The College of Engineering @ Michigan State University

Overview of Responsible Conduct of Research

December 2010

Advancing Knowledge, Transforming Lives
Give Credit where Credit is Due!!!

Much of the Material in this briefing come from...

The Graduate School
Michigan State University
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Outline

- Why Responsible Conduct of Research Training
- College of Engineering’s Plan
- How To Register for NCRS, CITI Courses, RTTS
- Q & A
- Background Material on Select Topic Areas
  - Plagiarism
  - Authorship
  - Intellectual Property
  - Data Management
  - Collaborative Research
  - Human Subjects
Why RCR? Why Now?

- Conducting research with integrity is essential to your career, MSU, and the world as a whole.
- It is the right thing to do!!!
- Why now?
  - NSF requires RCR training on all funded projects resulting from proposals due on or after 04 Jan 2010
  - NIH requires RCR training…
  - Provost Wilcox and Vice President Gray require RCR training for all research at MSU (eventually)
What is RCR?

- Honesty
- Accuracy
- Objectivity
- Fairness

RCR is Important to You

- Establish credibility as a researcher
- Establish a clear “path” of data
- Enable further research
- Contribute to the field of research
- Meet the expectation of public trust
- Membership in the community of scholars-- traditions, values, ethics
Traditions and Values of the Academy

“The scientific research enterprise, like other human activities, is built on a foundation of trust.”


You are the latest contributor to a saga that has transformed humanity for centuries…
College of Engineering’s RCR Plan

- NSF Requirement: 5 hours in first year, 3 hours each year thereafter as a MINIMUM
  - Other granting agencies may require more hours/year
- Introductory Briefing (this event)
  - 1 hour
- CITI RCR for Engineers (https://www.citiprogram.org/)
  - On-line training (1-3 hours/year)
- Face-to-Face Time with you Major Professor
  - At least 1 hour per year
- Good Ideas:
  - Department Courses with RCR Content: BAE820, CE890, CHE/MS802, ECE390/480, ENE880, ME481
    - Ask the instructor if you can “visit” during the RCR lectures
  - Other college’s RCR sessions
  - Graduate School sessions (http://grad.msu.edu/rcr/)
- **You will log your hours** (https://www.egr.msu.edu/secureresearchcourses/)
  - If you don’t tell them, it did not happen!
Registering on the System

- College of Engineering RCR Tracking (https://www.egr.msu.edu/secureresearchcourses/)
- Non-Credit (https://noncredit.msu.edu/)
- CITI (https://www.citiprogram.org/)
Log onto the system
- Username is your MSU Net ID (e.g., kempel)
- Password is your DECS password
- Select: Create/Editor Trainee Account
  - Add Current Academic Year
- Indicate type of trainee (undergraduate, graduate, post-doctoral researcher)
- Select department
- Identify faculty advisor (MSU Net ID)
- Save

Add Record
- Enter type of training (e.g., CITI module, PI meeting, etc), date, number of hours
- Save
Example Record

When you have completed your annual Training hours: Print, sign, get advisor’s signature and bring to your Department’s Graduate Secretary...
CITI: Collaborative Institutional Training Initiative

- On-line material for training
- The College of Engineering is using the Responsible Conduct of Research - Engineering Course
- See: https://www.citiprogram.org/
Registering for CITI

Complete Registration Steps 1-7 now.

1. Select your institution or organization

Choose your institution from the appropriate dropdown menu. Choose only one institution. If you are affiliated with more than one institution, you will be able to select additional institutions after providing the information required.

Participating Institutions:
- Michigan State University (WSU)
- Veterans Affairs:
- Department of Energy:
- HIV/AIDS Network Coordination (HANC):
- Canadian Institutions:

2. Create your Username and Password

Your username should consist of 4 to 50 characters. Acceptable characters include letters, numbers, and the symbols "@", ",", and ".". No spaces or other characters are allowed. Your username is not case sensitive. "A12345678" is the same as "a12345678". Once created, your username will be part of the completion report.

Username: [Input]

Your password should consist of 8 to 12 characters. Letters and numbers are the only acceptable characters. No spaces or other characters are allowed. Your password is not case sensitive. "A12345678" is the same as "a12345678". Once created, your password will be part of the completion report.

