TEACHING ETHICS & PROFESSIONALISM IN ENGINEERING: ASSESSMENT OF THREE CATEGORIES FOR ABET



DR. KORY P. SCHAFF
DEPARTMENT OF PHILOSOPHY
& COLLEGE OF ENGINEERING AND TECHNOLOGY

ENGR 3010: OVERVIEW

- **Collaboration between Philosophy Department and ECST to create a more robust professional ethics course**
  - From a 1.0 to 3.0 unit course
  - Team-taught by philosophy and engineering professors
  - Required for all third-year CE, EE, and ME majors
  - Writing intensive
  - Satisfies GE Block C-2 (Humanities)
- **The course meets the following ABET outcomes**
  - (F): “Understanding of ethical and professional responsibilities.”
  - (G): “Proficiency in written communication.”
  - (J): “Understanding of current issues in the field.”

COURSE LEARNING OUTCOMES

- Demonstrate understanding of ethical theory, including utilitarianism, deontology (respect for persons), virtue theory, and ethics of care.
- Demonstrate an ability to apply theories in case studies of ethics in engineering and their impact on society.
- Demonstrate well-honed and sophisticated critical thinking and composition skills.
- Demonstrate fundamental rhetorical strategies used to produce university-level writing.
- Demonstrate enhanced communication skills in both written and oral formats.

Table 1 - Performance indicators per outcomes and associated direct assessment tools for 2016-2018 assessment.

SO	Performance Indicator	Tools for Direct Assessment
ABET f	F1. Knowledge of ethical theories applicable to engineering professional practice	Engr 3010 (Ethics Class): Quiz (ETH-Q)
	F2. Ability to apply ethical reasoning in scenarios related to engineering	Engr 3010 (Ethics Class): Essay (ETH-EE)
ABET g	G1. (Written) Ability to develop well-organized technical report	Senior Design: Final Report (SD-R)
	G2. (Written) Ability to properly format report and minimize grammar/spelling errors	
	G3. (Oral) Ability to present technical design to a broad audience	Senior Design: Final Presentation (SD-P)
	G4. (Written) Ability to communicate in writing to a general audience	Engr 3010 (Ethics Class): Essay (ETH-EE)
	I2.Ability to set up short- and long-term career plans	
ABET j	J1. Ability to analyze current issues in ethical/professional framework	Emgr 3010 (Ethics Class): Essay (ETH-EE)
	J2. Awareness of current events and its impact	Senior Design: Essay on current events (SD-E)
	J3. Recognition of the connection between contemporary issues and engineering fields	

