

Let's Talk About Scientific Integrity

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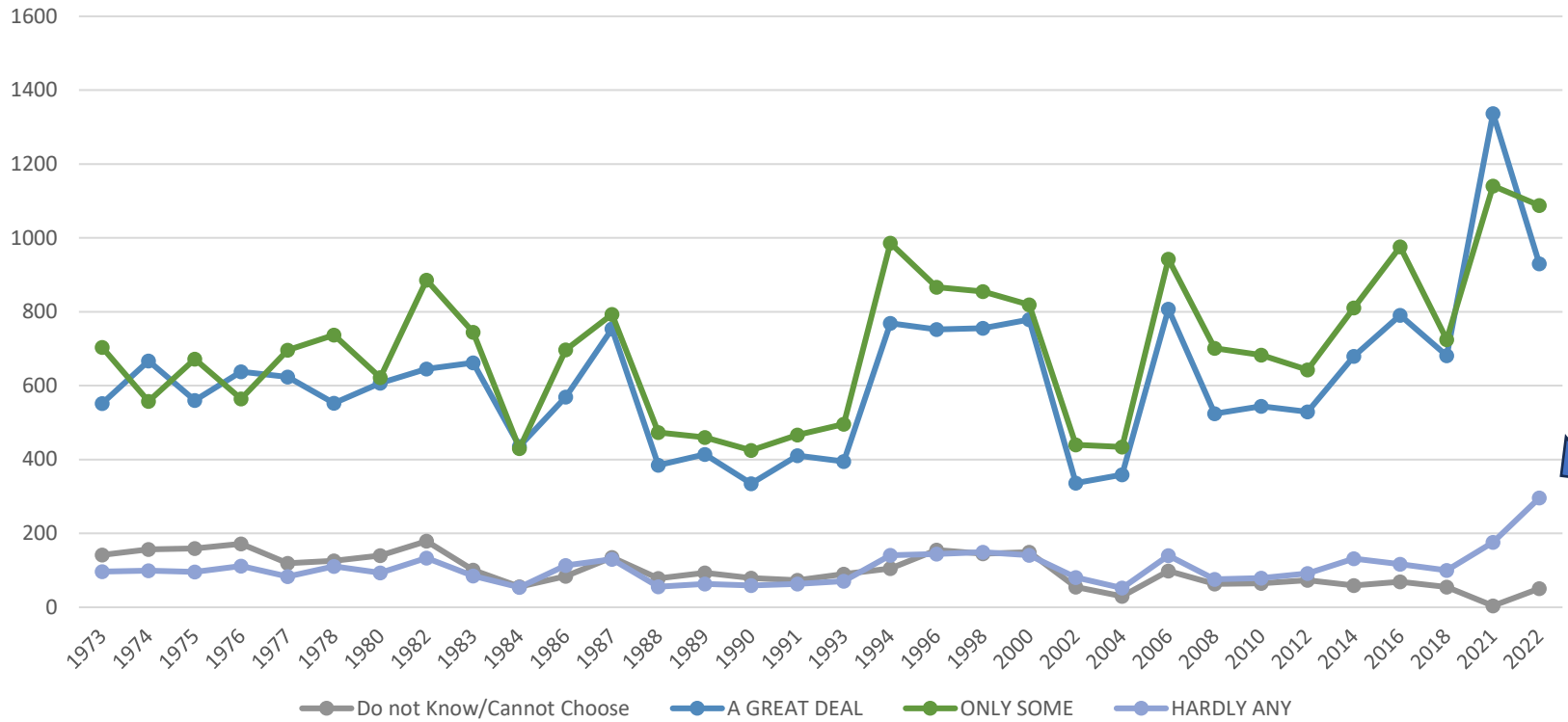
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General Social Survey:

I am going to name some institutions in this country. As far as the people running these institutions are concerned, would you say you have a great deal of confidence, only some confidence, or hardly any confidence at all in them?

