Plan for Responsible Conduct of Research (RCR) Training
Department of Physics and Astronomy
Effective January 1, 2017

Training in Responsible Conduct of Research (RCR) is essential to the preparation of future scholars and professionals. An understanding of the issues concerning the conduct of research in an increasingly complex world has become critical in successfully navigating the research landscape. To help prepare MSU graduate students for their future scholarly work, a plan for providing the foundation of responsible conduct has been developed in coordination with the Graduate School, the Vice President for Research and Graduate Studies Office, and college associate deans for graduate education. The plan is predicated on the principles that a basic understanding of issues is necessary through didactic training and a periodic reinforcement of the principles through discussion. This plan will provide a foundation for all graduate students pursuing a career in research and will offer the basic information to meet most federal agency granting requirements. The following plan for the Department of Physics and Astronomy (PA) meets the university-level requirements and goes into effect for all graduate students entering the PA program as of January 1, 2017. (Graduate students that entered before Jan. 1, 2017 may choose to follow the previous version of the RCR training.)

Graduate Student Training:

All graduate students (master's and doctoral) must complete a set of CITI online modules as well as complete 6 hours of discussion-based training by the completion of their degree. Doctoral students must also complete 3 hours of refresher training annually starting in their third year until completion of their degree. The CITI modules and any Graduate School RCR Workshops will be tracked in SABA. The PA department will track all other training in GradInfo. The completion of the discussion-based training will be recorded in GradInfo as "Initial training" and the annual refresher training will be recorded in GradInfo as "Annual training".

Year 1:
- All graduate students will complete the 4 following CITI online modules:
    - Introduction to the Responsible Conduct of Research
    - Authorship
    - Plagiarism
    - Research Misconduct
        - Information on how to complete the CITI modules can be found at https://grad.msu.edu/rcr.
- (1.5 hour discussion-based training) During orientation week, all incoming students will attend a 1.5-hour discussion within the PA department covering the following topics:
        - Honesty, accuracy, efficiency and objectivity
        - Authorship, publication, and data ownership and sharing policies
        - Research documentation and reproducibility of results

Year 2:
- Master's Plan A and doctoral students will complete the 3 following CITI modules:
    - CITI Collaborative Research
    - CITI Conflicts of Interest
    - CITI Data Management

- All master's (both Plan A and Plan B) students must have 4.5 more hours of discussion-based training to satisfy the university requirement of a total of 6 hours. This may be fulfilled by a combination of the following options totaling at least 4.5 hours:
    - (1.5 hours) Attend a 1.5-hour RCR workshop offered by the Graduate School (see https://grad.msu.edu/rcr).
    - (3 hours) Attend a 3-hour RCR workshop offered by the PA department. Currently two different workshops have been offered. Both focus on ensuring accurate, documented and reproducible results. One workshop centers on record keeping in laboratories, especially lab notebooks. The other explains programming best practices with an emphasis on version control.
        - In the event the PA workshops are not offered in a particular year the discussion-based training must be satisfied by taking 3 RCR workshops offered by the Graduate School.

Year 3 and Onward:
- Doctoral students must complete 3 hours of **refresher** training annually which is fulfilled by the following:
    - (1.5 hours) Once graduate students pass their exams and are doing research, they are required to meet with their guidance committee on a yearly basis. In preparation for this meeting the student must fill out a form in consultation with their thesis advisor answering 2 questions: 1) How is authorship determined for any publications related to your research? and 2) How do you ensure your work is reproducible? Describe how any computer programs, derivations and data are being documented and archived. The PA department keeps the form as part of the documentation that the student has satisfactorily fulfilled their annual guidance committee meeting.
    - (1.5 hours) Attend a 1.5-hour RCR workshop offered by the Graduate School (see https://grad.msu.edu/rcr) **OR** complete one CITI online module that has not been completed before such as:
        - CITI Financial Responsibility
        - CITI Mentoring
        - CITI Peer Review
- Doctoral students will be encouraged to attend the PA department's own RCR workshops when offered. So far two 3-hour workshops have been offered focused on ensuring accurate, documented and reproducible results. One workshop centered on record keeping in laboratories, especially lab notebooks, and the other on programming best practices with an emphasis on version control. One of these workshops would count as 3 hours towards **both** the annual refresher training and the discussion-based training.
- By the end of Year 5 doctoral students will have at least 6 hours of discussion-based training by spending 1.5 hours in Year 1 at orientation plus 1.5 hours in Years 3, 4 and 5 in preparation for their yearly guidance committee but may have more.
    - The average time to complete a Ph.D. in physics is 6 years but if a student will complete their Ph.D. before Year 5 they can still satisfy the discussion-based requirement by taking an RCR workshop (either from PA or the Graduate School) instead of the CITI online module in Year 3 or beyond.