(F): ETHICAL THEORY

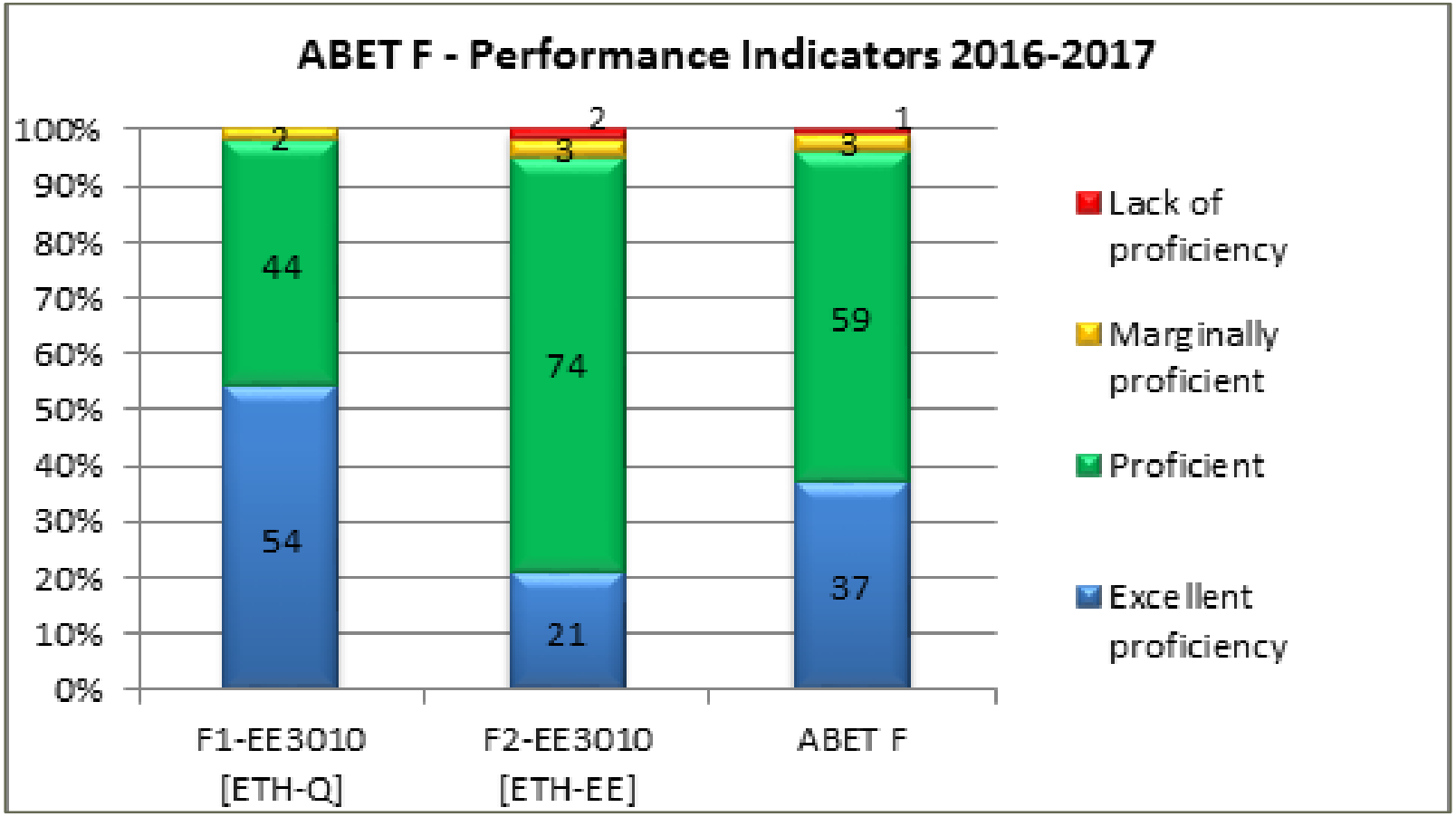


Figure 2 – Distribution of scores associated to average ABET F performance for BSEE 2016-2017 observed in direct assessment. 98% of students have score 3 or 4 for outcome F1, 95% for outcome F2. Overall, 96% for outcome F.

