NNCO NANOEDUCATORS QUARTERLY FORUM

Nanotech resources for your classroom

The Nanovation Competition, hands-on nanoscience lesson plans, and free programs for teachers from the California NanoSystems Institute at UCLA

Rita Blaik, PhD

Director of Education · California NanoSystems Institute at UCLA

rita@cnsi.ucla.edu

cnsi.ucla.edu/education

CNSI AT UCLA

The California NanoSystems Institute

Established in 2000 as one of the Governor Gray Davis California Institutes for Science and Innovation — an interdisciplinary hub at UCLA built around four missions.



Research

Member labs tackle health, clean energy, the environment, and information technology — all enabled by nanoscience.

Technology

Shared facilities with state-of-the-art instruments — electron microscopy, nanofabrication — plus full-time staff who train users.

Entrepreneurship

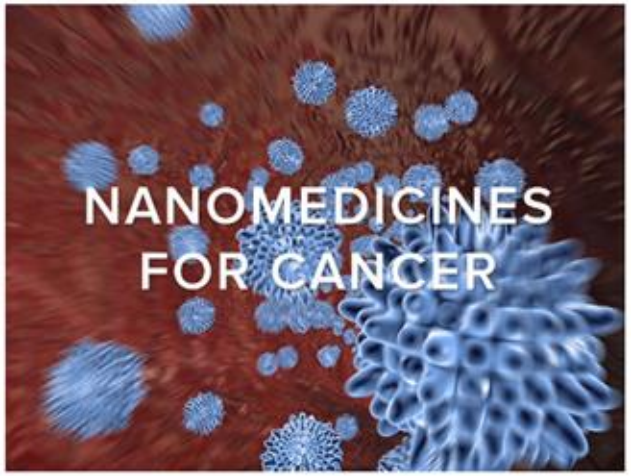
Magnify, CNSI's startup incubator: 108 companies incubated, 700 in-house IP filings, 500+ new jobs created.

Education

K–12 through workforce development — and the reason we're together today.

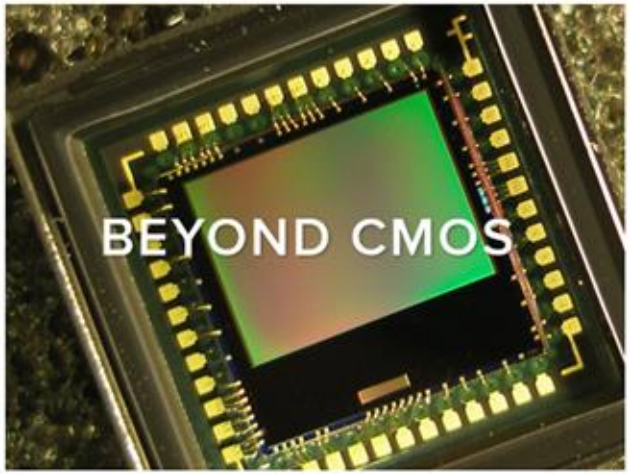
cnsi.ucla.edu

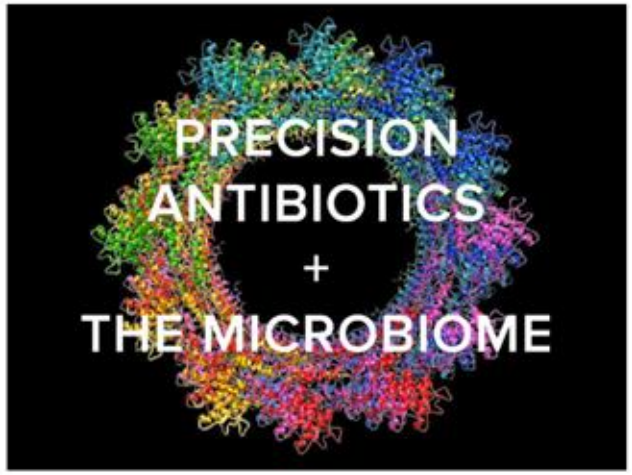
CNSI Research













cnsi.ucla.edu/research-initiatives/

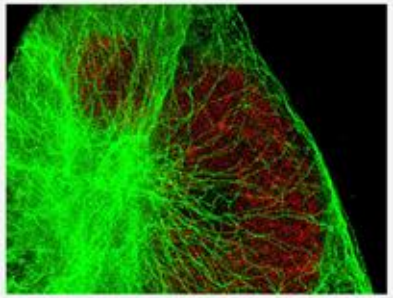
CNSI Technology Centers

Electron Imaging Center for Nanosystems (EICN)



