

# Engineering Society?

## A Course Manual

Spring 2015

STS 4500 [STS & Engineering Practice]

Instructor: Tolu Odumosu  
e: todumosu@virginia.edu  
t: 982-2623 / cell: 879-7050  
o: Thornton Hall A221

### When and where do we meet?

Class Times: Mon / Wed 2:00pm – 3:15pm Thornton Hall E304

Office hours: Mon. 11:30 – 12:30p / Tue. 10:30 – 11:30a

### Why “Engineering Society?”

No one would argue with the idea that Engineers build *things* – *widgets* – *artifacts*. Yes! Believe it or not, artifacts is a technical term for...stuff. However, do you know that engineers also *engineer* society?

What do I mean? I mean that in the process of building *stuff* (another technical term), they also *design* and *construct* social relations. Take roads and cars for example, in building a road, the civil (and maybe mechanical, electrical and environmental) engineers are making decisions on where we turn, how fast we can go, how many cars will the road support, how many people can fit into a car, what individuals can and cannot do in cars, what kinds of people are allowed to drive cars... the list of decisions that engineers make that affect how we live is endless. Ever heard of the iPhone? You know, the device that is never more than 6 feet away from you and is the last thing you put away at night and the first thing you reach for in the morning... even before your significant other? Yes, built by engineers! I don't think anyone would argue about the fact that Apple's introduction of the iPhone has led to a very different world. Or stated another way, Apple not only *engineered* the iPhone, but also, through the wide spread acceptance of the iPhone re-engineered society.

This course is designed to get you to start thinking about the *other* half of what you do as an engineer. We will learn, talk about, analyze and come to grips with how engineers *engineer* society.

### What will you be able to do after taking this course?

- You will learn to *appreciate*, to *read* STS (we will discuss what STS actually is in class) and the broader social science literature. You will learn to understand their scope, relevance, and utility to an engineer (you).

- You will achieve a robust understanding of how STS and the other social sciences are relevant to the process of you becoming an amazing engineer and how useful they can be in the actual practice of engineering.
- You will achieve a level of comfort and understanding of primary STS texts. This means that you will be able to reflect critically on these texts, show an understanding of how the texts are related to each other and build a robust understanding of the scope, depth and breadth of the “literature”.
- You will be transformed in your thinking about engineering (the perfect mix of science and technology) and appreciate how the practice of engineering *is* intimately tied up with the construction of 21<sup>st</sup> century scientific and technological society. Another way of stating this, is that once one accepts that science and technology constitute the bedrock of much of what society *is* and *does* today, it becomes clear that Engineering (perhaps more than any other discipline) is really about creating society. Pre-occupied as it is, with BOTH science (*in the sense of knowledge making*) and technology (*techne*).
- You will learn relevant and useful research methods necessary for completing your STS research thesis.
- You will learn how to carry out the research and writing of a publication quality engineering-focused STS research paper, including how to structure and build an STS argument.

### **Who should take this course?**

Everyone. No seriously, it would lead to a better world! Okay, this is a required course for all UVa 4<sup>th</sup> year engineering undergraduates. Note that I consider this learning opportunity to be year-long. As a result, this course is only the first of a two part series. Note that there are projects that we will begin this semester that will only be completed in the coming semester.

### **What will we do every week?**

Learn and enjoy – and not necessarily in that order. The primary motivation for everything we do in class is that it must be an opportunity to practice the skills and techniques you will need to achieve the objectives in the bullets above. This means for example, that after you have read the assigned reading for the day, in class we will practice analyzing and critiquing the text, and you will have an opportunity to reflect critically on it and connect it to your practice as an engineer. Our class is about learning, and you learn best by **doing**, so our classes will effectively be *doing* classes. You also learn best (believe it or not) by **explaining** what you know to others, so our classes are heavy on *discussion and conversations* with your colleagues. To facilitate all this lovely chatting and bonding, the class will be organized into groups and you will work closely with your group members on various projects during the semester.

Expect to devote about 4-5 hours every week to learning activities outside of class. This is UVa, our standards are high and I have every expectation that you will put your best foot forward in learning just as I will do my very best to create opportunities for you to do so.