Password: [Input]

Verify Password: [Input]

3. Create your Security Question and Answer

If you forget your login information, we'll verify your identity with your security question and answer. Choose a question only you know the answer to and that is not associated with your password. Choose an answer that is memorable, but not easy to guess.

Security Question: [Input]

Security Answer: [Input]

4. Enter your name

First Name: [Input]

(100 characters maximum)

Last Name: [Input]

(100 characters maximum)

5. Enter your email address

Enter your preferred email address.

Preferred Email: [Input]

(100 characters maximum)

Verify Preferred Email: [Input]

(100 characters maximum)

If you have a secondary email address that can be used in case your preferred email address changes, enter it below. If you forget your username or password, it will be mailed both to your preferred email address and your secondary email address.

Secondary Email: [Input]

(100 characters maximum)

Verify Secondary Email: [Input]

(100 characters maximum)

6. CME/CEU credits (required)

Do you anticipate requesting CME / CEU credits for the course(s) you are about to complete?

- [ ] Yes
- [ ] No

What is your professional affiliation for the credits?

Professional affiliation: [Input]

7. Course Survey (required)

Ways are contact you to complete a course survey?

- [ ] Yes
- [ ] No
These questions are required by MSU for to track data on who is making use of CITI.
Course Selection

Select the courses you need:
- Human Subjects
- Animal Welfare
- RCR for Engineers
Main Menu and Engineering Modules

CITI Collaborative Institutional Training Initiative

Main Menu

This is the email address we have for you: kempel@msu.edu. If this is not correct, click here to edit your email address and other account information including your security question and answer.

You are affiliated with 1 participating institution(s) on the CITI website. You will have at least one gradebook per institution to track your progress in meeting the institution’s coursework requirements (see below).

Affiliate with another institution | Change login information | Click here to Apply for CME/CEU Credits

Michigan State University (MSU)

You have enrolled for the following courses:

- Responsible Conduct of Research for Engineers, Basic Course
  - Not Started
  - Not Earned
  - N/A
  - Not Available

Add a course or update your learner groups for Michigan State University (MSU)

Optional Modules (completion is completely voluntary and will not count toward a completed course)
- Update my profile information for Michigan State University (MSU)
- See a list of all modules that you have completed (goes back to approximately

CR# 4894598: Responsible Conduct of Research for Engineers

To pass this course you must complete all the elective modules with a combined score of 80. Your current score is 0.

<table>
<thead>
<tr>
<th>Elective Modules</th>
<th>Required: 15</th>
<th>Completed: 0</th>
<th>Date</th>
<th>Complete</th>
<th>Score</th>
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<td>The Use of Live Animals in Research</td>
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<tr>
<td>Ethical Issues in the Management of Data in Engineering Research</td>
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<tr>
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Interpersonal Relationships

- Research teams are likely to be diverse
  - Interdisciplinary
  - Multi-cultural, multi-ethnic, multi-national
  - Differing levels of research experience
  - Differing levels of education
- Best practices
  - Get to know your colleagues and learn to appreciate their diverse attributes
  - Respect their contributions, interests, and needs
  - Educate each other
Desirable Work Habits

Some of the adages from *All I Really Need to Know I Learned In Kindergarten* (Robert Fulgham, 2003, Random House) hold true when applied to the research environment:

- Share everything
- Play fair
- Don't hit (hurt) people
- Put things back where you found them
- Clean up your own mess
- Don't take things that aren't yours
- Say you're sorry when you hurt somebody
When you get what you want in your struggle for self
And the world makes you king for a day,
Just go to a mirror and look at yourself,
And see what that man has to say.

For it isn't your father or mother or wife,
Who judgment upon you must pass;
The fellow whose verdict counts most in your life
Is the one starring back from the glass.

He's the fellow to please, never mind all the rest.
For he's with you clear up to the end,
And you've passed the most dangerous, difficult test
If the man in the glass is your friend.

You may be like Jack Horner and "chisel" a plum,
And think you're a wonderful guy,
But the man in the glass says you're only a bum
If you can't look him straight in the eye.