G: WRITING

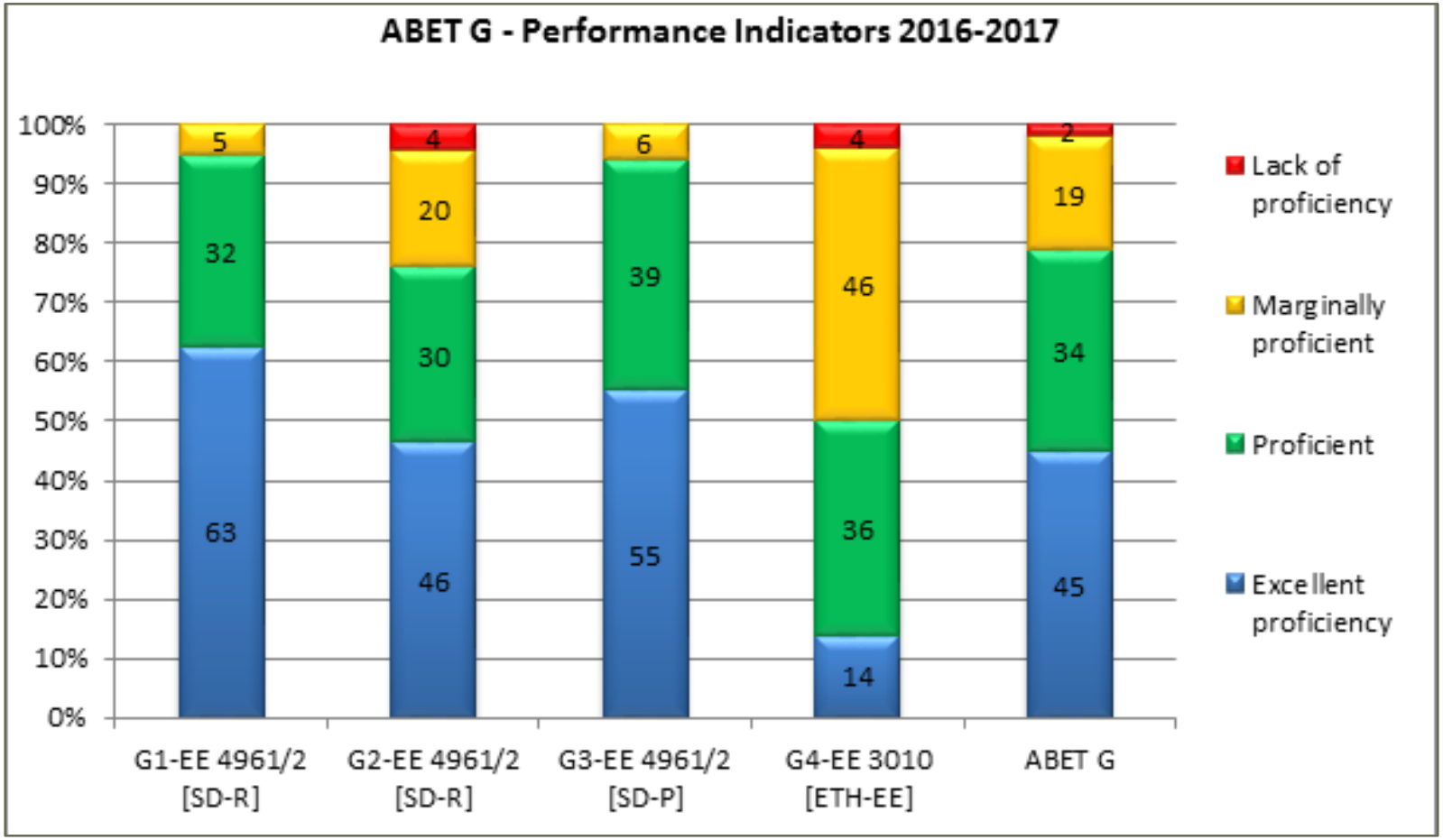


Figure 3 – Distribution of ABET G performance for BSEE 2016 - 2017 observed in direct assessment