The schedule below goes into a quite a bit of detail as to the various activities and amazing texts we will be reading.

## Schedule of Activities

Date	Topics	Texts	Things to Remember
Week 1 – Lecture 1 August 26	<b>Introduction – What makes UVa engineers unique?:</b> As you come to reflect on this question and come prepared to discuss it.	Please read Zeynep Tufekci's piece in the New York Times – <a href="#">Why 'Smart' Objects May Be a Dumb Idea</a>	<i>Please review the guidelines on expectations of reading reflections. Reflections are due the night before class.</i>
Week 2 – Lecture 2 August 31	<b>Constructivism:</b> How do you see the world? We will continue the tone of our discussion from the last class and consider different ways of approaching the world.	<a href="#">What Judges Should Know About the Sociology of Science by S. Jasanoff</a>  <a href="#">Where are the Missing Masses? The Sociology of a Few Mundane Artifacts by B. Latour</a>	<i>Update your learning journal with your single paragraph learning reflection for the week on collab. You should do this every week.</i>
<b>Engineering Design &amp; STS</b>			
Week 2 – Lecture 3 Sept. 2	<p><b>Case Study 1:</b> What do engineers <u>actually</u> do when they design systems?</p> <p>You should also SEARCH FOR and find Elon Musk's proposal for the Hyperloop. (Hint: It is a PDF <i>hyperloop_alpha</i> and its several pages long). Read the descriptive portions of it in detail. You don't have to read the preliminary design study, which begins on page 6. Finally, ask yourself how Callon's piece applies to Musk's proposal. Here are some questions to consider as you make your forum posting:</p> <ol style="list-style-type: none"> <li>1. What is the larger socio-technical problem that the Hyperloop is meant to tackle?</li> <li>2. What, if any, are the political and cultural dimensions of this case?</li> <li>3. Now that you have read Callon, how would you describe the Hyperloop proposal from an STS perspective? Has your analytical language changed as a result of reading Callon? What categories would you employ in your analysis?</li> <li>4. What do you think about the response to the Hyperloop?</li> </ol>	<p><a href="#">Society in the Making: the Study of Technology as a Tool for Sociological Analysis by M. Callon</a></p> <p>Also, read the following takes on the Hyperloop from <a href="#">The New Yorker</a> and the <a href="#">Guardian</a></p>	<i>Use the forum to discuss the readings with the other members of your group, and then discuss Musk's proposal and the two responses to it.</i>

Week 3 - Sept 7 Labor Day	<b>No Class today</b>		Assessment A is now accessible on Collab!
Week 3 – Lecture 4 Sept 9	<b>Users and Non-Users:</b> This is an important and fascinating topic in STS. The notion of "users" and its corollary "non-users" are very useful STS concepts for engineers. Users (and non-users) are involved in various aspects of the engineering, but most notably at the design stage	<a href="#">The de-scription of technical objects in Shaping technology/building society In Shaping technology/building society by M. Akrich</a>	Assessment A is now accessible on Collab!
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See collab for the rest of the interactive syllabus.

### Are there any Projects or major deliverables?

I thought you would never ask!

There are six major projects. In chronological order they are

- **Assessment A:** STS? Is it actually useful? *This assignment is designed with two objectives. First it provides you with an opportunity to demonstrate your knowledge, understanding and mastery of core STS concepts. Second, it allows you to share your appreciation of the relevancy of STS concepts to engineering learning and practice. This is best achieved by explaining a number of concepts to someone else and describing why you think they are useful (or not) in your own words. (5%)*
- **Assessment B:** Ways of seeing *A critical skill that you need to develop is the ability to ask STS questions. For the past few years at UVa you have been trained to approach problems the way an engineer would. Most of the time this means utilizing a positivist world view. This is a unique and important kind of inquiry. An equally valid and just important kind of inquiry is that of constructivism. Constructionists see the world, as constructed in very particular ways having to do with both human and non-human elements. This can be a very powerful mode of inquiry as it can open up possibilities that were hitherto invisible.*  
  
