

AN ENGINEERING GRAND CHALLENGE: ETHICS AND EDUCATION

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ASSIGNMENT OVERVIEW AN ENGINEERING GRAND CHALLENGE: ETHICS AND EDUCATION

For this assignment you will return to the engineering Grand Challenge/related topic (GC/RT) you wrote about for Writing Assignment #2. For Writing Assignment #4, you will write a 1500 word paper (minimum) that “revisits” your chosen Grand Challenge. You will now be writing about your Grand Challenge and related topic within the contexts of engineering ethics and engineering education. You will be articulating how specific codes of ethics are important to your chosen GC/RT, to the engineers working in the fields associated with your GC/RT, and to the people potentially affected by your chosen GC/RT. In Assignment #4, you will also assess the potential usefulness, within a freshmen engineering curriculum, of a study such as you have just done. You will clearly articulate how a study of the codes of ethics and the ethical issues associated with your chosen (GC/RT) might be (or might not be) a useful part of a freshman engineering curriculum.

GRAND CHALLENGE AND RELATED TOPIC: REFOCUS, RE-CONTEXTUALIZE

Refocus: The Importance of a Related Topic

For this paper, you will again describe your GC/RT. As with paper #2, your descriptions must be sufficiently detailed for your readers to see and understand the Challenge/related topic. If your descriptions in paper #2 did not fully clarify, for your readers, what your GC/RT are and what they involve, you now have an opportunity to provide further necessary descriptive details and explanations. The information you provide about your chosen GC/RT, should answer the questions: what are the main issues or parameters of the Grand Challenge I have chosen to write about? What, specifically, is my “related topic”: what particular issue and/or technology within that Grand Challenge am I focusing on? Can readers clearly see what the Challenge and the related topic are?

If you did not clarify a “related topic” within your Assignment #2 paper, you now have an opportunity to meet this important requirement of Assignment #2 and, now, of Assignment #4. For example, if, in Assignment #2, you wrote about the Grand Challenge “Secure Cyberspace,” then went on to write about various security concerns in banking, *and* in online shopping *and* in national defense, *and* in online medical records, you did not delineate a “related

topic.” The result of not focusing on a “related topic” is that you did not have the time and space to fully explore a significant part-of-the-whole. In the example of “Securing Cyberspace,” an effectively written paper for Assignment #2 and, now, Assignment #4, would focus on *either* online banking, *or* on securing medical records, *or* on protecting national security.

Yes, all of these areas of cyberspace share some common security issues, but focusing on one will allow you to more fully explain the significance of cyber-security by fully investigating, for example, why it is so important to secure online information in a health care. By focusing on cyber-security in health care, you will have the time and space to discuss why should engineers should focus on a particular kind of security that is relevant to medical records and the health care setting. You will be able to show readers, in considerable detail, what the results of a lack of attention to cyber-security in an area such as health care might be. This focus on a “related topic” is crucial for Assignment #4, because you will not only be describing your chosen GC/RT, you will be showing how engineering ethics enter the picture, and you will be evaluating the potential educational value of a student’s investigation of the GC/RT and those related ethical considerations.

Re-contextualize

For Writing Assignment #2, you were required to establish and maintain a particular analytic context. This context was a general evaluation, from your point of view, of the importance or value of your GC/RT. For Writing Assignment #4, you will write about your selected GC/RT within the context of specific engineering ethics and specific engineering educational applications. Remember, you are not only clearly describing what your chosen GC/RT *is*, you are detailing and explaining the ethical considerations and educational possibilities of that GC/RT. You will need to make sure your readers have an overall understanding of the Grand Challenge, have a clear understanding of important elements of your “related topic,” have a clear understanding of how particular codes and directives of engineering ethics are important to your GC/RT; and have an appreciation of the potential usefulness (or lack thereof) of the study you have just done for freshmen engineering education.

ETHICS CODES; ETHICAL ISSUES

All engineers are ethically and legally required to act in accordance with an overall engineering code of ethics. The standard general code in the United States is the National Society of Professional Engineers (NSPE) Code of Ethics. Engineers in various fields are also expected to be familiar with and to follow the particular ethics codes of their disciplines, for example, the American Institute of Chemical Engineers Code of Ethics or the Institute of Electrical and Electronics Engineers Computer Software Code of Ethics or the Biomedical Engineering Society's Code of Ethics.

