**Introduction to
Responsible Conduct of Research
at Academic Institutions**

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Introduction to Responsible Conduct of Research at Academic Institutions

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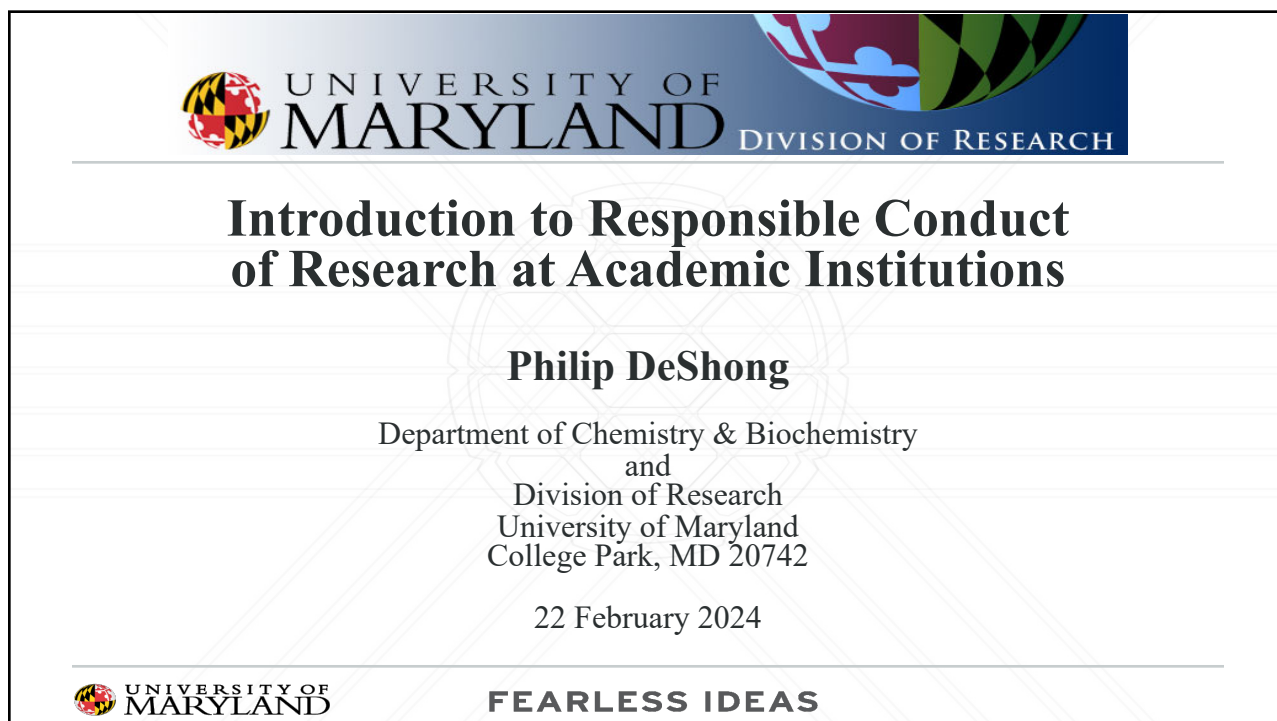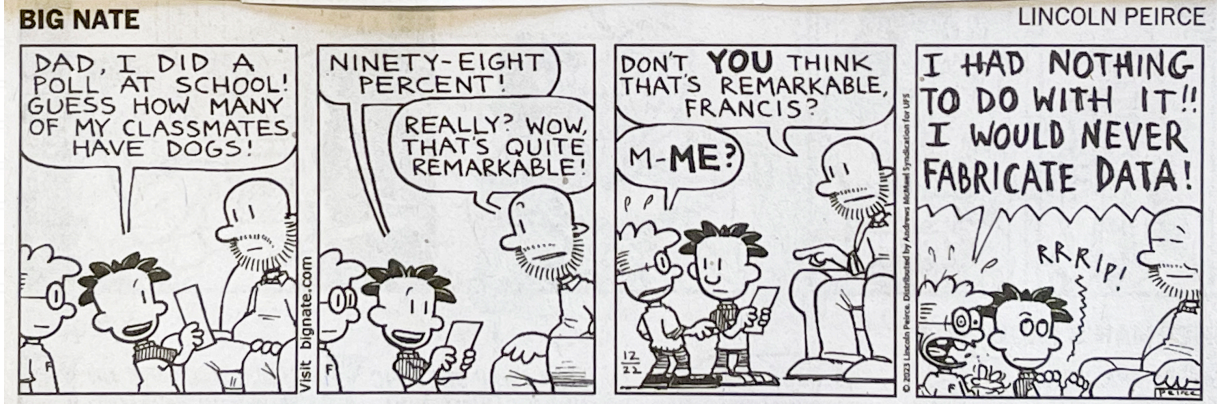
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Responsible Conduct of Research

