Education in Nuclear Science, Technology, & Policy

National lab engagement
- National Laboratory internships, workshops, and rotations
  - Lab scientist research mentorship

Classroom-based & Online learning
- Webinars, online lectures, and electronic engagement
  - Summer schools
The NSSC Educational Experience

LAB ENGAGEMENT
- Lab Mentors
- NSSC Webinars
- In-Residence Research

LAB INTERNSHIPS
- NSSC-LANL Keepin Program
- NSSC Laboratory Investigators Rotation
- NSSC-LLNL Summer Experience

ACADEMIC SUPPORT
- Academic Advisor
- Sponsored Courses

SUMMER SCHOOLS AND BOOTCAMPS
- Nuclear Data Summer School
- Radiochemistry Summer School
- Public Policy and Nuclear Threats Boot Camp (PPNT)

CONFERENCES AND TRAVEL
- UPR
- Technical Conferences
- Research travel
- & much more!

CAREER SUPPORT
- NSSC Lab Connections
- Opportunities Mailing
- Network of Alums
NSSC-sponsored course established by Prof. Michael Nacht (Public Policy) and Prof. Stan Prussin (NE) in 2012
● Currently fielded in cooperation with LANL’s Partnership and Pipelines Office
● Archived course material available on YouTube (2016-2021)
● >100 students in technical and social science educated
● First of its kind textbook published in 2021!
In the Classroom: Nuclear Forensics

- NSSC-sponsored course re-invented by Prof. Heino Nitsche in NSSC1
- New NSSC faculty **Prof. Rebecca Abergel** at the helm
- Designed to solidify principles and refine experimental skills in nuclear and radiochemistry
- **Curriculum tightly tied with research activities at neighboring LBNL, LLNL, and SNL**

Prof. Abergel (UCB NE)
Nuclear Policy Working Group

EDUCATION
To educate scholars on pressing issues in nuclear security and weapons policy

COLLABORATION
To foster collaboration across technical and social science fields

IMPACT
To generate original policy recommendations impacting the nuclear security field

Austin Mullen (UCB)
Deputy Director

Jacob Sebastian (UCB NE), Gabriel Kaufman (UCB Political Science), 2011 PONI Conference

<table>
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<tr>
<th>Date</th>
<th>Event</th>
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<tr>
<td>Apr 25, 2022</td>
<td>Nuclear Jeopardy</td>
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<td>Apr 11, 2022</td>
<td>Research Presentation</td>
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<td>Apr 4, 2022</td>
<td>Leah Walker, Institute for Security and Technology</td>
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<td>Mar 28, 2022</td>
<td>Herb Lin, Stanford University</td>
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<td>Mar 14, 2022</td>
<td>Rolf Mowatt-Larssen, Harvard Belfer Center</td>
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<td>Mar 7, 2022</td>
<td>Interactive Wargame (CSIS PONI)</td>
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<td>Feb 28, 2022</td>
<td>Andrew Reddie, UC Berkeley/Sandia</td>
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NSSC Webinars, Seminars, and Electronic Engagement

- NSSC has organized hundreds of webinars, seminars, workshops, and panels.
- Webinars are organized monthly: [https://nssc.berkeley.edu/events-and-programs/webinar-series/](https://nssc.berkeley.edu/events-and-programs/webinar-series/)
- Recent example:
  - NuSec/NNSA: “Novel laser-based sources and how to image them,” Mar 2022, Dr. Christopher Murphy (York)

Sarah ensures nuclear technology is being used for peaceful purpose.
NSSC Graduate Fellowship

Every NSSC Fellow is required to have:

- **Academic Advisor**
- **Lab Mentor**

To help facilitate each student’s involvement in **Lab Directed Projects** and **In-Residence Research**.

Additional NSSC3 Graduate Fellowship requirements include:

**National Laboratory Internship**
- NSSC-LANL Keepin Nonproliferation Science Summer Program
- SNL Summer Internship
- NSSC-LLNL Summer Experience - *New for NSSC3*

**Topical Summer School**
- Nuclear Data Summer School
- Radiochemistry Summer School (in development)
- Public Policy and Nuclear Threats Boot Camp
- Topical program of choice
NSSC Nuclear Data Summer School
Aug 1-12, 2022

Goal:
★ Train scholars in nuclear data measurement, modeling, compilation, evaluation, and uncertainty quantification

Prof. Lee Bernstein
UC Berkeley

Prof. Vlad Sobes
UT Knoxville

Dr. Eric Matthews
UC Berkeley

Prof. Eric Prebys
UC Davis

Topics include:
○ thermal neutron scattering
○ nTOF measurements
○ R-matrix theory
○ neutron capture data
○ optical model & EMPIRE
○ inelastic scattering

○ fission data
○ FREYA, CGMF
○ integral benchmarks
○ library validation
○ AI/ML for nuclear data

Applications are open now! Join us at UC Davis on August 1-12, 2022.