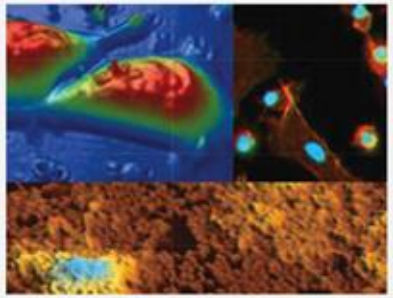
EICN provides advanced electron imaging tools operating at scales ranging from micrometers to angstroms and delivers valuable structural information for biomolecular, molecular, and materials sciences as well as cell biology and microbiology.

Advanced Light Microscopy and Spectroscopy (ALMS) Laboratory



ALMS supports the application of optical microscopic and spectroscopic methods to achieve high spatial and temporal resolution from whole in vivo animal imaging to sub-70 nm imaging using super-resolution nanoscopy techniques.

Nano & Pico Characterization (NPC) Laboratory



NPC offers microscopic techniques to characterize surfaces, adsorbates, nanostructures, materials and devices at the atomic and molecular scales under a wide range of experimental conditions.

Molecular Screening Shared Resource (MSSR)



MSSR provides industrial strength HTS capabilities at a capacity of >60,000 wells per assay per diem. A full suite of services leverages a curated ~200,000 small molecule library, arrayed genome wide shRNA, cDNA and siRNA libraries as well as CRISPR sets.

NSF BioPACIFIC Materials Innovation Platform



The **NSF BioPACIFIC MIP** operates a one of a kind user facility dedicated to creating a nexus for synthetic biology and materials to revolutionize high-performance polymers.

UCLA Nanofabrication Laboratory (NanoLab)



NanoLab provides access to a 20,000 square foot clean room in two locations on the UCLA campus for nanofabrication and characterization that integrates classic semiconductor tools and processes with biological, chemical, and medical substrates.

cnsi.ucla.edu/technology-centers/

CNSI Entrepreneurship

MAGNIFY



magnify.cnsi.ucla.edu

CNSI Education: what we do

Free, hands-on nanoscience for students, teachers, and the public

Nanovation Competition

Nanotech entrepreneurship competition for grades 6–12 (part 1 of today's talk).

Teacher workshops

Free monthly professional development with take-home lesson plans and kits (part 2).

Public outreach

Exploring Your Universe, National Nanotechnology Day, Ask-a-Scientist nights, school science fairs.

Field trips to UCLA

Experiments, technology center tours, and student panels for visiting middle and high school classes.

Summer programs

One- and two-week high school programs in nanoscience, lab skills, and entrepreneurship.

Youth Research Initiative

Summer research placements for high school students in UCLA bioengineering labs.

Our Team



Sarah H. Tolbert

Faculty Director



Rita Blaik

Director of Education



Cheylene Tanimoto

Education Manager

Our teaching philosophy

What we believe

- Science is fun, and nanoscience is cool
- Science can and should be accessible to everyone
- Teachers are valued members of society, and experts should be trusted
- An informed citizenry has the 4C skills: critical thinking, collaboration, communication, creativity

How we teach

- Instill a growth mindset — students are capable of doing challenging things
- Scaffold understanding by breaking complex topics into digestible pieces
- Relate new concepts to things students already know
- Meet students where they are, and raise them to where we want them to be

PART 1

The Nanovation Competition

An interdisciplinary competition and outreach program training the next generation of scientists and entrepreneurs

Built on CNSI’s existing networks

Nanovation didn’t start from scratch — it connected three communities CNSI had already built.