You may fool the whole world down the pathway of years.
And get pats on the back as you pass,
But your final reward will be the heartaches and tears
If you've cheated the man in the glass.
Questions???
Background Slides

- Plagiarism
- Authorship
- Intellectual Property
- Data Management
- Collaborative Research
- Human Subjects
Plagiarism is Global... and Local!!!

Allegations of Scientific Misconduct, Received at MSU, 2002/03 – 2006/07

Data from MSU Research Integrity Officer, 10/8/07
What is Plagiarism?

Plagiarism is the “use or close imitation of the language and thoughts of another author, and the representation of them as one's own original work”

What is Plagiarism? (continued)

- Plagiarism is **stealing** by using another person’s words or ideas
- Plagiarism is **academically dishonest**
- Plagiarism is **unacceptable**
- Plagiarism **can/will result** in penalties

If you use someone else’s words or ideas, you **must** give them credit to honor their thinking and words. Failing to give credit is plagiarism.
What is Plagiarism? (continued)

- “The uncredited (no quotation marks, no reference) use (both intentional and unintentional) of somebody else's words or ideas” ([http://owl.english.purdue.edu/owl/resource/589/01](http://owl.english.purdue.edu/owl/resource/589/01))
- Unintentional plagiarism is still plagiarism – “I didn’t know” is not an excuse
- “Copying large sections of text from a source without quotation marks or proper citation” ([http://www.stateuniversity.com/blog/permalink/How-to-Avoid-Plagiarism.html](http://www.stateuniversity.com/blog/permalink/How-to-Avoid-Plagiarism.html))
- Plagiarism can occur with any source of information, including books, journal articles, newspapers, other print media, and the internet
Is this Plagiarism?

Original work: Academic excellence comes through recognition by one's peers. Some new and innovative ideas have the potential for generating widespread professional interest and credit in the area of their scholarship for purely academic reasons. Others have the potential for generating substantial commercial interest and financial gain. Either can be motivation to stretch and even exceed acceptable standards of conduct in how scholarship is conducted. ([http://grad.msu.edu/all/respconduct.htm](http://grad.msu.edu/all/respconduct.htm))

Work done by a student after reading the original work: Recognition of your research and writing by other faculty and students demonstrates excellence. Some new research or scholarship can create great interest among your professional colleagues and credit as a contribution to knowledge. Others have the potential for generating substantial commercial interest and financial gain. Either of these outcomes could encourage a person to conduct research in a way that is not responsible.
Why Do People Plagiarize?

This list is from experts at the University of Alberta
http://www.library.ualberta.ca/guides/plagiarism/why/index.cfm

Writing and research skills
- Lack of research skills
- Problems evaluating internet sources
- Confusion between plagiarism and paraphrasing
- Confusion about terminology
- Careless note-taking
- Confusion about how to properly cite sources
Why Do People Plagiarize? (continued)

Misunderstanding key concepts

- Plagiarism
- Intellectual property, copyright, and public domain
- Common knowledge
- Perception of online information as public knowledge

External factors

- Pressure from family, competition for scholarships and jobs
- Student ethics and relationship with the university
- The commoditization of knowledge and education
Why Do People Plagiarize? (continued)

Internal factors
- Poor time management and organizational skills

Cultural factors
- Culturally based attitudes towards plagiarism
Authorship Issues

Disputes about authorship represent about 25% of all problems reported to the MSU Research Integrity Officer (http://www.rio.msu.edu/)

Why Does Authorship Matter?

- Recognizes accomplished work – it is fair and important to receive credit for one’s contributions
- Encourages continued research and publication efforts
- Establishes scholarly reputation for
  - Acceptance to advanced degree programs, post-doctoral fellowships, and faculty positions
  - Promotion and tenure decisions
  - Determination of merit pay increases
  - Grant applications
  - Awards
  - Get “THE POSITION YOU WANT”
- Helps establish the scholarly reputation of the department, program, and university
In your discipline, how many publications are needed by:

- An undergraduate or master’s degree student seeking admission to a top doctoral program?
- A doctoral student seeking admission to a top post-doctoral program?
- A doctoral student seeking a job at a university or other setting?
- An assistant or associate professor seeking reappointment, promotion, or tenure at MSU?
- How do you know? Where can you find this information?
The number of publications you need depends on:
- Your discipline
- Your university or place of work
- Your "line of research"

