

ESC203: Engineering, Society and Critical Thinking, Fall 2013

Course Coordinator:

Robert Irish, Office SFB670 r.irish@utoronto.ca

Office Hours: Thursdays 4pm-6pm

Corrections this Revision: Order of Readings Corrected

Seminar Facilitators and Locations:

TUT01 (BA 2155) 9-11AM Bernie Fitzpatrick bernie.fitzpatrick@utoronto.ca	TUT05 (BA 2159) 12-2PM Amit Deshwar amit.deshwar@utoronto.ca
TUT02 (BA 2145) 9-11AM Jonathan Gammell jon.gammell@utoronto.ca	TUT06 (BA 2155) 12-2PM Andrew Clark aclark@mie.utoronto.ca
TUT03 (BA 2185) 9-11AM Andrew Clark a.clark@mie.utoronto.ca	TUT07 (BA 2175) 12-2PM Jenna Usprech jenna.usprech@mail.utoronto.ca
TUT04 (BA3008) 9-11AM Jenny Lofgreen j.lofgreen@utoronto.ca	TUT08 (BA 3012) 12-2PM Amy Khan amy.khan@mail.utoronto.ca

Calendar Description

Through this course, students will make use of a broad social science and humanistic approach to examine the interrelations of science, technology, society and the environment (STSE). Using topics in STSE as the context, students will consider established models of critical thinking and develop their own framework for analyzing socio-technical issues. Students will have the opportunity to apply tools learned through persuasive writing and formal debate. Upon completion of the course, students will have an understanding of how structured models of thinking can aid in the analysis and evaluation of thought, and should be able to apply tools of critical thinking in other contexts.

Course Resources

1. Required Textbook:
Technology and Society: Building our Sociotechnical Future, edited by D.G. Johnson and J.M. Wetmore. MIT Press, 2009. Available at the U of T bookstore.
2. Website available through <http://portal.utoronto.ca>. Various readings, available online and through the U of T Library will be provided on the course website.

Communications Support

This course relies on communication principles taught in Praxis I and II, which you can apply to your writing and presentations in this course. Writing, argument development, and other support for course assignments is available through the Engineering Communication Program Tutoring sessions, which can be booked online here: <https://awc2.wdw.utoronto.ca/awc-login>. Additional course coordinator office hours will also be set up prior to assignment deadlines.

Course Overview

ESC203 will use and expand on concepts covered in Praxis. Through Praxis, you had an opportunity to develop and justify your own definitions of “engineering” and “engineering design,” and to consider what it means to be an “engineering designer.” You also enhanced

your communication and critical thinking skills through writing and design. In ESC203, you will find yourself involved in activities to:

- Apply critical thinking and develop clear, logical arguments using appropriate and credible evidence
- Write clearly at the document and paragraph level, expressing sophisticated ideas and judgment
- Practice and improve oral presentation skills
- Explore the consequences of framing of values, goals and assumptions of individuals
Examine the role of engineering and the engineer in society

ESC203 encourages you to develop an understanding of the relationship between technological and social development, and “technological studies” and the social sciences. You should complete this course with an appreciation for the nature of technology, its impact on society, and vice versa. The course will also explore the role of the engineer in society and the way that social structures and values influence the work of an engineer.

ESC203 divides into three main parts:

- In the first section, we examine theories in technology and society studies, future studies, engineering ethics and technology & values. These theories provide the groundwork for further study in STSE.
- The second part focuses specific topics within the field to explore the relationship between technology and engineering studies and other disciplines, such as political science, communications, and environmental studies.
- The third part of the course involves the presentations for the Case Study Projects in the last two weeks of November and offers an opportunity to put into practice the concepts of the course.

Consideration and application of different critical thinking tools has been integrated throughout the course, as the complexity of socio-technical issues warrants explicit “thinking about our thinking.” You will also build communication skills in writing, debate, discussion and facilitation.

The focus of this course is very much on process rather than a specific set of outcomes; we expect you to be a co-constructor of knowledge rather than a passive receiver. Also, there is much more to know about the complex interactions between technology and society. We hope that this course will open the door to further exploration and cause you to consider the impact of your work as an engineer now and in the future.

Course Goals and Learning Objectives

This course includes three integrated themes: 1) Exploration of Engineering, Society, and Socio-Technical Issues, 2) Critical Thinking Tools and 3) Communication Skills.