(J): CURRENT ISSUES

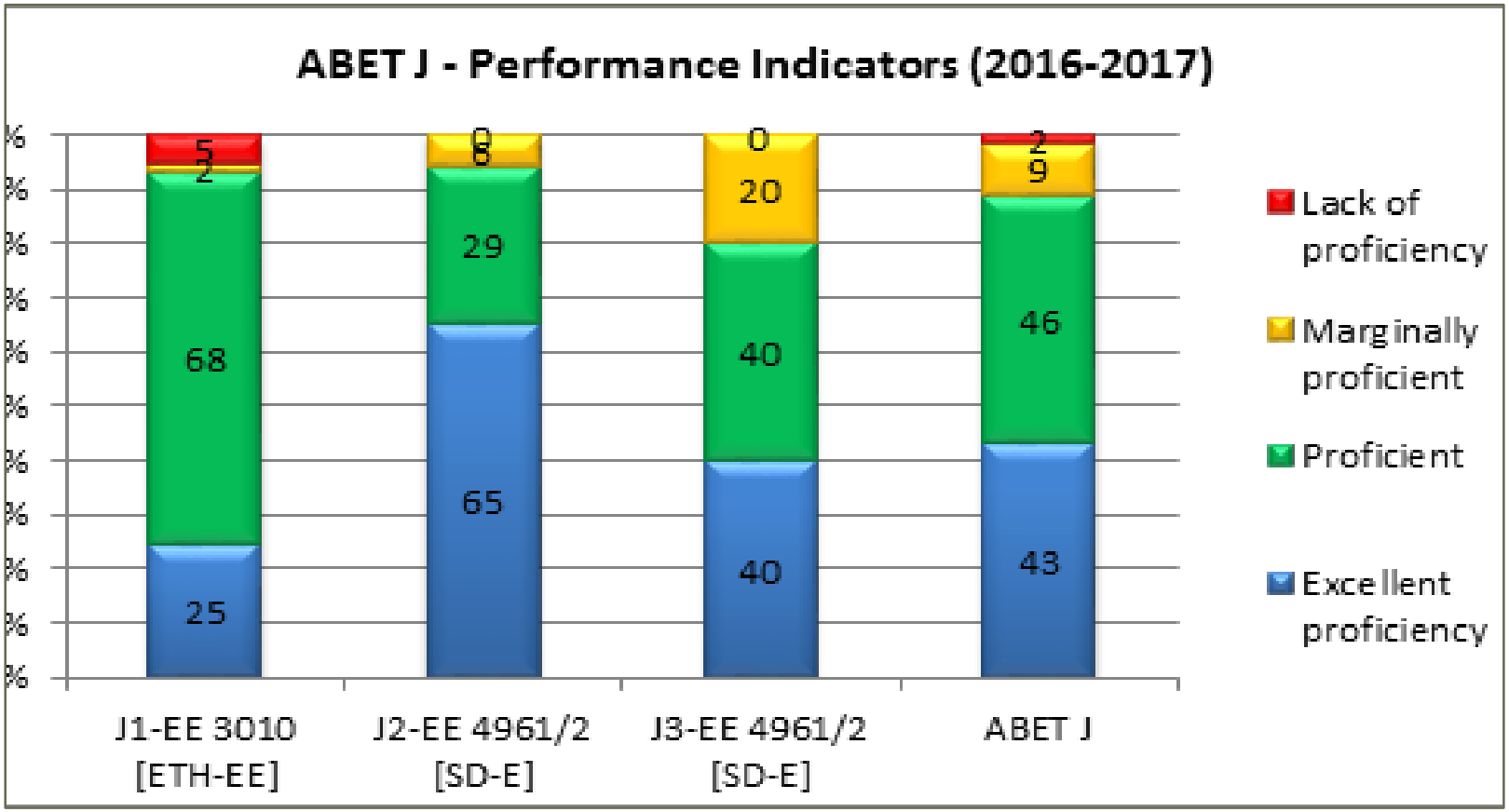
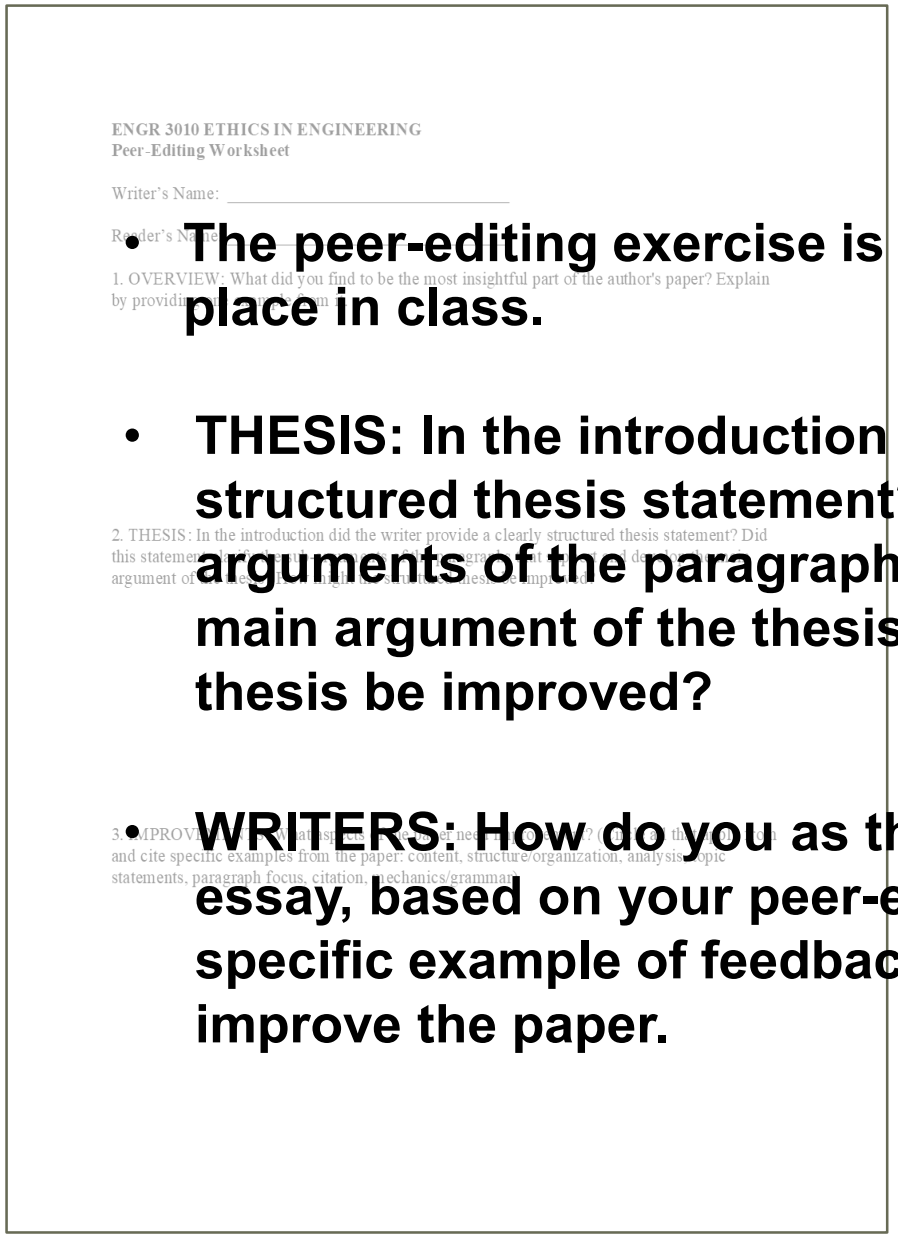


