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Training Graduate Engineering Students in Ethics

Mohamed Trabia
University of Nevada, Las Vegas, mbt@me.unlv.edu

Julie A. Longo
University of Nevada, Las Vegas

Susan Wainscott
University of Nevada, Las Vegas, sue.wainscott@unlv.edu

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Mohamed Trabia, Ph.D.; Julie A. Longo, MSE; Susan Wainscott, MLIS
University of Nevada, Las Vegas

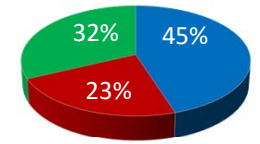
ABSTRACT

The Howard R. Hughes College of Engineering at the University of Nevada, Las Vegas embarked on providing ethics instruction to incoming graduate students in the form of a mandatory workshop.

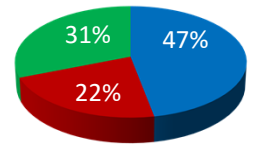
The College has a diverse graduate student population, including a sizable international component, who are enrolled in several M.S. and Ph.D. degree programs within four departments. Faculty felt that training in ethics was needed to better prepare incoming students for successful graduate studies and working professionally after graduation. Therefore, a standalone workshop was developed that covered four major topics: Research Ethics, Computer Coding Ethics, Publishing Ethics, and Intellectual Property. The last topic covered copyright law, patent law, and trade secrets.

To develop this ethics workshop, some ethics instruction programs at U.S. engineering colleges were investigated.

Breakdown of UNLV Graduate Engineering Students



Fall 2014



Fall 2015

International Students
Underrepresented Minorities
Other

ACKNOWLEDGEMENTS

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UNLV Howard R. Hughes College of Engineering

INSTRUCTION METHODS

The workshop included a lecture on the basics of each ethical topic and a panel discussion with campus experts in each of the four topics, including faculty from the School of Law and the College of Engineering. The panel discussion was open, and based upon questions posed anonymously in advance.

At the end of the workshop, each participant received a flash drive with the lecture slides, a Frequently Asked Questions document containing written answers provided by the panelists, a bibliography, and resource materials for all four ethics topics.

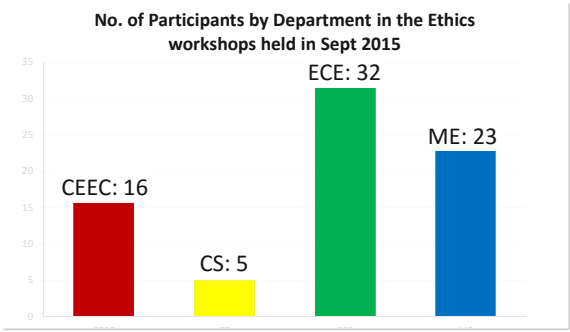
Considerations	Literature	UNLV
Type of instruction	Embedded in engineering courses and labs [3,4] Standalone course [3,4]	Lecture plus a Q&A session with expert panelists from the College of Engineering, School of Law, and the UNLV Libraries
Content	Recognizing ethical and professional responsibilities[1] Meet criteria for a B.S. degree or graduate degree[2]	Enable graduate engineering students to recognize the basics in the U.S. regarding: • Research Ethics , • Publishing Ethics, • Computer Coding, and • Intellectual Property
Instructors	Engineering faculty [4,5,6] Philosophy faculty [4,5,6] Team approach [4,5,6]	Team approach that included Engineering staff and faculty, School of Law, and UNLV Libraries

REFERENCES

1. ABET (2015). Proposed Revision to Criteria for Accrediting Engineering Programs definitions, General Criterion 3 Student Outcomes, and General Criterion 5 Curriculum. *2016-2017 Criteria for Accrediting Engineering Programs – Proposed Changes*, 5 pp. Retrieved from http://www.abet.org/wp-content/uploads/2015/11/Proposed-Revisions-to-EAC-Criteria-3-and-5.pdf
2. ABET Engineering Accreditation Commission (2014). Criteria for Accrediting Engineering Programs. 25 pp.
3. Hamad, J., Hasanain, M., Abdulwahed, M., & Al-Ammari, R. (2013). Ethics in engineering education: A literature review. In *Frontiers in Education Conference, 2013 IEEE* (pp. 1554 – 1560). IEEE. http://doi.org/0.1109/FIE.2013.6685099
4. Li & Fu (2012). A Systematic Approach to Engineering Ethics Education. *Science and Engineering Ethics 18*:339-349.
5. Newberry, B. (2004). *The Dilemma of Ethics in Engineering Education. Science and Engineering Ethics, 10*, 343-351.
6. Cao, G. H. (2015). Comparison of China-US Engineering Ethics Educations in Sino-Western Philosophies of Technology. Science and Engineering Ethics, 21:1609:1635. doi: 10.1007/s11948-014-9611-3

RESULTS

No. of Participants by Department in the Ethics workshops held in Sept 2015



The graph shows that out of 76 graduate students who attended the two Ethics workshops held in September 2015:

- 21% were from Civil and Environmental Engineering & Construction (CEEC)
- 7% were from Computer Science (CS)
- 42% were from Electrical and Computer Engineering (ECE)
- 30% were from Mechanical Engineering (ME)

The higher percentages from ECE and ME was because those departments made it **mandatory** for all engineering graduate students to attend, not just new students as requested by the Associate Dean.

Assessment of effectiveness included pre- and post-workshop surveys of participants as well as feedback from faculty and panelists. The post-workshop survey gave an opportunity to the respondents to provide feedback. Among the written responses, the participants stated that aspects of the workshop they found valuable included:

- *"Discussion with the panelists*" and
- "*Discussion about engineering-related research (using codes and citing them, figure usage, etc.)*".

When asked to rate three aspects of the workshop from 0 - 100, 0 being extremely poor and 100 being excellent, the respondents, on average, selected:

- The four ethics topics: 85 / 100
- Panel discussion and the opportunity to ask questions: 84 / 100
- Flash drive with resource material: 81 / 100

Preliminary results included panelist support for continuing to offer the workshop , and a good level of attendance by both new and returning graduate students.

Based on the pilot test of this workshop in May 2015 and the first two sessions that were rolled out in Fall 2015, the College of Engineering decided to continue the workshops for incoming graduate students. Current activity includes updating the content of future workshops based on:

- Continuing assessment of student learning and
- The content of participant questions for the panelists.