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Responsible Conduct of Research

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Why Do We Care About Research Integrity?

Research integrity – trust and honesty – is the foundation of research.

The academic research environment is complex.

Federal agencies demand that universities be proactive in promoting research integrity.

Education programs on integrity are mandated by federal agencies. The goal of these programs is to:

- present key issues and concepts associated with research
- develop critical thinking regarding complex issues relating to research integrity
- introduce resources available to assist in making wise research decisions

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Consequences of Research Misconduct

Marc Tessier-Lavigne
Former President of Stanford University

Claudine Gay
Former President of Harvard University

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" Integrity is priceless. And in the end,
it is all you have. We intend to keep ours."

Jerome Powell
Chair, Federal Reserve

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THE TRUST EQUATION

Taken from Charles Green

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What Goes Around, Comes Around

Require education of
faculty/staff In RCR

Researchers

Deviations from
accepted practices

Universities

"Misconduct!"

Universities must be
more proactive

Media reports
the misconduct

Feds

Demands
action

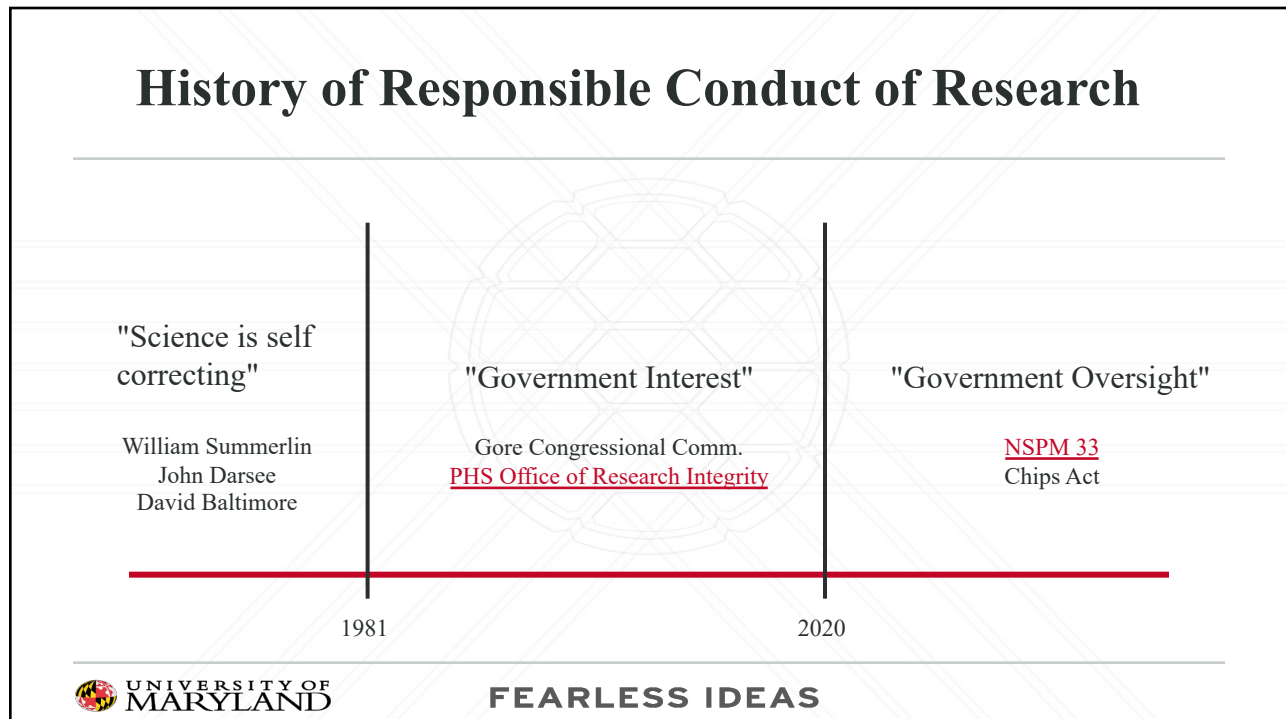Public

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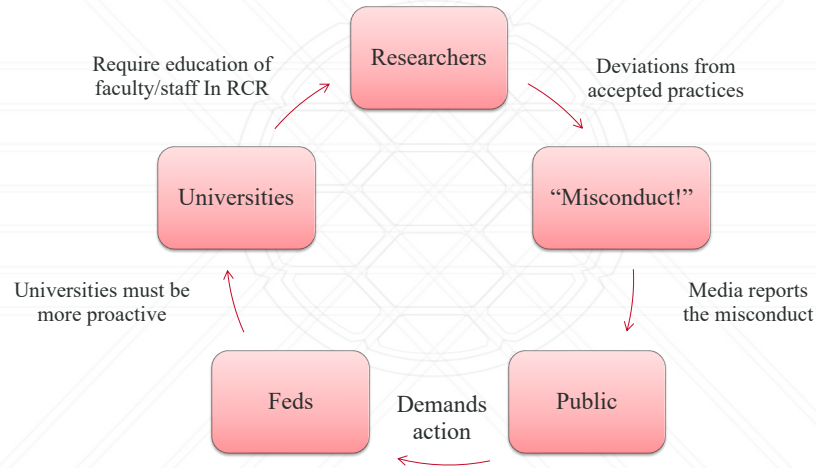
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"Our greatest strength is the authority and reputation of the *University's research*. We must do nothing that would undermine or dilute it and everything possible to enhance it...

... It is imperative that our *research* maintain the highest possible standards to ensure that we do nothing that might erode the *public*'s faith and confidence in our *reports*. This means that *researchers* should be vigilant in avoiding any activity that might pose an actual or apparent conflict of interest and thus threaten the *University's* ethical standing...