Teacher programs

A decade of grad-student-led nanoscience workshops gave us the experiments, the curriculum base, and a network of hundreds of trained teachers to recruit teams from.

Graduate professional development

Career seminars, resume building, and industry workshops run with UCLA Graduate Division — the pipeline for our graduate student mentors.

Magnify incubator

CNSI’s startup incubator supplies real-world entrepreneurial expertise — judges, role models, and a path for mentors who catch the startup bug themselves.

Why entrepreneurship?

Tech translation

Helping students how an idea goes from research to market

Gap filling

Spotting an unmet need, and learning how to meet it

Input completing

Marshaling different inputs into a finished product

Agents of change

Driving structural change, including in low-income communities

Teamwork and opportunities

Understanding that STEM careers go beyond the lab.

Job creators

Small businesses drive the bulk of new employment

62%

of new U.S. jobs have been accounted for by small businesses since 1995

U.S. Small Business Administration, 2026

Why teach it early — and why in STEM?

STEM IDENTITY FORMS BY

4th grade

Many students have had little science exposure by then — and the gender and culture gaps that open at this age only widen with time.

- **Training works.** Students who receive entrepreneurship education perform better running real ventures
- **The entrepreneurial mindset is a STEM mindset:** leadership, vision, and opportunity-finding are the qualities we want in future scientists and engineers
- **It's a new on-ramp.** America's fascination with startups (9M+ viewers per Shark Tank episode at its peak) can pull in students not already hooked on science

Nanovation at-a-glance

Student teams invent a nanotechnology product that solves a high-impact problem — then develop the science, the business plan, and the pitch.

Grades 6–12

Open to middle and high school teams across Southern California

4–5 students

Per team, with a teacher leader at the helm

10 finalists

Teams selected by CNSI staff and UCLA graduate student reviewers

~3 months

Of mentored development, from kickoff to final pitch

Grad mentors

UCLA graduate students meet each team virtually every week

Live finals

5-minute pitches before an industry panel, livestreamed on YouTube

Two sets of learning outcomes

Nanotechnology

- Apply classroom nanoscience concepts to a real product idea
- Defend the scientific feasibility of a design
- Research deeper into a chosen nanoscale phenomenon
- Communicate science to a non-expert audience

Entrepreneurship

- Design thinking: from problem to user to prototype
- Intellectual property fundamentals
- SWOT and market analysis
- Writing a business plan and pitching to investors

HOW THE PROGRAM EVOLVED

Year one: the pilot (2016–17)

Early January	Submissions open
Late January	10 finalist teams selected and notified
Mid February	Kickoff: design thinking for students (Stanford d.school) and entrepreneurship for teachers (UCLA School of Management)
May	Final pitch session and business plan submission

First-year proposals included

- Anti-fouling catheter coatings
- Super-grip cell phone cases

...and the winning team was a group of all-girls middle schoolers.

Year one: glows and grows

Glows

- High student interest
- Two teams kept researching their idea after the competition ended
- Teachers changed their science curriculum based on the experience

Grows

- Mentors felt ill-prepared on the business side
- Scientific accuracy needed more support
- Some mentors were matched to projects outside their expertise
- Funding

What we changed in year two

A mentor business class

Mentors could take a free business school class as a thank-you — closing the business-knowledge gap they flagged in year one.

Two mentors per team

Pairing mentors gave each team broader expertise to draw on and gave the mentors themselves more support.

Sponsorships

We brought in outside companies to support the competition — new funding and real-world connections for the teams.

Year two: glows and grows

Glows

- Students arrived better prepared on both science and business
- Some mentors began considering startups of their own
- Outside support arrived from connected companies

Grows

- Mentors felt the full class was too much on top of research
- Some teams struggled to communicate consistently
- Companies told us our sponsorship asks came too late in their cycle

The iteration continued: the semester-long class became a focused one-day Saturday business intensive — entrepreneurship basics, IP 101, SWOT, starting a company, pitching — open to mentors and teachers alike.