Hands-on stacked target activation experiment
Nuclear Analytical Techniques
Summer School | Jun 20-30, 2022

Goal:
★ Hands-on training in nuclear instrumentation and radiation detection

Activities include:
- neutron activation analysis using the McClellan Nuclear Research Center TRIGA reactor
- gamma-ray spectroscopy with HPGe detectors
- elastic proton scattering at the Crocker Nuclear Laboratory

Public Policy and Nuclear Threats Boot Camp | Jul 31 - Aug 12, 2022

Goal:

 ★ Train scholars in key historical, technical, legal, ethical, and policy aspects of nuclear weapons issues

- Originally established in 2003
- Hosted by the Institute on Global Conflict and Cooperation (IGCC)
- Technical and social scientists from graduate students to mid-career professionals
- Topics include:
  - Principles of nuclear deterrence
  - Arms control
  - Safeguards
  - World nuclear forces

Dr. Bethany Goldblum
UC Berkeley/LBNL

Amb. Linton Brooks
NNSA (retired)

Ms. Marie Stewart
IGCC
**NSSC LANL Keepin**
Nonproliferation Science Summer Program

**Goals:**
- ★ Create **working relationships** between NSSC students and LANL/SNL scientists
- ★ Increase number of students performing **programmatic research** with LANL
- ★ Turn research and training into **careers at the national laboratories**

**Jun 21 – Aug 12, 2022**

**Program Agenda:**
- ● 85% research
- ● 15% enrichment

★ **83%** of students who responded ranked their overall experience as a **4 or 5 out of 5**.

★ **83%** of students are **likely or very likely** to recommend this program to others.

★ **83%** of students found this program to be **beneficial or very beneficial** to their professional development.

“**My mentor was super helpful with making connections in the lab and I felt like an integral part of the research project.**”

“**Making connections to various partners throughout the lab system was the best.**”

“I really enjoyed all of the more focused, technical talks about different areas of research being performed at the lab."

92 students have completed the program, including 38 NSSC scholars!
Strengthening the Pipeline

★ 6 out of 6 of students who responded plan to continue working with LANL through:
  o Internships
  o Remote work
  o Thesis collaborations
  o GRAs

★ 83% of students said that this Program increased the likelihood of them doing dissertation research at LANL.
★ After this Program, 5 out of 6 of students are more likely to consider careers in nonproliferation at:
  o LANL
  o Other laboratories
  o DOE
  o University

“It seems now that LANL would be the mostly likely option, but there are many good labs that would be great to work at.”
Keepin Success Stories

TYLER JORDAN
University of California, Berkeley

2017 NSSC LANL Keepin Program
Advanced Nuclear Technology Group (NEN-2)
Lab Mentors: Madison Andrews, Krista Meierbachtol

2018-Present
Full-time LANL Graduate Student
Lab Mentor: Edward McKigney

Development of a pixelated BaF$_2$ detector for sub-nanosecond timing

BENJAMIN WALUSIAK
George Washington University

2021 NSSC LANL Keepin Program
Material Science and Technology Division
Nuclear Material Science Group (MST-16)
Lab Mentor: Dr. Alice Smith

2022 Glenn T. Seaborg Institute
Graduate Research Program

Neutron diffraction studies on uranium salts
NSSC Laboratory Investigators Rotation

- **Six-to-eight-week** assignment at NSSC partner national laboratories
- **Postdocs and junior faculty** perform research in basic and applied nuclear science.
- Program participants are **connected with national laboratory experts** to initiate new research projects, facilitate existing ones, and **deepen University-Lab connections**.
- This program makes available **lab facilities** and instrumentation to participants.
- Opportunities for participation in **seminars, lectures, and organized tours**.

NSSC-LLNL Summer Experience

- Provides **students with an extended research** internship at the National Lab.
- Students will spend **eight weeks on a research project** with a strong connection to nonproliferation science and technology, that directly relates to their research and academic interests.
LLNL Success Stories

James McGreivy
University of California, Berkeley

2020 NSSC-LLNL Internship
Nuclear Criticality Safety Division
Lab Mentors: Dr. Daniel Siefman, Mr. Mark Mitchell

2022 NSSC-LLNL Internship
Returning to full-time summer research
ML-enabled neutron spectrum unfolding

Teal Pershing
University of California, Davis

2017-2020 | LLNL In-Residence Research
Lab Mentors: Adam Bernstein, Marc Bergevin, Steven Dazeley

2020-Present | LLNL Postdoc
Detector simulation software package (RAT-PAC)
The NSSC Pipeline

9 to Nuclear Security Industry
- Alicia Palmisano (MSU) Postdoc at UTK
- Vincent Fischer (UCD) Postdoc at Iowa State
- Ben Schlitzer (UCD) Faculty at UCD

57 to Nuclear Security Related Academia
- Mariah Ramirez (TAMU) Nuclear Security Operations at IB3
- Amber Hennessy (UCI) Radiation Effects Chemist
- Ariel Braunstein (GWU) Nuclear Regulatory Consultant

22 to other US DOE Labs
- Stephanie Lyons (MSU) PNNL
- Milos Atz (UCB) Argonne NL
- Carl Britt (UTK) PNNL

32 to LLNL
- Kevin Glennon (TAMU)
- Andrea Richard (MSU)
- Kelly Kmak (UCB)

19 to LANL
- Athena Gallardo (UNLV)
- Jason Matheny (UCB)
- Daniel Votaw (UCD)

21 to LBNL
- Nikki Apadula (UCB)
- Morgan Askins (UCD)
- Daniel Hellfeld (UCB)

8 to SNL
- Jon Balajthy (UCD)
- Jaclyn Unagst (UCI)
- Andrew Reddie (UCB)

35 to other Government Positions
- Rebecca Krentz-Wee (UCB) IAEA
- Roy Ready (MSU) to the US Naval Research Lab
- Sarah Laderman (UCB) IAEA
- Caleb Redding (UTK)
- Krystein Stiefel (MSU)
- Rachel Mersch (UTK)
Acknowledgements

This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0003996.

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Education in Nuclear Science, Technology, & Policy

- National Laboratory Internships and Rotation
- Workshops and Summer Schools
- Program and Curriculum Development
- Careers in the Nuclear Security Arena
- Webinars, lectures, and electronic engagement