*This assignment is designed to help you switch back and forth between asking questions in the positivist frame and asking constructivist questions of the exact same phenomena. This can be very difficult at first but gets easier with practice. (10%)*
- **Assessment C:** Concept Repositories *Your team will create an online concept repository to teach high school students STS and take them on a whirlwind tour through the literature (15%) –*
- **Assessment D:** Anatomy of a Scene “Research Paper *Your group will produce a detailed critique of an iconic STS paper, much as movie directors do for the New York Times (10%)*

- **Assessment E:** Prospectus *An opportunity to create a fully-fledged research plan for your final project due next semester (30%)*
- **Assessment F:** Research Portfolio A & B *Over the course of the semester you will create a research portfolio of your evolving project. This will culminate in the first draft of your STS research paper (15%)*

If you have been paying attention, that all sums to 85%. Where's the rest?

Participation is worth an entire 15% of the assessment. As this is a *doing* class and a substantial portion of learning lies in the interactive elements of the class. We will take participation very seriously indeed – hence the 15% grade. What does it mean to participate? In its simplest essence, it means being present in the moment and throwing yourself into the various activities both online and in class. Participation points will be available all throughout the semester.

### **What do you have to do?**

We are reading far and wide and all readings will either be available online or as pdfs in Collab so you don't have to buy a text book.

You should however, come with an open mind. Be prepared to engage with the instructor and your peers. Be assured that this class is a safe place for ALL. Be comfortable knowing that the class welcomes discussion, debate and *especially* disagreement. Above all, be willing to learn.

Oh, and you also have to make sure that you are registered for *this* particular course in SIS...

# Ways of Seeing

## Assessment B

**Reason and Rationale:** A critical skill that you need to develop is the ability to ask STS questions. For the past few years at UVa you have been trained to approach problems the way an engineer would. Most of the time this means utilizing a positivist world view. This is a unique and important kind of inquiry. An equally valid and just important kind of inquiry is that of constructivism. Constructionists see the world, as *constructed* in very particular ways having to do with both human and non-human elements. This can be a very powerful mode of inquiry as it can open up possibilities that were hitherto invisible.

This assignment is designed to help you switch back and forth between asking questions in the positivist frame and asking constructivist questions of the exact same phenomena. This can be very difficult at first but gets easier with practice.

### Description:

Your task is to practice switching frames of inquiry by generating both types of questions (positivist and constructivist) of the same phenomenon. There are two parts to this assignment.

First, you need to write TWO jokes about a positivist and constructivist. Your jokes should take the form

“A positivist and a constructivist [do something – e.g. walk into a SEAS classroom] and [observe some phenomenon]. The constructivist asks [constructivist question] and the positivist asks [positivist question].”

For example:

*“A positivist and a constructivist observe the painting of the copper dome on the rotunda. The positivist wants to know if the white color will contribute to heat reflectance and wonders if the painting roofs white could be useful in warding off global warming. The constructivist wants to know how it is that the imaginary of the rotunda is so firmly enmeshed in a particular historical period that has come to represent “authentic” UVa even though the initial Rotunda and the Lawn looked very different indeed.”*

Okay, so that wasn't a great joke. Okay, okay, it is probably a bad joke, but you get the point. The “joke” does not have to be funny - Bonus points if it is though.

Part B of this is that you need to find two individuals, one representing the constructivist view (for example a student in the college studying the humanities) and the other representing the positivist view (for example an engineering student who isn't in this class). You should share your two jokes with them and get their reactions. See if they “get it”.

### Reflection

You should also submit a separate reflection document where you should reflect on where your thinking was when you began this process, what you learned during the process, especially in the writing and in your interactions with your colleagues. What your conclusions are now about how different training influences the way people see the world and ask questions of it?

**Advice on Process:**

Feel free to work with other members of your group and discuss this if you wish. The only caveat to working with others is that the writing has to be in your own words.

**Submission:**

You have one week to submit this assignment. The jokes and reflections should be submitted in collaboration no later than Oct 9 by 11:00pm.