The importance of a publication to your scholarly reputation depends on:
- Your contribution to the manuscript
- Quality of the manuscript
- Quality of the journal

Ask your mentor(s) if you have questions!
Authorship Guidelines

- MSU researchers are expected to comply with the authorship policies of the journals or other venues in which they publish
- Use the MSU Authorship Guidelines if the journal publisher does not have a policy or guidelines
- If your work is subject to conflicting guidelines, discuss the matter with your coauthors and work toward a consensus solution

Source: J. Pivarnik, MSU Research Integrity Officer, personal communication, 10/29/09
The MSU Authorship Guidelines are based upon these principles and best practices:

1. Authors should demonstrate:
   a. Substantial participation in conception and design of the study, or in analysis and interpretation of data
   b. Substantial participation in the drafting or editing of the manuscript
   c. Final approval of the version to be published
   d. Ability to explain and defend the study in public or scholarly settings
2. Contributions that do not justify authorship should be acknowledged
3. Honorary authorship should not be tolerated
4. The rights of graduate students to publish the results of their research should be protected
5. The “senior” author is the person who leads the study and makes the most substantial contribution
6. The senior author determines order of authorship in consultation with other members of the research team (see notes below this slide!)
7. Disputes over authorship should be resolved by senior author and/or principal investigator (PI) in collaboration with other authors – mediation may be appropriate if disputes cannot be resolved amongst the authors.
Intellectual Property (IP)

- **What is it?**
  - Confidential data, patents, copyrighted material, trade secrets, etc

- **IP has value...**

- **Focus of this conversation?**
  - IP owned by someone else!!!

- **Why protect it?**
  - It is not yours, not your major professors, not MSUs...
When will you run into IP owned by others?

- Printed material (see discussion on plagiarism as to why you need to not steal someone else’s IP)
- Data as part of a Confidential Data Agreement (CDA)
  - Do not sign a CDA yourself; there are potential implications that are complex
  - For example: A signed CDA on research that may be export-controlled will possible negate the “Fundamental Research Exemption” enjoyed by US academic institutions: serious criminal and civil penalties can follow
  - CDA’s are signed on behalf of MSU by MSU Technologies and binds all MSU employees including graduate student research assistants
- Data that you know is protected and somehow you acquired it...
  - Not saying you did anything wrong; sometimes someone else’s IP is “laying around -- physically or electronically.
Basic Means to Protect IP

- Only release the IP to someone authorized to have it
  - MSU employee for example
- Ensure that your material meant for unrestricted release does not contain someone else’s IP
  - Papers, presentations, unlimited reports, etc
  - Have someone authorized to have IP review your material, you will miss a mistake 100+ times in a row
- Lock up data when not in use
  - Paper in file cabinets/desks, locked electronic folders
- When in doubt, ask!!!
  - Don’t ASSUME, get information from experts
What Are Research Data?

“Recorded information, regardless of the form of the media on which it may be recorded, necessary to support or validate research findings”

MSU’s guidelines on Research Data: Management, Control and Access, [http://rio.msu.edu/research_data.htm](http://rio.msu.edu/research_data.htm)
What is Included?

- “Textual information, numeric information, instrumental readouts, equations, statistics, images (whether fixed or moving), diagrams, and audio recordings”
- “Raw data, processed data, published data, and archived data”
- “Data generated by experiments, by models and simulations, and by observations of natural phenomena at specific times and locations”

Inclusions (cont)

- "Data gathered specifically for research as well as information gathered for other purposes that is then used for research"
- "Data stored on a wide variety of media, including magnetic and optical media"

Exclusions

- “Physical objects (including living organisms) and other materials used in research such as biological reagents or the devices, instruments, or computers that generate experimental or observational data”
  - Note that written, numeric, or visual descriptions of physical objects do constitute data
- “Information that can be important in research but is not used to generate research conclusions including interpretive statements, or matters of personal judgment …”

Management of Research Data

- **Control** – physical management of research data and records
- **Access** – conditions under which various people may inspect or use research data
- **Ownership** – in a legal sense, who owns the data
“Ensuring the integrity of research data is essential for advancing scientific, engineering, and medical knowledge and for maintaining public trust in the research enterprise. Although other stakeholders in the research enterprise have important roles to play, researchers themselves are ultimately responsible for ensuring the integrity of research data.”