For Writing Assignment #4, you must demonstrate the importance, to your chosen engineering GC/RT, of the NSPE Code of Ethics and of at least one other relevant code of ethics. "Demonstrate the importance of . . ." does **not** mean merely quoting the first (and often broadest) statements from these codes. **Clearly and authoritatively demonstrating the importance of these codes to your chosen engineering GC/RT requires a demonstration of your familiarity with the details of relevant, established ethical canons and accompanying directives for practice. Read through ALL the canons and accompanying directives for practice of the NSPE Code of Ethics and read through ALL the canons and accompanying directives of at least one other relevant code.** Use the particulars of these codes as essential tools for analyzing the ethical elements, issues, and considerations that are important to your chosen engineering GC/RT. An understanding of the details of engineering codes of ethics will allow you to discuss, with authority, how engineers' attention to (or lack of attention to) such codes and their directives might affect, has affected, and/or continues to affect your chosen GC/RT and the engineers and applications associated with that GC/RT.

YOUR ENGINEERING GC/RT + ETHICS = A VALUABLE EDUCATIONAL OPPORTUNITY?

This assignment requires a discussion of how your chosen GC/RT and the ethical issues of particular importance to that GC/RT might be (or might not be) a useful part of a freshman engineering curriculum. Your paper must include a section that responds to these questions: **might a study of your GC/RT and the surrounding ethical directives and issues be a valuable part of a freshman engineering curriculum? Is it useful and important for freshmen engineering students to learn about an engineering GC/RT such as the one you have been writing about? Would it be valuable for students to study the accompanying, relevant ethical directives and issues? Or would a study of a GC/RT and surrounding ethical directives and issues not be particularly timely or useful at the freshman level?**

Be sure to respond to these questions **specifically**; your assessment of the potential educational value (or lack thereof) of your GC/RT must specify why you are assessing

a study of your GC/RT and associated ethics as a valuable (or problematic) element of a sound freshman engineering education.

POSSIBLE PAPER SECTIONS

As you draft and complete your paper for Assignment #4, you will need to carefully create sections that will promote organization and interconnection. Here is advice about how you might proceed, logically, through useful sections.

Introduction

Your paper must begin with an introduction that briefly describes your chosen Grand Challenge/related topic (GC/RT) within and beyond the context of the NAE Grand Challenges. Remember that in this, as in most writing situations, you must specifically make note of all the important contexts that frame and inform your paper. In the case of Assignment #4, you must provide brief, but specific information about the NAE and its Grand Challenges project, and you must specify that the challenge about which you are writing is one of these Grand Challenges. Your introduction must also provide an overview of the ethical issues relevant to your GC/RT, and your Introduction must briefly explain why it might be important for freshmen engineering students to research and write about this GC/RT and related ethics codes and issues.

Describe the GC/RT

The next section of your paper might fully describe your related topic, **including information about relevant technology or technologies and the role engineers play in creating, improving, and/or applying these technologies.** You might close this section by "previewing" how your related topic and the associated engineering and technologies are connected to particular ethical issues and considerations and how particular codes of ethics can help engineers and others understand related ethical issues.

GC/RT and Ethics

The next section of your paper, then, might logically be a section that details ethical considerations and the codes that inform such considerations. In this section, you will **describe the codes you are using, and provide detailed analysis about why particular parts of those codes are of particular significance to your GC/RT.** Readers will want to know what code or codes, and what particular directives or sections of that code or those codes, are **most relevant** to your GC/RT. You will want to demonstrate your understanding of **how** an engineering code and particular directives of that code **should and can guide engineers towards relevant ethical decisions and practice.** To convey the usefulness of ethical codes, you may want to discuss

what could happen if engineers working on your related topic failed to follow the directives of the relevant codes.

This section of your paper might lead into the next section by “previewing” what you see as the value (or lack thereof) of having freshmen engineering students do what you have just done: familiarize themselves and their audiences with engineering challenges and ethics via research and writing within a freshmen engineering curriculum.

GT/RC and Ethics: Educationally Valuable?

The next logical step for your paper might be a section detailing your evaluation of the place and usefulness of investigating, reporting on, and evaluating engineering challenges and ethics via research and writing within the freshman year of engineering education. In this section, you will want to make sure your evaluative position is clear, and you will need to clarify why you are taking this particular position.

You should be making significant connections to previous sections and information. You have spent the last few weeks researching and writing about a GC/RT and about associated ethics: how has that research and writing been valuable (or not been valuable) to you as a freshman engineer? How might such a research and writing project be valuable (or not) to a Swanson School of Engineering freshman student next year, and/or to a student at the Purdue University College of Engineering, or the Penn State College of Engineering, or the MIT School of Engineering, or the University of California at San Diego Jacobs School of Engineering? Remember, in this area of your paper, you are not just stating an evaluative position; you are describing the experience and showing the reasoning that supports that position.