Nanovation today: how it works

Kickoff at CNSI: a design thinking workshop, first mentor meetings, and advice from Education Faculty Director Prof. Sarah Tolbert

Weekly mentorship: 30-minute virtual meetings with UCLA graduate student mentors, scheduled by the team and teacher leader

April business workshops: intellectual property, SWOT analysis, and pitching

May feedback sessions: each team meets CNSI experts on Zoom to refine the business plan, market analysis, financials, and pitch

Business plans due two weeks before the final presentations

Finals: 5-minute pitch + 5-minute Q&A before a panel of technology and industry professionals, livestreamed on YouTube

This year’s timeline

Dec 8
Applications open online

Jan 23
Submission deadline

Jan 30
Ten finalist teams announced

Mar 6
In-person kickoff at CNSI

Mar–May
Weekly mentor check-ins and business workshops

May 22
Final presentations at CNSI

cnsi.ucla.edu/education/nanovation-competition

How your students enter

The application: three short answers, 750 characters each

- **The need** — what high-impact problem are you solving, and who would buy the solution?
- **The nanotechnology** — your product idea and the science behind it
- **The alternatives** — what already exists, and why yours is different

Any nanoscience topic qualifies — CNSI workshop participation is **not** required. Up to 8 applications per teacher; at most 3 finalist teams per school. Every applicant gets feedback on feasibility and originality.

Prizes: classroom science supplies

1st place — $2,000
2nd place — $1,000
3rd place — $500

All ten finalist teams receive an award for completing their pitch and final proposal.

cnsi.ucla.edu/education/nanovation-competition

PART 2

Free resources for teachers

Professional development workshops, classroom-ready nanoscience lesson plans, custom materials kits, and programs your students can join

The Nanoscience Workshop for Teachers

Free professional development uniting cutting-edge UCLA research with hands-on, classroom-ready experimentation.

One Saturday a month

At CNSI on the UCLA campus, throughout the academic year

6 hours of PD credit

Pre-approved for LAUSD salary points

Taught by researchers

Experiments developed and led by teams of UCLA graduate students

Standards-aligned

Curricula designed around NGSS and Common Core, with pedagogy from UCLA Center X

Everything's covered

Free parking, free breakfast, free lunch

Free kit to take home

A custom materials kit for your classroom — with free refills for life

Who the workshops reach

100+

teachers trained annually

400+

local schools represented across greater Los Angeles

89%

of participating schools are Title I (designated low-income)

103

UCLA volunteers gave 1,052 hours in 2025–26, earning 12 teaching awards along the way

17 hands-on experiments, grades 3–12

Each one a full lesson plan: teacher manual, student manual, slides, and a materials kit.

Elementary + Middle

- Biogels
- The Science of Mood Rings
- Indirect Measurement of a Molecule
- The Lotus Effect

Middle + High School

- Biopolymers
- Biosensors
- Biotoxicity
- Emulsions & Microfluidic Mixing
- Measurement at the Nanoscale
- Nanoscale Control of Wetting
- Nanoscale Patterning
- Water Purification

High School

- Building a Virus (computational)
- Color from Gold (plasmonics)
- Fast Batteries (supercapacitors)
- Magnetic Nanoparticles (ferrofluids)
- Solar Cells (dye-sensitized)

Every workshop sends you home with

A complete documentation hub

Teacher manual, student manual, and the full slide presentation on a shared Padlet — live-updated by our team, and downloadable and editable for your own classroom.

A free custom kit

The standard kit covers 10 groups of 3–4 students per class period; we add consumables for each additional period you teach. Request it by Google Form, sized to your real class list.

Refills, forever

Consumables run out; the program doesn't. Any workshop you've attended entitles you to free kit refills in future years — pre-order to pick up at your next workshop.

Survey instruments

Pre- and post-experiment surveys for students and teachers — your feedback feeds published education research on the experiments' efficacy.

Joining a workshop is three steps

1

Fill out the interest form

One form covers all workshops for the year — find it on the CNSI Education page.

2

RSVP for your workshop

We send a workshop-specific RSVP form along with the kit request form.