... And it also means that the research we practice daily must be beyond reproach."

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History of Responsible Conduct of Research

"Science is self correcting"

William Summerlin
John Darsee
David Baltimore

"Government Interest"

Gore Congressional Comm.
PHS Office of Research Integrity

"Government Oversight"

NSPM 33
Chips Act

1981

2020

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RCR Education: Born out of Research Misconduct

PHS ORI (Office of Research Integrity) established in 1994

ORI has mandated that

- Universities receiving NIH funds must have formal scientific misconduct policy
- NIH requires training grant recipients (grad students/postdocs) to receive RCR education in person
- Today, most federal funding agencies require RCR education for *anyone* paid on federal funds

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NSPM 33 (Jan. 2022)

"... [support] the values that distinguish the U.S. research enterprise: openness, transparency, honesty, equity, fair competition, objectivity, and democratic participation.

NSPM-33 directs a series of actions for Federal research agencies, with an emphasis on developing standardized policies and practices for disclosing information to assess conflicts of interest and conflicts of commitment among researchers and research organizations applying for Federal R&D awards."

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Chips & Science Act (HR-4346; Aug. 2022)

(Sec. 10337) ...."NSF grant applicants [must receive] training and oversight in the responsible and ethical conduct of research. The section requires such training and oversight to be provided to <u>postdoctoral researchers, faculty, and other senior personnel</u> and requires the training and oversight to include (1) mentor training and mentorship; (2) training to raise awareness of potential research security threats; and (3) federal export control, disclosure, and reporting requirements."