Conclusion

Having described and analyzed a GC/RT and related ethical and educational issues, you might now be ready to move into your Conclusion. Remember, your Conclusion should leave your reader thinking, but it is not the place to first and fully discuss an entire required aspect of a paper. Your Conclusion is not, for example, the section in which you first and fully discuss engineering education. Your detailed attention to educational value requires more time and space than a Conclusion can provide. Your Conclusion is where you will reinforce the most important ideas communicated throughout your paper and the connections among these ideas.

RESEARCH AND REFERENCE SPECIFICS

For Writing Assignment #4, you will need to consult a minimum of 6 sources. Two of your sources must be codes of ethics. One source will be the NAE/Grand Challenges

site. The remaining 3 sources can include books, magazines, journals, newspapers, and *substantive* web sites. You may use the same sources you used to help you describe and evaluate your Grand Challenge for Assignment #2, but you may need additional resources to fully describe and evaluate the ethical and educational considerations of Assignment #4.

Note that these are minimum research source requirements; you may, of course, consult more than the required 6 sources. Please consult the Library Research Guide for further information about searching for and locating appropriate sources.

WORD COUNT

The minimum word count for your paper for Assignment #4 is 1500 words, or approximately 2 two-columned pages. This word count does not include your References, Additional Resources, or Acknowledgments sections. Note that this is a minimum count; you may go over this word count. If, as you draft your paper, you are concerned that you are going too far over the minimum word count, consult your Writing Instructor. If you are concerned that you are not meeting the required minimum count, carefully look over your notes and drafts to see where you are being too vague, abstract, or general. Be sure you are showing your knowledge and insight by showing specifics and detailing all analyses and explanations.

SUBMISSION REQUIREMENTS

Format

Format your paper and your references according to the instructions in the Formatting Guideline found on the 0011/0711 Writing Projects pages. The formatting specifics for this paper are exactly the same as they were for Assignments #2 and #3.

Attach Paper #2 and the #4 Evaluation Sheet

When you hand in your hard copy of paper #4, please be sure to have a copy of paper #2 attached, preferably the graded copy, if that copy is available. Also, please attach the Assignment #4 Evaluation Sheet

Submit a Hard Copy and an Electronic Copy

In addition to the hard copy of Assignment #4 that you will submit at the start of class be sure to have an electronic copy of Assignment #4 available for in-class submission.

SUMMARY PRESENTATION: COMPLETING THE PROCESS BY PRESENTING YOUR FINDINGS

30, that gives you a week to review the presentations with your mentors.

For this assignment you will make two power point presentations that will be given in your small seminar section when you return from Thanksgiving break. The first presentation is the traditional ppt file with multiple slides. The second is a poster presentation. Each mentor section is doing it a little different, so contact your mentor for details. Each traditional presentation should be approximately 5 minutes long, with a minimum of 6 -10 slides. Use tables and graphs to display numerical data instead of text. Some of the slides should have images. Instead of long paragraphs of text, summarize the information into lists.

The purpose of this presentation is to summarize the writing assignments for this semester. The first assignment was a bio. The purpose of the paper was to get you to think about who you are, what are your interest areas and what are your strengths. The second paper had you find a trend or challenge in engineering to write about. The purpose of this paper was to have you look into the future and try and predict where your field of engineering is headed. The third paper was a detailed study of the present area of engineering you are interested in. The final paper was about society and engineering and how you see the two connected.

The purpose of this presentation is to look at the big picture and complete the circle. You know what your strengths are, you can see the present and future of the various fields of engineering, now tell me how it fits together for you. How do you see the trends taking you into an area that fits your interest areas. Tell me why you think the present working conditions in engineering fit into your goals and how your future plans are in line with what the trends are showing. Finally explain how you, society and work will all come together.

After you complete your traditional 6 – 10 slide presentation, your task is to summarize everything into one poster slide. This will be explained in class. Basically, there are two types of professional presentations. One involves standing in front of a room and talking through a number of slides. This is what the first part of this project deals with. The second type of presentation, is a poster. A poster is typically 24 inches by 36 inches. If you walk around the building you will see student posters from last year mounted on the walls. The purpose of these presentations is for the poster to act like a piece of art work that people read by themselves. Typically the author does not discuss this type of presentation. The content of the poster stands on its own. Walk around the building and review the various posters so you get an idea of what is required.

Both power point files are due the Monday November 30, you return from Thanksgiving break. The small group presentations will be the last week of classes December 7 - 11. Thus, if you have the power point done by November