnology research at the National Nanotechnology Coordinated Infrastructure (NNCI) Research Experience for Teachers program at the University of Nebraska. During the program, each participant will develop an instructional unit based on their experience to share with students and peers. This 6-week program is for high school teachers and community/technical college faculty who teach science or technology and are within driving distance of the University of Nebraska-Lincoln (UNL) campus.

Teachers will be selected to participate in research in nanoscale science and engineering labs at UNL, gaining hands-on experience with the cutting-edge techniques and tools used in NNF facilities. This RET program partners with other RET sites across the US, enabling teachers to network with scientists and teachers nationwide on key ideas in nanoscale science and engineering.

Teachers will spend time designing curricular materials for their classrooms and will share these materials during the program and upon returning to their home institutions. Be a part of a national initiative this summer, learning about nanoscience research, creating your curriculum, and discovering new ways to teach science and engineering.

Applications
Applications Due: Friday, April 17, 2026
Eligibility: Must teach science or technology in grades 9-12 OR community college
APPLY NOW!
https://nanoscale.unl.edu/ret/#app
Questions? Contact Steve Wignall at swignall4@unl.edu or 402-472-6078

Program Overview

- Schedule: June 15 – July 24, 2026
- $8,000 stipend (additional funding available for curricular materials, lesson plan/curriculum dissemination, and travel to Georgia Tech)
- US Citizenship required
- Program requirements: Participants will need to attend all daily and weekly meetings, seminars, field trips, and workshops during the entire program
- *New this year, funding for one teacher to have Room and Board on Campus who is outside a 60-mile radius of Lincoln

Follow-up activities:

- Curriculum implementation during the academic year
- Construct a poster to present at the Graduate Studies SRP
- Follow-up at Georgia Tech, October 2026

**Priority will be given to teachers who have not been part of the previous NNCI Summer RETs, but previous RETs will be considered if numbers allow.*

Development of Curricular Modules

High school and community college educators will develop modules and curricular materials to integrate their research into their classrooms. The modules will directly relate to the research conducted at the NNF lab, where each teacher is hosted. At the same time, teachers will be supported in ensuring that the modules align directly with the high school and community college curricula required at their teaching sites. All participants will conduct a research study—example projects are listed below.

Sample RET Projects

Note: These are examples of the types of experiences you can expect.

"Engineered Nanoparticles"

Complex nanoparticles formed via physical processes offer the opportunity to explore new states of matter, as this far-from-equilibrium processing route can create novel structures and chemical arrangements with unique magnetic properties for use in biomedical or data storage applications. Numerous research projects on our nanoparticles or thin film structures have involved undergraduate researchers [4] and teachers [13], who use the deposition systems and perform x-ray diffraction to study structure AFM to analyze size and magnetometry. Teacher and/or Community College Faculty component: The teacher will learn to deposit alloy nanoparticles and then characterize them using the techniques mentioned above as well as scanning/transmission electron microscopy.

"Additive Manufacturing/3D printing of metals"

The singular design and material flexibility offered by metal additive manufacturing (AM) processes can improve performance, reduce waste, and lower processing costs across critical industries, including aerospace, biomedical, automotive, and defense. For instance, an aerospace part weighing just one pound requires subtractive machining of 20 pounds of raw material (a buy-to-fly ratio of 20:1). Using metal AM, the buy-to-fly ratio reduces to 4:1. There is also significant savings of energy and time, reducing lead times from weeks to days. AM also allows for novel part design due to the expanded manufacturability of complex parts. For instance, General Electric's new jet engine includes an AM-produced single-piece nozzle, a design that once contained 20 separate parts, while the Cessna Denali aircraft engine now has 12 AM-produced parts rather than 855. In both cases, there was an overall reduction in weight and an improvement in fuel efficiency of more than 10% [5]. AM also allows for the easy reproduction of legacy parts and custom design for biomedical implants.

In our group, we analyze the microstructural evolution of AM-processed parts in order to understand the effect of processing parameters and part design on performance. We utilize various forms of microscopy, including optical and scanning electron, as well as measure mechanical performance. As for AM, we utilize laser powder bed fusion, directed energy deposition, and wire arc techniques. The ultimate goal is to ensure that every part has predictable properties.