

# STSS 4100: Professional Development II (Tech Issues and Solutions)

**Course Instructor:** Dan Lyles, Ph.D

**Office:** REMOTE

**Phone:** REMOTE

**Office Hours:**

Tuesday 10:00 am – 11:30 am

Friday 10:00am – 11:30 am

All Other Times By Appointment

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**Course TAs:**

**Course Meetings:**

**Sec 01 (29624) WED 2:30 pm – 4:20 pm**

**Sec 04 (29627) TUE 8:00 am – 9:50 am**

**Sec 05 (29628) FRI 8:00 am – 9:50 am**

**Sec 09 (29632) TUE 2:30 pm – 4:20 pm**

**Sec 10 (29633) FRI 2:30 pm – 4:20 pm**

## **Course Description**

This course focuses on increasing students' knowledge concerning the impact of non-technical issues on the viability of technical (engineering) designs and solutions. The non-technical issues we will consider include the cognitive and physical strengths and limitations of people in the chain spanning from product/equipment designers/manufacturers to end users, as well as economic, environmental, cultural, political, ethical, health and safety, and societal influences. During the course, we will read and discuss articles and case studies in which the technical solution pursued did not have the desired effect, or led to disaster. Possible explanations include a failure to take into account the environmental, economic, socio-cultural, and/or political issues associated with the technology's ultimate usage.

## **Student Learning Outcomes**

- Students will demonstrate their knowledge of the potential consequences of engineering solutions in a global, economic, environmental, political and social-cultural context by reading/discussing/debating case examples in which proposed technical solutions did not have the desired effects because those involved failed to adequately consider the aforementioned factors.
- Students will demonstrate their knowledge of the role of contemporary issues in the context of engineering.
- Students will receive basic instruction on how to write a refereed/peer-reviewed paper, and will prepare a paper on a research topic associated with this course. Students will perform and receive peer reviews on drafts of the paper.

Among others, this course responds to the following [student outcomes identified by the ABET:](#)

- An understanding of process and solutions to meet specific needs with consideration for public health and safety, and global, cultural, social, environmental and economic factors.
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and social contexts.

Students will demonstrate understanding of the material by actively participating in classroom discussions, completing assignments and project work, participating in a group presentation, and writing and reviewing a paper.

### **Academic Integrity**

Student-teacher relationships are built on mutual respect and trust. Students must be able to trust that their teachers have made responsible decisions about the structure and content of the course, and that they are conscientiously making their best effort to help students learn. Teachers must be able to trust that students do their work conscientiously and honestly, making their best effort to learn. Acts that violate this mutual respect and trust undermine the educational process. The Rensselaer Handbook of Students Rights and Responsibilities defines various forms of Academic Dishonesty and you should make yourself familiar with these. In this class, all assignments that are turned in for a grade must represent the student's own work.

### **Remote Instruction Guidelines (FA 2020)**

Remote instruction brings a whole host of challenges, expectations and opportunities. This semester, this course is being offered online as a remote course which will mean modifications both on the part of the student and the instructor. As such, we will operate based on the following expectations:

- Naturally, because of the unfolding COVID crisis, this syllabus is subject to change. In fact, count on it.
- This course is operating on the basis of good faith of both students and instructors – We will proceed under the assumption that unless good cause is given we are all being fair, honest and open about what is happening in our lives and with the course.
- I'm looking for good faith efforts to complete the work and engage in the material
- Everything in the course is just going to take longer than it would under normal conditions and we're going to have to make accommodations for that. (e.g. if you send an email, expect it to take time for me to get through to it as I may have several dozen or even a hundred emails to get through)
- **I'm asking you to resist the urge to panic if something goes wrong.** Given the vast number of technological systems at play, things breaking are almost guaranteed (We'll cover why that is in weeks 7, 8 and 9) so I'm asking you to be patient if things are chunky, clunky or otherwise complicated. If you are expected to turn something in, you will have the opportunity to do so even if the system is temporarily down.
- **DO NOT UNDER ANY CIRCUMSTANCES EMAIL ME ASSIGNMENTS UNLESS I HAVE EXPLICITLY AND SPECIFICALLY ASKED YOU TO DO SUCH. I WILL NOT REVIEW ANY ASSIGNMENTS SENT TO MY INBOX. TURN IN EVERYTHING IN THIS COURSE TO THE APPROPRIATE SPOT IN LMS.**

- Please be mindful that there are differences in technology, time zones and comfort in engaging in a primarily online course. While I have endeavored to make the course available and accessible to as many people as possible, there will be points where we will have to figure out the best way to proceed in real time.
- Please make sure to make available the time scheduled for your course meeting. If there are issues due to time zones, let's discuss that one on one to figure out solutions, *but unless other arrangements are made, you are expected to be present at the time your course is scheduled.*
- **Attendance** - While I am expecting every student to be present for synchronous learning during the time their course is scheduled, material for offline or asynchronous learning will be made available.
- While I am expecting every student to be present for synchronous learning, I will not be expecting people to make their webcam available for this course. **I am aware that this invites a degree of leeway and flexibility in how you show and participate in class and I am expecting you to not take undue advantage of this or act unprofessionally towards each other.**
- **Participation**- This is a highly interactive class that requires active discussion and participation. Students will come to class having read the assigned reading materials, and be prepared to discuss the information.

