

Societal and Ethical Implications across the NNCI

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SEI in the NNCI

Working toward the daunting goal outlined in the

21st Century Nanotechnology R&D Act:

“integrating research on societal, ethical, and environmental concerns with nanotechnology research and development, and ensuring that advances in nanotechnology bring about improvements in quality of life for all Americans”



Three primary areas of work in SEI:

Instruments
Engagement
Training



SENIC: Instruments for SEI research

ECONOMIC IMPACT OF NNCI - FUNDED NANOFABRICATION AND CHARACTERIZATION FACILITIES

A CASE STUDY AND TOOLKIT

- *Identification of publications using grant number = 444 SENIC papers
- *1427 authors, 3446 citations, 14,810 downloads, traditional + nontraditional fields, 3 major community networks
- *Replication through partners, publication identification, software, analyses, communications

- *Interview guide to identify Type 1 companies that would not exist but for the NNCI facility
- *19 company users at SENIC/GT = \$24m direct impacts, \$51m total impacts
- *Replication through partners, companies, interview guide, type of company, analysis and results


MAPPING RESEARCH OUTPUTS

A CASE STUDY AND TOOLKIT



MONT: Instruments for SEI education

Your Account

 MONTANA STATE UNIVERSITY
Montana Nanotechnology Facility

Nanotechnology in STEM > Ethics

Nanotechnology in STEM

- Nanotechnology: an Emerging Science
- Needs and Opportunities
- An Emerging Teaching Opportunity
- Evidence-based Teaching Practices
- Background Nanoscience Resources for Instructors
- Nanoscience Literature for Earth and Environmental Science
- Instruments and Analytical Methods Common to Nano
- Registry of Analytical Geochemical

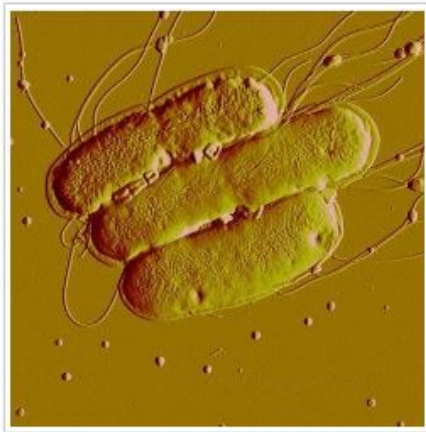
Ethics Education

Ethics Education is an increasingly important component of the pre-professional training of scientists. Funding agencies (NSF, NIH) require training of graduate students in the responsible conduct of research, employers are increasingly expecting their workers to have basic training in ethics, and the public demands the highest standards of ethical conduct by scientists. Yet, few faculty have the requisite training to effectively teach about ethics in their classes, or even informally in mentoring students working in their labs.

This module has been developed to meet the need of introducing ethics education into the STEM curriculum:

- **For faculty**, resources, case studies, and teaching activities are provided to facilitate instruction in ethics within established geo "core" courses or in a dedicated course on "Ethics and Nanoscience";
- **For students**, resources are provided to help expand their understanding of ethical situations that may arise in their careers, and to give them the tools they need to appropriately address these issues.
- **To start:** Take a look at this video on [The Ethics of Nanotechnology](#)--developed by the Microelectronics Research Center, University of Texas--Austin.

How to Use this Module: We have assembled a large collection of references and related



https://serc.carleton.edu/msu_nanotech/ethics.html

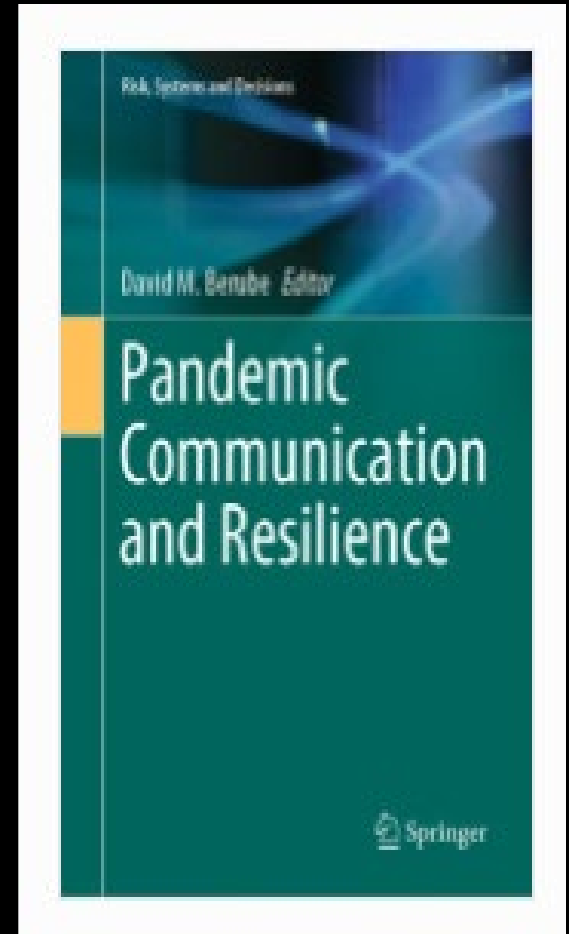
Or just search:

MONT
Nanotech
Ethics



RTNN: Instruments and Engagement

- Public Report on future nanotechnology infrastructure needs for food security
- Book Projects:
 - Pandemic Communication and Resilience (2021)
 - COVID: Vaccination Hesitancy
 - Nanohype: Then and Now
 - “Youtie Project” – Review SENIC instrument and conduct similar examination of RTNN