“Research data, methods, and other information integral to publicly reported results should be publicly accessible.”

Data Stewardship Principle

“Research data should be retained to serve future uses. Data that may have long-term value should be documented, referenced, and indexed so that others can find and use them accurately and appropriately.”

Responsibilities

The **Principal Investigator** (PI) is responsible for:

- Determining how data should be collected, stored, secured, retained, and if necessary, recovered in the event of disaster
- Educating members of the research team about the management of research data
- Supervising members of the research team to whom any of these responsibilities have been delegated
Data Retention

- At MSU research data must be kept for at least 3 years after the final publication or report.
- Longer periods of retention may be needed:
  - To protect intellectual property (e.g., patents)
  - For resolution of misconduct or financial conflict of interest allegations
  - For student research – until degree is awarded
  - If the sponsor has a longer retention period; know your sponsor’s requirements!!!
- Data may be destroyed after the retention period (describe the destroyed data/date in lab notebook).

Research Data: Management, Control, and Access
http://rio.msu.edu/research_data.htm
Who Owns “Your” Research Data

- MSU is the owner of scientific data and records for projects conducted at the university
- Exception:
  - Funded research with contracts that include specific provisions regarding ownership, retention, and access to technical data

Source: Research Data, Management, Control, and Access, http://rio.msu.edu/research_data.htm
Transfer of Research Data

- The PI must retain original data and research records at MSU.
- When researchers (including students) leave MSU, they may take copies of research data for projects on which they have worked.
- If the PI leaves and a project is moved to another institution, ownership or custody of the original data may be transferred with approval of the Vice President for Research and Graduate Studies and written agreement from the PI’s new institution.
Effective Collaboration

“Collaboration is a major responsibility – one that is not to be entered lightly. It will take time, effort, and the nurturing of relationships.”

Role of the Principal Investigator

The PI must provide leadership with respect to:

- Clear written expectations about the roles and responsibilities of each research team member
- A management plan that specifies the chain of command for important project components
- Adequate training and supervision
- Compliance with applicable policies and regulations

Responsibilities of Collaborators

Personal qualities of a good collaborator

- Honesty
- Openness
- Fairness
- Hard-working
- Respect
- Reliability

Source: Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty (2nd ed., p. 207), (2006), Burroughs Wellcome Fund & Howard Hughes Medical Institute
Sharing Credit

- **Authorship** – discuss plans at the outset of the collaboration and review periodically
- **Patents**
  - Discuss likely ownership of potential discoveries and shared work
  - Determine who will manage patent applications and maintain patents that are received

**Source:** *Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty* (2nd ed., p 206), (2006), Burroughs Wellcome Fund & Howard Hughes Medical Institute
Human Subjects

- Increasingly, Engineering faculty and students are participating in research involving Human Subjects
  - Surveys, measurements of biological responses, biometrics, etc.
  - Human subject means “a living individual about whom an investigator … conducting research obtains (1) data through intervention or interaction with the individual, or (2) identifiable private information”

- The Institutional Review Board (IRB) is responsible for monitoring and approving research plans involving Human Subjects
  - See: http://www.humanresearch.msu.edu/

Rule-of-Thumb: When in doubt, ask the IRB. Let them tell you you do not need IRB approval.
Important Information

- Every investigator associated with a project (including students) must be listed on the IRB application.
- Every investigator listed on the IRB application must have current training.
- The IRB cannot approve a research project after the fact – the application must precede the research.
- Failure to observe IRB regulations is an unacceptable research practice that will result in penalties for the investigator.
  - Such situations may be referred to the MSU Research Integrity Officer for action.
  - Dissertations and theses might not be accepted by the Graduate School.
  - Graduate students may be dismissed from their degree programs and the university.
  - Journals may refuse to publish manuscripts without evidence of IRB approval.
Where to Go From Here?

- Talk to your Major Professor!!!
- Graduate School (http://grad.msu.edu)
  - http://grad.msu.edu/researchintegrity/resources/