### **COURSE COMPONENTS AND GRADING**

- Class Participation 20% (e.g. Submitting questions for class, asking those questions during your session, engaging with the work, participating with your group project)
- Writing Assignments:
  - Reading Responses 20%
  - Midpoint Assessment 15%
  - Final Assessment 15%
- Group Project (30%)
  - Part 1 – Developing your project
  - Part 2 – Presenting your project (Feedback and presentation)
  - Part 3 – Final Project (First Draft + Revisions)

### **Course Materials:**

- There is no required text for this course. The readings can be found through some light use of [google scholar](#) and will be provided through LMS.
- Books featured in this course but not Required:
  - o Norman, D. (2013). *The design of everyday things: Revised and expanded edition*. Constellation
  - o Perrow, C. (2011). *Normal Accidents: Living with High Risk Technologies- Updated Edition*. Princeton university press
  - o Petroski, H. (1985). *To engineer is human: The role of failure in successful design* (No. BOOK). New York: St. Martin's Press.
  - o Wisnioski, M. H. (2012). *Engineers for change: Competing visions of technology in 1960s America*. MIT Press.

### **Writing Assignments**

#### ***a. Reading Responses (20% of course grade)***

You will write a brief (no more than a paragraph per question, though some questions require substantially less) response to key questions on the assigned readings and submit the responses via LMS. Reading responses are due on the course LMS before the class meeting. All weekly reading responses are required; at the end of the semester, only 8 papers will count towards your final grade.

Some sample questions that you should answer in your weekly reading response, AND be prepared to discuss in class are:

- What is the main argument? How do you evaluate the argument?
- What are the main sociotechnical (e.g., human factors, social, economic, cultural, political, environmental, ethical) causes/explanations?
- Who has power in this situation? What is the engineer's role in creating systems that people will use to settle disputes?
- What is the main argument in this week's reading? Explain using one example.
- How do you evaluate the argument? Is it convincing? Why/not? What are possible limitations of the argument?
- How can you apply this week's argument and/or concepts in your own research? Be as specific as you can (provide examples of how the argument/concept helps you understand certain aspects of your own research).
- Identify two questions/issues that you think deserve further discussion based on this week's readings.

***b. Mid-point and Final Assessment (Each 15% - total 30% of course grade)***

For both the Midterm and Final Assessment, students will write a 2-3-page paper (approx. 1500 words) on the readings and information covered in class. The paper will address key questions (which will be provided) related to the topic.

Assignment should be double-spaced, Times New Roman, 12 point-font with 1-inch margins on all sides. Use headings as appropriate to guide the reader (the instructor). Any figures or tables included do not count against the page requirement and should be explained thoroughly in the body of the paper. Always cite your resources, parenthetically and in the reference page. While I do not have a preferred citation style, you are not allowed to use MLA in this course. I recommend you use whatever format is common in your discipline and note that in your heading. Please don't forget your name and page numbers. *Due dates are listed on the Course Calendar.*

***c. Group Research Paper and Peer Review (30% of course grade):***

***Overview of Paper***

- Students in collaboration with their peers will write a 6-8-page research paper.
- Select an Engineering solution, technical issue, event, disaster, or success story and provide an in-depth discussion of what led up to the event, the event itself, and what happened as a result of the event.
- Conduct an extensive literature review to identify key information on your topic. Be sure to include all relevant technical and non-technical (e.g., human factors, social, economic, cultural, political, environmental, ethical) factors that led to the event.
- Your topic may be a topic discussed in class
- Students will receive peer and TA/Professor reviews on the paper and will perform a peer review.
- Students will be graded on both the quality of their paper and the quality of the peer reviews they write.

## Course Calendar

Please refer to the table below for your course calendar. Note that weekly schedules vary slightly by section, because of RPI's holiday schedule.