TNF: Engagement and Training

- SEI Training materials as part of lab training protocol
- Piloting the development of online resources for integrating SEI into K-12 education

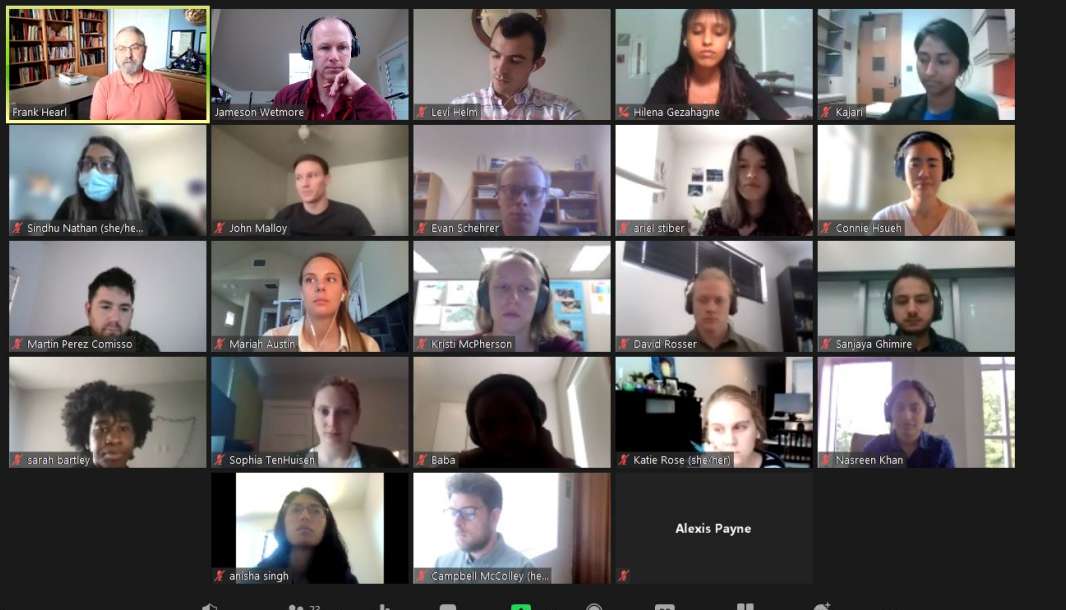


The University of Texas at Austin
Moody College of Communication



Microelectronics Research Center
THE UNIVERSITY OF TEXAS AT AUSTIN

Science Outside the Lab: Training in SEI



Stanford

Washington

Texas

ASU

Georgia Tech

North Carolina A&T

U Pennsylvania

Oregon State

NC State

Harvard

Montana State

Minnesota

Univ. of
Cambridge



June 1-11, 2021

How do we work to ensure that science and engineering make the world better for everyone?

EPA: How do they choose what to regulate and not regulate?

NIOSH: How does a federal agency respond to changes in administrations?

National Air and Space Museum: How do we present science that generates controversies to the public?

NSF: What makes for a successful funding proposal?

Sloan Foundation: How do foundations approach funding differently?

Slate.com: How can grad students get their ideas out to a broad audience?

American Institute of Physics: How can scientists provide input into the policy process?



In my field, we are encouraged to 'do research that matters'. Participating in SoTL showed me what that looks like, by showing how research is used to impact decisions. This knowledge is incredibly valuable to me as a scientist.

-Levi Helm, SOTL 2021





Moriah Locklear

SOTL class of 2018 – Nebraska

SOTL TA 2019

Research Fellow

Potomac Institute for Policy Studies



Michelle Solomon

SOTL class of 2019 – Stanford

SIPE Congressional Fellow /

AAAS S&T Policy Fellow

Sen. Markey's Office



SOTL Ambassador Program: SEI Engagement

Sample Projects:

- Series of podcasts about how to increase research funding at HBCUs (currently engaging in a 6-week business incubator to refine concept)
- Bringing SOTL like policy speakers to engineering/science grad student forums for presentations and discussions
- Development of online modules on respectful conduct in the lab and responsible communication for use in training programs
- Working with local science museum as an area expert/public speaker
- Engaging with and Presenting to REU programs





HOW AND WHERE
ARE SCIENCE AND
TECHNOLOGY POLICY
DECISIONS MADE?

HOW DO SOCIETY
AND GOVERNMENT
USE TECHNOLOGICAL
KNOWLEDGE?

WHAT DO SCIENCE
AND TECHNOLOGY
POLICY JOBS
LOOK LIKE?

Next Nano S0tL will be held in June 2022
Requests for Applications announced January 2022



Ninth Annual Winter School on Emerging Technologies: Accelerating Impactful Scholarship

SEI Training

- January 3-10, 2022
- Bring together PhD candidate Social Scientists, Natural Scientists and Engineers
- Explore variety of ways to make scholarship more impactful
- Concludes with Sandpit exercise to craft proposals (for possible funding) for projects that extend beyond winter school.



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Applications being accepted until November 8th!



Current Trends and Near Futures in Federal Science Funding



TOMORROW
Wednesday 3
2:00-3:00pm CDT
Breakout Session 2

Mitch Ambrose
American Institute of Physics



Contact me if you're
interested in getting
more involved in
Instruments,
Engagement and
Training in SEI

For instance maybe you'd like to...

- Add an SEI component to an REU program
- Help give K-12 teachers tools to teach SEI
- Create an SEI engagement program
- Discuss the Ambassador Program/Winter School/Science Outside the Lab
- Create SEI grad student programs/clubs

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Societal and Ethical Implications

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