NIH, NASA, USDA, and DoD have followed or will soon follow the NSF mandate.

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Responsible Conduct of Research Education:
What it is!! and What it is not!!

- 'Philosophy' of how one conducts science
- Government regulations & guidelines for conducting research
- **Bioethics**: stem cells, vaccines, abortion, euthanasia
- **Science and Society:** environmental pollution, species elimination, nuclear waste

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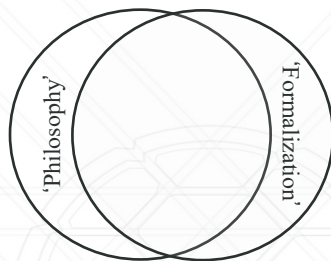- ~~**Science and Society:** environmental pollution, species elimination, nuclear waste~~

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"... scientific integrity, a principle of scientific thought that corresponds to a kind of utter honesty - a kind of leaning over backwards.... you should report everything that you think might make it invalid.... details that could throw doubt on your interpretation must be given... you must present all of the facts that disagree with it, as well as all that agree with [your hypothesis]..."

Richard Feynman

Physicist, Nobel Laureate

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What are the Features of a RCR Course?

- Online vs. In Person vs. Hybrid
- Topics (some are mandated, additional topics are be included)
- Who must take the course?
- Who must teach the course?
- Bureaucracy- record keeping

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What are the Core RCR Topics?

- Responsible Authorship
- Responsible Peer Review
- Mentorship
- Research Misconduct
- Human Subjects
- Animal Subjects

- Data Management & Ownership
- Conflict of Interest
- Conflict of Commitment
- Collaborative Research
- Financial Management
- Biohazards & Biosafety

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What are the Emerging RCR Topics?

- Artificial Intelligence & Publications-Authorship
- Data Transparency, Treatment & Storage
- Reproducibility
- Verification of cell lines, antibodies, and reagents
- Social Media & Preprint Servers
- "Dual Use" of Science & National Security

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RCR Education at the University of Maryland

- UMd has an <u>online</u> course in Mentorship & RCR Overview
- UMd offers online courses on RCR by CITI
- Departments are responsible for administration of RCR education
- Many departments offered discipline tailored RCR education to graduate students and postdocs

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RCR Education at the University of Maryland
in the Department of Chemistry & Biochemistry

- Freshman majors course – one lecture on RCR + other info
- Junior majors course – one lecture on RCR
- First year graduate students have a 3-credit "Professionalism" course that includes 10 hours of in person RCR discussion
  - Writing assignments
  - Lecture material developed by faculty pertaining to RCR
  - Case studies on all topics

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Thank You

Questions? Comments?

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History of Responsible Conduct of Research (RCR) Education

• Started with scientific misconduct, but has become more than "Scientific Misconduct"

• RCR is an overarching philosophy of _individual_ and _institutional_ behavior that encompasses four broad topics
  • research integrity
  • environmental and safety issues
  • fiscal responsibility
  • subject protection

• RCR involves not just faculty, _but everybody who is part of the research endeavor,_ including research staff and administrators

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RCR Education: Born out of Research Misconduct

Going way back…
    Louis Pasteur (1800's), Robert Millikan (1900's)

1970's and 1980's
    William Summerlin (Sloan-Kettering) –skin cancer & transplantation

    John Darsee (Harvard) – cardiologist

    David Baltimore (Rockefeller/CalTech) – immunology

First formal House investigation into scientific misconduct (1981)
    Al Gore "We need to discover whether recent incidents are merely episodes that will drift into the history of science as footnotes, or whether we are creating situations and incentives in the biomedical sciences, and in all of Big Science, that make such cases as these the tip of the iceberg"

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Definition of Scientific Misconduct

US Public Health Service (NIH) Definition

"Misconduct" or "Misconduct in Science" means **fabrication, falsification, plagiarism**, or other practices that deviate seriously from those commonly accepted within the scientific community for proposing, conducting, or reporting research. It does not include honest error or honest differences in interpretations or judgments of data.