Week	T (Sec 04 & 09)	W (Sec 01)	F (Sec 05 & 10)
1	Jan 14	Jan 15	Jan 17
2	Jan 21	Jan 22	Jan 24
3	Jan 28	Jan 29	Jan 31
4	Feb 4	Feb 5	Feb 7
5	Feb 11	Feb 12	Feb 14
6	Feb 25	Feb 19	Feb 21
7	March 3	Feb 26	Feb 28
8	March 17	March 4	March 6
9	March 24	March 18	March 20
10	March 31	March 25	March 27
11	April 7	April 1	April 3
12	April 14	April 8	April 10
13	April 21	April 15	April 17
14	April 28	April 22	April 24

DATE	TOPIC	READINGS	ASSIGNMENTS DUE BEFORE CLASS
Week 1	Introduction to PD II <ul style="list-style-type: none"> <li>Review of syllabus</li> <li>Who we are and what we want to accomplish</li> <li>Overview of class</li> </ul>	Video: <a href="#">Changing Educational Paradigms - Sir Ken Robinson</a>	
Week 2	A) Technology Is/Creates Power	Read: Winner- Do Artifacts Have Politics?	<b>Reading Response 1</b>
Week 3	A) Engineering Responsibility? Professionalism? Codes? Where does all this stuff come from? <ul style="list-style-type: none"> <li>a. Skill – Practical</li> </ul>	Read: Wisnioski – Engineers for Change Chapter 4: The Crisis of Technology as a Crisis of Responsibility	<b>Reading Response 2</b>

	Note Taking in the age of digital Paper		
Week 4	<ul style="list-style-type: none"> <li>▪ To Engineer is Human</li> <li>▪ Simple vs. Complex designs and human error</li> <li>▪ Acceptable vs. Unacceptable <ul style="list-style-type: none"> <li>• Skill - How to do research. Like, practically where do you get started?</li> </ul> </li> </ul>	Read: To Engineer is Human- Henry Petroski (chapter 1)	<b><i>Reading Response 3</i></b>
Week 5	<ul style="list-style-type: none"> <li>▪ Human Error/Human Factors (simple case)</li> <li>▪ Discussion of Norman Doors and other simple design issues/errors</li> <li>▪ Skills – Good Peer Review Feedback Vs. Not. Work in your groups to talk about it and write some about each other's work.</li> </ul>	Read: Donald Norman – chapter 1	<b><i>Reading Response 4</i></b>
Week 6	<ul style="list-style-type: none"> <li>▪ How do we generate these insights? Where do we look for complex systems?</li> <li>▪ Skills – Weak Thesis Statements</li> </ul>	<ul style="list-style-type: none"> <li>• Read: Weak Thesis Statements: Recognizing and Fixing Them</li> <li>• Not Required but Recommended: Williams – Style Lessons in Clarity in Grace Chapter 2</li> <li>• Watch: <i>Social Life of A Small Urban Space</i></li> </ul>	
Week 7	Normal Accidents (complex case)	Read: Charles Perrow – Introduction; Ch. 1 (Three Mile Island Class Handout: <b><i>Midpoint</i></b>	<b><i>Reading Response 5</i></b>

		<b>Assessment</b>	
Week 8	<b>Normal Accidents (Complex Case)</b>	Read: Ch. 9 -Living with High Risk Systems	<b>Reading Response 6 Midpoint Assessment Due</b>
Week 9	<b>Systems Engineering-</b> Where might we intervene in systems to have desirable outcomes? What might a systems approach look like for solving problems?	Meadows- Leverage Points Places to Intervene in a system Penzenstadler et al- Software Engineering For Sustainability <b>Class Assignment - Pick Groups</b>	<b>Reading Response 7</b>
Week 10	Responsibility (in)Action	Watch: The Human Scale (1hr 23 minutes)	<b>Group Assignment 1 due</b>
Week 11	<b>Deepwater Horizon Oil Spill-</b> Human Error, Culture- \$\$/greed over safety, Government	Article Cluster in LMS <b>Class Presentations: Group Pair off presenting and providing feedback to each other.</b>	<b>Reading Response 8 Presentation Due</b>
Week 12	<b>Bhopal, India Pesticide Gas Leak-</b> ethics, Culture- \$\$/greed over safety, Government	Article Cluster in LMS Video: Documentary – “One Night in Bhopal”	<b>Weekly Reading Response 9</b>
Week 13	<b>Artificial Intelligence/ Autonomous Vehicles-</b> Ethics, human culture, human error	Article Cluster in LMS Video: <a href="#">Humans Need not Apply</a> (15min)	<b>Reading Response 10 Group Paper Submissions</b>
Week 14	<b>The Future of Engineering - The Engineer of the Future</b>	Article Cluster in LMS Class Handout: <b>Final Assessment</b>	<b>Reading Response 11 For Finals Week: Final Group Paper (With Revisions) Submissions Final Assessment</b>

\*\*\* Schedule is subject to Change