Confidence in Scientific Community



TRAINING

ENSURE: Fair Authorship

ENSURE: Peer Review

ENSURE: Free flow of accurate information

ENSURE: DEI and Accessibility are included in program

PROHIBIT: Research Misconduct

PROHIBIT: Political Interference

Government Response



- January 2021: Biden Administration issues Presidential Memo
- January 2022: Protecting Integrity
- January 2023: Framework
- September 2024: OSTP Report/Update

Scientific integrity is the adherence to professional practices, ethical behavior, and the principles of honesty and objectivity when conducting, managing, using the results of, and communicating about science and scientific activities. Inclusivity, transparency, and protection from inappropriate influence are hallmarks of scientific integrity.

REFERENCES:

[Memorandum on Restoring Trust](#)

[Framework for Federal Scientific Integrity](#)

[OSTP 2024 Report](#)

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What is Scientific Integrity?

SCIENTIFIC RESEARCH INTEGRITY IS...



USING HONEST AND VERIFIABLE METHODS AND BEING TRANSPARENT IN PROPOSING, PERFORMING, AND EVALUATING RESEARCH, **WITHOUT BIAS**



CONDUCTING AND REPORTING RESEARCH RESULTS WITH PARTICULAR ATTENTION TO **ADHERENCE TO RULES, REGULATIONS, GUIDELINES, AND POLICIES**



FOLLOWING COMMONLY ACCEPTED PROFESSIONAL CODES OR NORMS; AND

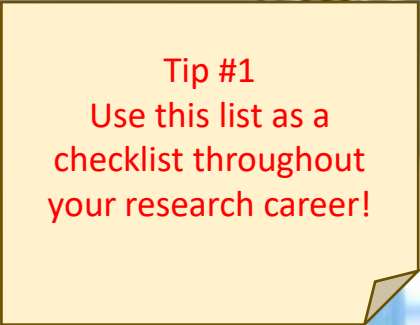


TREATING COLLEAGUES FAIRLY AND WITH RESPECT.

REFERENCES:

[NSF Research Integrity Requirements](#)
[NIH RCR Requirements](#)
[National Academies Fostering Integrity in Research](#)
[Caltech Faculty Handbook](#)
[Caltech Code of Conduct](#)
[Caltech Honor Code](#)

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Tip #1
Use this list as a
checklist throughout
your research career!

Using Honest and Verifiable Methods: Responsible Conduct of Research

- Use Scientific Method/Scientific Rigor/Reproducibility
- Document and Report Accurately
- Avoid Research Misconduct (FFP)
- Avoid Conflicts of Interest and Conflicts of Commitment (Avoid Bias)
- Practice Transparency and Openness in Reporting Research
- Keep up on Training/Education

REFERENCES:

[National Academies Fostering Integrity in Research](#)
[NIH on Rigor and Reproducibility](#)
[National Academies Reproducibility and Replicability](#)
[OSTP Data Sharing](#)
[Federal Regulations Research Misconduct](#)
[NSF Research Integrity Requirements](#)
[NIH RCR Requirements](#)
[Student and Postdoc Training Requirements](#)



Using Honest and Verifiable Methods: Avoiding Research Misconduct

Research Misconduct:

Research misconduct is fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results.

- **Fabrication** is making up data or results and recording or reporting them.
- **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.
- **Plagiarism** is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.
 - * Authorship (Planning, Disputes)

*Research misconduct **does not** include honest error or differences of opinion.*

- If you suspect or know of research misconduct, it must be reported.

REFERENCES:

[Federal Research Misconduct Policy](#)

[NIH \(42 C.F.R. Part 93\)](#)

[NSF \(45 C.F.R. Part 689\)](#)

[NASA \(14 C.F.R. Part 1275\)](#)


[DOE \(Policy and Regulations\)](#)

[DOD \(Instruction\)](#)

[Caltech Research Misconduct Policy](#)

[Caltech Authorship Dispute Process](#)

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Tip #2
Talk to your faculty
advisor about
authorship practices in
their lab.

Tip #3
Caltech has an
iThenticate account you
can use to plagiarism
check your work!