3

Get your confirmation

A confirmation email arrives with parking details. Show up hungry — breakfast is on us.

Bring a colleague: teachers who invite colleagues to a workshop earn an Amazon gift card.

More ways in for your students

Field trips to UCLA

Bring your class for a nanoscience experiment, technology center tours, and undergrad/grad student panels. You arrange transportation and lunch, we handle the science.

High school summer programs

- **Nanoscience Lab** — 1 week of experiments and science communication
- **Applications of Nanoscience** — 2 weeks adding entrepreneurship

Applications open in December

UCLA-LA Youth Research Initiative

Summer research placements in UCLA bioengineering labs: lab techniques, computational skills, scientific literacy, and confidence. Select teachers nominate top students each February–March.

And catch us out in public

EXPLORING YOUR UNIVERSE

Sunday, November 8, 2026 • 12–5 PM

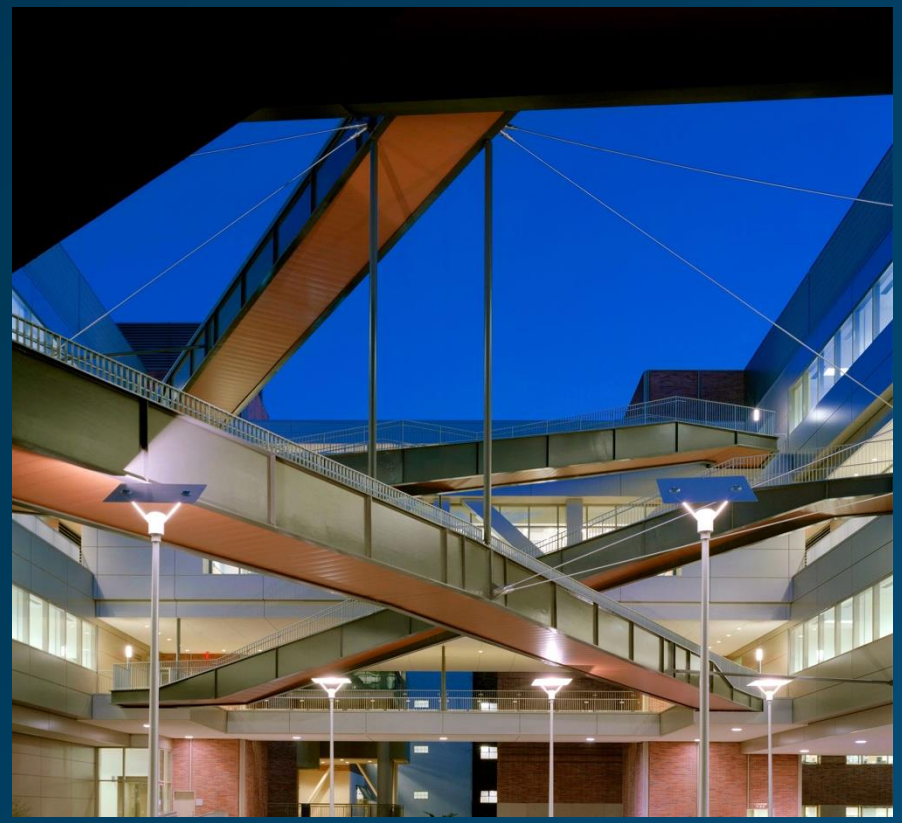
UCLA Court of Sciences — the largest annual science fair at UCLA, free and open to K–12 students and families from underrepresented communities.

exploringyouruniverse.ucla.edu

- **National Nanotechnology Day** — October 9, every year
- **Ask-a-Scientist nights** at local schools
- **School science fairs** — invite CNSI to your campus

Thank you!

Questions, ideas, or want to collaborate? Get in touch!



Rita Blaik, PhD

Director of Education — programs, partnerships, Nanovation

rita@cnsi.ucla.edu

Cheylene Tanimoto, PhD

Education Manager — workshops, field trips, school events

ctanimoto@cnsi.ucla.edu

Everything online

Programs, workshop schedule, and the Nanovation application

cnsi.ucla.edu/education