Background: The National Science Foundation (NSF), to meet the intent of the America COMPETES Act, have established a new requirement for responsible conduct of research (RCR) training for all undergraduate students, graduate students, and post-doctoral personnel engaged in the conduct of research. The Association of American Universities (AAU) has recommended five hours in the first year of a person’s research career and three years annually thereafter or as required by a specific funding agency, whichever is larger. Michigan State University (MSU) endorsed this time standard in its implementation of RCR training. Provost Wilcox and Vice President Gray have charged the various units on campus to establish plans [1]. The College of Engineering has elected to develop a college-wide plan. It is expected that all or nearly all Federal funding agencies will eventually require RCR training as a condition of the grant/contract. Hence, we can expect that RCR training will be required for all undergraduate students, graduate students, and post-doctoral personnel involved in the research enterprise.

Some of the topics of concern include [2]:

1. General RCR education
2. Authorship/Plagiarism
3. Conflict of Interest
4. Acquisition, Management, Sharing and Ownership of Data
5. Research Misconduct
6. Peer Review
7. Collaboration
8. Animal Welfare
9. Mentoring
10. Human Subject Protections

RCR training has potentially both face-to-face and on-line components. MSU is requiring some face-to-face time annually to allow researchers the opportunity to ask questions. Meeting the five-hour/three-hour training requirement on an individual basis can take many forms. Some possible methods to meet these requirements are (assuming the three hour per year “refresher” commitment; for the initial year two additional hours of training must be added to these examples):

1. Three hours annually of individual research group RCR training.
2. One hour of individual research group RCR training, one-hour seminar from the Graduate School, one hour of on-line training.
3. One hour of individual research group RCR training, one-hour seminar as part of the Engineering Brownbag Series, and one hour of on-line training.
4. One hour of individual research group RCE training, one-hour of visiting an Engineering course for that course’s lecture related to RCE, one hour of on-line training.
5. One hour of individual research group RCR training, two hours of on-line training.
6. Any combination of these options such that at least one hour of face-to-face time is provided and one hour of individual research group RCR training is provided.

In engineering, for graduate students, individual research group training will be certified by each student’s research advisor as part of the annual graduate student evaluation process. For example, the following can be added to the graduate student evaluation from: “This student has received ____ hour(s) of responsible conduct of research training from myself.”

Tracking of compliance for undergraduate students, graduate students, and post-doctoral researchers is an open topic of which the college is awaiting guidance from the central administration.

The following sections detail potential resources for meeting the university requirements in addition to individual research group activities.

**Face-to-Face Component**
The College of Engineering will sponsor four (4) opportunities for RCR training, of approximately one hour per session, to members of the college and university communities. The offerings will be (all dates are approximate based on schedule availability of key personnel and suitable rooms):

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
<th>Content Provider</th>
<th>Organization Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>09/16</td>
<td>New graduate student orientation</td>
<td>Egr. Research Comm.</td>
<td>Asc. Dean Graduate Studies</td>
</tr>
<tr>
<td>01/16</td>
<td>Lunch Workshop</td>
<td>Egr. Research Comm.</td>
<td>Div. of Engineering Research</td>
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<tr>
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<td>Lunch Workshop</td>
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<td>Div. of Engineering Research</td>
</tr>
</tbody>
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In addition, the following classes offer at least one hour of ethics instruction within the various departments:
1. BAE820,
2. CE890,
3. CHE/MSE802,
4. ECE390 and ECE480,
5. ENE880, and ME481.

The college/departments will advertise opportunities for students/post-docs to visit such courses on days that ethics or related RCR training is presented with the permission of the instructor. If the instructor permits visitors on those days, the college/departments will make arrangements for a larger lecture space as needed.
Finally, the Graduate School is providing sessions for MSU personnel as part of its RCR program (see: http://grad.msu.edu/rcr/). These sessions occur approximately monthly and require pre-registration at: gradwrsp@msu.edu.

On-line Component
The College of Engineering will develop a number of on-line training modules for use by college and university personnel. This will include logging of user unique-name but not elapsed time for the training module. The Division of Engineering Computing Services (DECS) will be responsible for the technical implementation of the on-line modules while the Engineering Research Committee will be responsible for choosing content. Sources of best practices and/or content are (the Penn State site is particularly useful):

Penn State University: http://www.research.psu.edu/orp/sari/
Penn State has extensive on-line content as part of its RCR program. This includes PowerPoint presentations on: Authorship/plagiarism; conflict of interest; acquisition, management, sharing, and ownership of data; research misconduct; peer review; collaboration; animal welfare; mentoring; and human subject protections. We hope that we will be permitted to make use of this material without plagiarism rearing its ugly head!

Michigan State University: http://grad.msu.edu/rcr/
MSU will be providing content, typically in PowerPoint form, that can be incorporated in either face-to-face or on-line training opportunities.

University of Minnesota: http://cflegacy.research.umn.edu/first/CourseSchedReg.htm
This program covers social responsibilities, authorship, plagiarism, and peer review. Part one is face-to-face and part 2 is on-line. This training is for principal investigators. Part 2 is found at: http://cflegacy.research.umn.edu/first/electroniccourses.htm. It has four modules (conflict of interest, fiscal responsibility, intellectual property, and quantitative/qualitative research data management). All four modules must be completed by PIs. There is a continuing education requirement (on a three-year cycle): http://cflegacy.research.umn.edu/first/ContEd.htm

University of Michigan: http://my.research.umich.edu/peerrs/
The UofM system folds Institutional Review Board (IRB) training – how to apply for IRB approval and its purpose – with more general responsible conduct of research training. It is focused around biological and social science research; however, some of the topics are clearly relevant for engineering.

Centers that are Resources for Responsible Conduct of Research Training
1. Center for the Study of Ethics in the Professions (CSEP) at Illinois Institute of Technology, Hermann Hall, Rm. 204 3241 S Federal Street Chicago, IL 60616 Phone: 312.567.3017 Fax: 312.567.3016, e-mail csep@iit.edu.

2. The Poynter Center for the Study of Ethics and American Institutions,
References
1. Kim Wilcox and J. Ian Gray, Memorandum, 13 October 2009 (see: http://grad.msu.edu/researchintegrity/).
2. Penn State Senior Vice President for Research Site, Research Protections: http://www.research.psu.edu/orp/sari/.