Publication/Authorship

Responsible Authorship

- The PI or the Advisor determines authorship at Caltech.
- The co-authors of a paper should be all those persons who have made *significant scientific contributions* to the work reported and who share responsibility and accountability for the results. (AI?)
- Caltech provides some guidance and a dispute process.

REFERENCES:

[NIH Authorship Guidance](#)

[Caltech Authorship Dispute Process](#)

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Tip #4
Outside Activities need
Approval!

Being Transparent: Disclosure and Avoiding Conflicts

- Researchers' primary Commitment is to Caltech/Research
- Problem: Outside interests can result in bias in research or otherwise significantly affect the design, conduct, or reporting of research; compromise IP, lead to other unethical research behaviors
- Disclose Financial Interests and Commitments & Caltech helps you "manage" them
- Postdocs disclose at hire, annual, and within 30 days of acquiring a new interest:
 - Internships
 - Fellowships (Watch out for foreign government talent programs)
 - Consulting
- Outside Activity (OA) Request
 - Complete BEFORE you start an activity!

REFERENCES:

[Caltech COI Policy](#)
[Caltech FCOI Policy for Federal Sponsorship](#)
[Outside Activity Requirements for Staff](#)
[Consulting for Professorial Faculty](#)
[Research Compliance Resources](#)
[NIH Disclosures \(Bio, Other Support\)](#)
[NSF Disclosures \(Bio, C&P\)](#)
[Foreign Government Talent Programs](#)

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Adhering to Rules, Regulations, Guidance and Policies: Compliance*

Tip #5
This is overwhelming!
If you need help with
any of these areas,
reach out to
ORC@caltech.edu.

- [Animal Research: IACUC](#)
- [Recombinant Nucleic Acid Research: Institutional Biosafety Committee/Dual Use Research of Concern](#)
- [Disclosure of Conflicts of Interest and Commitment](#)
- [Data Management/Sharing](#)
- [Export Compliance](#)
- [Human Subjects Research: IRB](#)
- [Intellectual Property \(Patents, Copyrights\)](#)
- [International Collaboration](#)
- [Publication/Authorship](#)
- [Radiation Safety](#)
- [Research Misconduct](#)
- [Research Security](#)
- [Responsible Conduct of Research](#)
- [Stem Cell Research](#)
- [Use of Controlled Substances and Chemical Precursors](#)

REFERENCES:

[Research Compliance Website](#)
[Research Administration Website](#)
[Office of Technology Transfer and Corporate Partnerships Website](#)
[Caltech Library Website](#)

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* This list is not meant to be exhaustive, only an example of some of the requirements

Tip #6

Talk with your faculty advisor about these. Make sure you understand their expectations of you.

Tip #7

Caltech has a subscription with LabArchives, an electronic notebook system.

Following Commonly Accepted Professional Codes or Norms

Ethical Codes: Caltech Honor Code; Caltech Code of Conduct

Professional Codes: Generally, subject matter specific, but there are some overarching similarities:

- Common Values
- Data Management/Sharing Practices
- Documentation
- Publication/Responsible Authorship

REFERENCES:

[Caltech Faculty Handbook](#)
[Caltech Code of Conduct](#)
[Caltech Honor Code](#)

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Treat Colleagues Fairly and with Respect



The climate and culture in the laboratory should provide an environment that is productive and collaborative.

- Federal Agencies Strongly Encourage Diversity in the Lab Environment- research shows that diversity has a positive impact on the science!

Tip #8
Be a supportive and respectful team member.

Tip #9
Report any concerns to your Advisor, Division Office, or appropriate Caltech organization.

REFERENCES:

[National Academies: Sexual Harassment of Women](#)
[NSF Sexual Harassment Policy](#)
[NSF Requirements for Notice](#)
[NIH Supporting a Safe and Respectful Workplace](#)
[NIH Requirements and Expectations](#)
[NIH Notice Requirement](#)
[NIH Diversity Matters](#)



Mentor Training



For all career stages. Mentors of research trainees learn to

- Align expectations
- Address equity and inclusion
- Articulate a mentoring philosophy and plan
- Assess understanding
- Cultivate ethical behavior
- Enhance work-life integration
- Foster independence
- Maintain effective communication
- Promote mentee research self-efficacy
- Promote professional development

Tip #10
Look for opportunities to
build your mentoring
skills!



