**Training in the Responsible Conduct of Research**

Our RCR training **exceeds NIH recommendations**, with **21.5 hrs of face-to-face training** **with faculty** in a discussion format over 7 years, and an additional 4 hrs of online instruction, followed by a week-long full time course in the final MD year. The students are exposed to **all nine topics** recommended by NIH, including research misconduct, data acquisition and management, conflict of interest, responsible authorship/publication, peer review, mentor/mentee responsibilities, collaborative science, use of animals or humans in research, and the scientist as a responsible member of society. Training **meets the NIH instructional plan** for Format, Subject Matter, Faculty Participation, Duration and Frequency. To ensure that the topics required in NOT-OD-10-019 are considered in sufficient depth and to consolidate learning within a “broad conceptual framework”, RCR training is spread over 8 years using the **stage-appropriate model** outlined below. Note specifically that over their last 4 years in the PhD phase of the program, this schedule provides **14.5 hrs** **of face-to-face RCR training**, whichexceeds the NIH mandate of a minimum of 8 hours per 4 years.

**Year 1, MD primary phase** (**1 hr**): Students attend an introductory lecture (1 hr) on RCR that touches on each of the issues listed above, including coverage of Research Misconduct, and introduces a resource of RCR-related materials developed by BGS (<https://www.med.upenn.edu/bgs-rcr-exdes/>), including policies and guidelines, case-studies, and material for study in each of the above topics. This site also provides electronic versions of *Scientific Integrity* (Macrina, ASM Press) and *Responsible Conduct of Research* (Shamoo and Resnik, Oxford University Press). Finally, RCR principles are re-enforced by separately mandating students to complete an online module in the Collaborative Institutional Training Initiative (CITI) RCR Program (1 hr; over and above year 2, 3hr tally).

**Year 2, MD primary phase** (**6 hrs**): Students take *Case Studies in Translational Research* in the fall. This is a weekly small group overseen by the MD-PhD program director. Topics relevant for RCR include human subjects use, including children; informed consent; intellectual property; and ethics of translational research.

**Year 3, PhD primary phase** (**7 hrs**): During orientation, students attend sessions on data acquisition and management, focusing on best practices regarding traditional and electronic laboratory notebooks (2 hr), and on professionalism, including mentor/mentee responsibilities (2 h). Each student is mandated to participate in **small group (10-12) discussion**, led by two physician scientist training faculty (**1.5 hr; Please insert date of your training, and list faculty present; example: “5/15/2018; PIs DiNardo & Gold”**). Topics are research misconduct (including plagiarism), data management, and mentor/mentee relationships. Students review case studies in advance and are given the article ‘What’s in a Picture? The temptation of image manipulation’ (*J. Cell. Biol.* 166: 11–15, 2004). During case study workshops, students and faculty engage together in analysis, review of facts, and study of the ethical principles raised. In addition, each student participates in a **RCR-dedicated lab meeting** (**1.5 hr; Please insert date of lab RCR training**), led by their PI who selects the topic and facilitates a discussion among lab members. This design satisfies the small-group benefits of discussion, and explicitly treats RCR issues that grow out of the laboratory’s research area. These **RCR meetings are reported to BGS** by the PI, and document topics covered, materials used, and the trainees participating. Finally, RCR topics are re-enforced by mandating an online CITI module (1 hr; not included in the 3hr tally).

**Year 4, PhD primary phase** (**3 hrs**): Each student is mandated to participate in small group discussions led by our physician-scientist faculty (**1.5 hr**; **Please insert date of your training, and faculty present**). Topics are collaborative science, the use of animals and humans in research and scientist as a responsible member of society. Students participate in a **RCR-dedicated lab meeting** (**1.5 hr; Please insert date of lab RCR training**) (see Year 3 description). Finally, RCR topics are re-enforced by mandating an online CITI module (1 hr; not included in the 3 hr tally).

**Year 5, PhD primary phase** (**3 hrs**): The mandated small group discussion revolves around the stage-appropriate topics of conflicts of interest, authorship/publication practices, and peer review (**1.5 hr; Please insert date of your training, and faculty present**). Students participate in an **RCR-dedicated lab meeting (1.5 hr; Please insert date of lab RCR training**) (see Year 3 description). Finally, RCR topics are re-enforced by mandating an online CITI module (1 hr; not included in the 3 hr tally).

**Year 6 & 7, PhD primary phase** (**1.5 hr; Please insert date of lab RCR training, or “To Be Arranged”**). Students participate in an **RCR-dedicated lab meeting** (see Year 3 description).

**Year 8,** **MD primary phase** **(26 hours):** Graduating MD-PhD students take a required week-long course, *Bioethics and Professionalism*, which has 26 hrs of formal instruction: 11.5 hrs of lectures, panels and seminars plus 17.5 hrs of small group sessions. It is the capstone to MD curriculum in professionalism and medical ethics and is taught by faculty from the medical school and the School's Dept of Medical Ethics & Health Policy. Topics include confidentiality, informed consent, conflict of interest and professionalism.