Figure 4 – Distribution of ABET J performance for the BSEE 2016-2017 through direct assessment. 93% of students have score 3 or 4 for outcome J1, 94% for outcome J2, 80% for outcome J3. Overall, 89% for outcome J.

USING ASSESSMENT TO IMPROVE COURSE

- **Faculty planning retreat to create action plan**
- **More accessible readings => improve reading skills => improve writing skills**
  - Reading summaries are consistently assigned to promote accountability *and* writing proficiency
- **We track multiple categories relevant for ABET by using Moodle quizzes**
  - Ethical Theory (F1) Applied Reasoning (F2), Sustainability, Public Policy, Leadership, Project Management
- **Research paper topics are always current issue: DAPL, data falsification, bridge collapse, border wall.**
  - Provide in-class workshops + require peer-review exercise

Figure 5 – Sample of peer-editing worksheet used by students for revision process.



ENGR 3010 ETHICS IN ENGINEERING
Peer-Editing Worksheet

Writer's Name: _____

Reader's Name: _____

1. OVERVIEW: What did you find to be the most insightful part of the author's paper? Explain by providing a specific example from the paper.

2. THESIS: In the introduction did the writer provide a clearly structured thesis statement? Did this statement clarify the sub-arguments of the paragraphs that support and develop the main argument of the thesis? How might the structured thesis be improved?

3. IMPROVEMENTS: What specific aspects of the paper need improvement? (Identify the problem and cite specific examples from the paper: content, structure/organization, analysis, topic statements, paragraph focus, citation, mechanics/grammar)

4. CONCLUSION: Did the conclusion merely summarize results, or did it connect the argument of the paper with current issues and/or broader ethical issues raised in the paper?

5. READABILITY: In terms of style and tone of your peer's paper, what specific feedback did you provide to help the writer improve the paper? Explain and provide one example from the paper.

7. WRITERS: How do you as the writer intend to change your essay, based on your peer-editing partner's feedback? Give a specific example of feedback and how you will use it to improve the

- **The peer-editing exercise is mandatory, structured, takes place in class.**
- **THESIS: In the introduction did the writer provide a structured thesis statement? Did it clarify the sub-arguments of the paragraphs that support and develop the main argument of the thesis? How might the structured thesis be improved?**
- **WRITERS: How do you as the writer intend to change your essay, based on your peer-editing partner's feedback? Give a specific example of feedback and how you will use it to improve the paper.**

CREDITS

- **College of Engineering and Technology**
  - Dr. Jane Dong
  - Dr. Tona Rodriguez-Nikl
  - Dr. Claudia Espinosa Villegas
  - Dr. Maryam Azarbayjani
  - Hyginus Mmeje, P.E.

- **Department of Philosophy**
  - Dr. Kayley Vernallis
  - Dr. Talia Bettcher