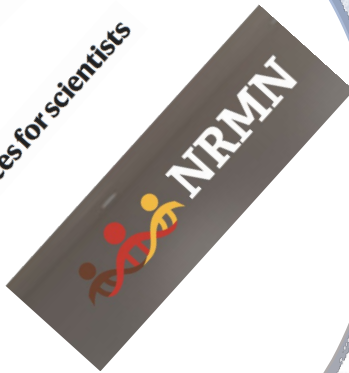
Mentoring and Being Mentored

Mentoring Components:

- career counseling;
- training in preparation of proposals, publications and presentations;
- guidance on ways to improve teaching and mentoring skills;
- guidance on how to effectively collaborate with researchers from diverse backgrounds and disciplinary areas; and
- training in responsible professional practices



nature
Mentoring resources for scientists



REFERENCES:

- [National Research Mentoring Network \(NRMN\)](#)
- [Center for the Improvement of Mentored Experiences in Research \(CIMR\)](#)
- [Nature Mentoring Resources](#)
- [Caltech Student Faculty Programs- Mentoring](#)





What if I Have Questions or Need Help with a Research Integrity, Compliance or Research Security Issue?

- [Office of Research Policy and Compliance](#)
- [Office of Technology Transfer and Corporate Partnerships](#)
- [Office of Research Administration and Sponsored Research](#)
- [Office of Export Control](#)
- [Research Compliance Committees \(IRB, IACUC, IBC, Radiation, HESC\)](#)
- [Environmental Health and Safety](#)
- [Title IX Office](#)
- [Graduate Studies Offices \(Resources\)](#)
- [Caltech Student Faculty Programs- Mentoring](#)

There are links to all of these offices/organizations at:

www.researchcompliance.caltech.edu

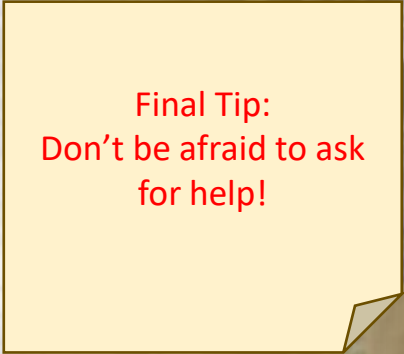
Reporting Issues or Concerns:

(1) Contact Audit Services and Institute Compliance from here.

•Submission through the **Online Hotline Form** by clicking [HERE](#).

•Anonymous via telephone at (626) 395-8787 or toll-free at (888) 395-8787

(2) Contact the Office of Research Compliance: orc@caltech.edu



**Final Tip:
Don't be afraid to ask
for help!**

Thanks!



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General Guidelines for Authorship Contributions

Contributions	Authorship? (■ yes; ■ no)	Comments	
Design & Interpretation of results	original idea, planning & input	■	An idea alone may not warrant authorship, unless highly original & unique
	other intellectual contribution	■	Yes, but assuming active involvement
Supervisory role	supervision of the project	■	Yes, but assuming active involvement
	training, education	■	
	mentoring of 1st author	■	No, unless substantive contribution made to study
Administrative & technical support	resources: \$	■	Acknowledgements yes, authorship no
	resources: animals, reagents	■	No if already published; yes if novel
	resources: patients	■	Maybe, depending on circumstances
Data acquisition	original experimental work	■	
	technical experimental work	■	No if routine; yes if novel methods added, or specific role, e.g., statistics, imaging etc.
	data analysis (assays)	■	Yes, unless only very basic
	data analysis (statistics)	■	Yes, unless only very basic (t-tests e.g.)
Writing & other	drafting of manuscript	■	Warrants first authorship
	reading/ commenting on manuscript	■	Substantial feedback can be acknowledged
	none	■	Includes honorary authorship for lab chiefs, celebrities etc.