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The FFP Clause

Fabrication is making up data or results and recording or reporting results.

Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record. (See Reproducibility)

Plagiarism is the appropriation of another person's ideas, processes, results, or words, without giving appropriate credit. (See Authorship & Peer Review)

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Research misconduct does NOT include differences of opinion or interpretation.

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DoD Definition of Research Misconduct
(DoD Number 3210.7, Enclosure 2)

"Fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. Research misconduct does not include honest error or differences of opinion.

The record of data or results that embodies the facts resulting from scientific inquiry. It includes, but is not limited to, research proposals, laboratory records, progress reports, abstracts, theses, oral presentations, internal reports, and journal articles, whether in physical or electronic form."

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**Core RCR Topic: Conflict of Interest, Consulting,
Current & Pending on Grant Applications**

The University of Maryland has updated its policies and procedures on
- Conflict of Interest
- Conflict of Commitment
- Consulting
- Current & Pending Reports on Grant Applications

to comply with demands from the federal funding agencies.

The University has provided recently workshops to ARLIS staff on these topics.

 If you need advice on how to comply with the existing policies, please contact Beth Brittan-Powell, Pat O'Shea, or Denise Clark.

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RCR and Data Science

The power of "Big Data" tools has been employed to support research integrity
- *IThenticate* for plagiarism
- *Proofig* for image manipulation
- *Microsoft Excel* for data manipulation
- *Leica* for digital capture authentication (Content Authenticity Initiative, C2PA standard)
- *AI imagery*

- Current & Pending info for grant submission

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Case Studies
see Misconduct Summaries at
http://ori.hhs.gov/case_summary

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Case Study – Plagiarism?

Jim Stocking is serving a 4-year term as a member of an NIH study section. His service is a matter of public record, and his name appears on a roster distributed with all written critiques to grant applicants.

Later, while preparing his own grant application, Dr. Stocking reproduces a table and a figure taken from "Background" and "Significance" sections of two applications he has reviewed. He clearly indicates the origin of both items in his own grant and attributes them to the authors.

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<p style="text-align:center;color:blue">Is this legal?
Is it ethical?</p>

<p style="text-align:center;color:blue">As the SRA of the study section, you learn what Dr. Stocking has done.
What, if anything do you do?</p>

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Case Study – Plagiarism?

Maureen has prepared a research proposal in the form of an NIH grant application as part of the requirements for her Ph.D. degree. Maureen conceived the idea for the proposal after reading her mentor's funded NIH grant application. Maureen has developed the idea thoroughly, and her mentor has provided only minimal assistance in the development of her proposal.

Several weeks later, Maureen learns that verbatim sections of her grant proposal have been included in a new grant application being submitted to the NIH by her mentor.

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Is this appropriate?
Is it plagiarism?
How would you 'fix' or 'prevent' this?

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Case Study – Plagiarism?

Professor Lee is writing a proposal for a research grant, and the deadline for the proposed submission is two days from now. To complete the background section of the proposal, Lee copies a few isolated sentences of a journal paper written by another author. The copied sentences consist of brief, factual, one-sentence summaries of earlier articles closely related to the proposal, descriptions of basic concepts from textbooks, and definitions of standard mathematical notations. None of these ideas is due to the author. Lee adds a one sentence summary of the journal paper and cites it.

Does the copying of a few isolated sentences in this case constitute plagiarism?
By citing the journal paper, has Lee given proper credit to the other author?

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NSF Definition of Scientific Misconduct

NSF definition similar to NIH definition, but also includes:

The NSF definition explicitly limits itself to research that applies <u>only</u> to proposals submitted to NSF

A finding of research misconduct also requires:
- Significant departure from accepted practices of relevant scientific community
- Misconduct must be committed intentionally, knowingly, or recklessly
- Allegation must be proven by the preponderance of evidence

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