Global Course Goals:

Complement science, technology and design curriculum with broader questions around the nature of technology and society

Encourage the development of a diverse range of knowledge and thinking styles and tools when considering socio-technical issues

Continue to cultivate strong communication skills, particularly in the realms of discussion, debate, writing, presentation and facilitation

ESC203: Engineering, Society and Critical Thinking, Fall 2013

Detailed Learning Objectives:

1. Complement science, technology and design curriculum with broader questions around the nature of technology and society:
 - Define key concepts and tools in technology and society studies, and apply them to the examination of socio-technical issues
 - Analyze the impact of technology on the individual and society, and how social, cultural and political systems and values in turn affect technological development
 - Explain the relationship between the community, government, corporation and the engineer in the context of socio-technical issues
 - Articulate the role of the engineer in the technology-society interface
 - Describe the challenges and opportunities in implementing technology given complex social, cultural and political structures
 - Articulate the purpose, challenges and future directions for the engineering profession and you as an individual/engineer
 - Frame a relevant issue in STS studies for consideration by your peers
 - Explain the impact of place, time and culture on thinking about socio-technical issues
 - Identify future issues for consideration in the realm of STS studies
2. Encourage the development of a diverse range of knowledge and thinking styles and tools when considering socio-technical issues
 - Identify and define thinking tools useful for the 21st century engineer
 - Use elements of critical thinking to structure arguments and analyze the arguments of others
 - Describe the interaction of technological studies with the social sciences
 - Consider how to work effectively with others from different disciplinary backgrounds, in other words, consider interdisciplinarity
 - Appreciate the social sciences and diverse epistemological viewpoints in a technology-driven society
 - Identify relevant viewpoints and stakeholders in a particular socio-technical issue
 - Explain and apply basic principles of moral and ethical reasoning
 - Recognize that a problem may not have a clear answer or a single solution
 - Define “engineering knowledge” and the nature of engineering epistemology
 - Be aware of yourself as a thinker
3. Communication
 - Develop written arguments about technology and society
 - Write clearly at the global and paragraph level, expressing sophisticated ideas and judgment
 - Use discussion and debate to state and defend your point of view
 - Actively listen to and build upon the discussion points of your classmates and seminar facilitator
 - Use elements of a good presentation to showcase a socio-technical issue to your peers
 - Summarize key content and process issues from the weekly seminars
 - Facilitate discussion on a socio-technical issue that encourages the participation and engagement of your classmates

Course Activities

Lectures: Monday 1-2 PM (MC102) and Tuesday 2-3 PM (WB116)

Discussion Seminars: Friday 9-11 or 12-2

Lectures are designed to cover key concepts and examples, sometimes presented by guest speakers, which will then be explored further in the discussion seminars. Both the lectures and seminars are supported by the readings.

The discussion seminars are truly the core of ESC203. They are designed to provide students with a non-threatening arena for discussing socio-technical issues and applying concepts of critical thinking. Learning through discussion relies on you to exchange ideas, arguments, theories, perspectives and information, and are demonstrated to not only improve student learning, but provide you with a skill that you will use in other courses and beyond Engineering Science. The seminars will include participatory activities such as organized discussion activities, debates and simulations.

Why Use Discussion (from “Leading Effective Discussion,” STLHE Green Guide):

1. Discussion promotes deeper learning and higher retention
2. Discussion helps learners practice and develop critical thinking skills and creative openness to new ideas
3. Discussion can change attitudes, values and behaviours
4. Discussion aids personal development (such as taking responsibility)
5. Discussion helps learners develop better communication and listening skills
6. Discussion helps learners develop better group and teamwork skills

Students can prepare for the seminars by attending lecture and doing the course readings. A set of discussion questions will be posted online by Friday at 5PM for use in the following week, and students are also encouraged to formulate their own questions to bring to seminar each week. Sometimes, students will be asked to complete very short tasks prior to seminar, and this will be incorporated into the seminar participation mark. Every week, 2-3 students will be asked to lead a reading discussion on a specific reading. Sign-up for reading discussion will take place in the first seminar.

Course Assessment

ESC203 is a Humanities and Social Sciences (HSS) credit. Therefore, you will be evaluated in ways consistent with other HSS courses. This includes writing and engagement in the weekly discussion seminars. Please note that further documentation, including specific instructions and marking rubrics, will be provided to students.

Summary of Assignments

Assignment	Weight	Due Date
Technology Analysis	15%	Part 1: October 1 st in lecture Part 2: October 28 th in lecture
Policy from Failure	15%	November 22
Seminar Participation	11%	Ongoing
Seminar Quizzes	5%	Weekly
Student-led Discussion	4%	In Seminar
Case Study Project	25%	
• Topic	Pass/Fail	October 16 th 23:59 by e-mail
• Proposal	5%	October 29 th , in lecture
• Case Study Package	10%	November 8 th , in seminar
• Case Study Facilitation	10%	November 18-29
Final Exam	25%	As scheduled by Registrar

Technology Analysis (15%)

This assignment has two-parts. You are required to select a single technology and analyze it from two different perspectives: technological determinism and social constructivism. In doing so, you should come to an understanding of how the two approaches differ and the strengths and weaknesses of looking from either approach.

Part 1, 500 Words, due Tuesday, October 1 in Lecture

The Implications of Technological Determinism

- Briefly describe the technological artifact (<100 words)

ESC203: Engineering, Society and Critical Thinking, Fall 2013

- Working from the assumption that technology develops in a naturally determined sequence, describe the development of your chosen technology
- Analyze what social, cultural, and/or political constraints result from the adoption of this technology

Part 2, 900 Words, Due Monday, October 28 in Lecture

The Social Construction of Your Technology

- Revise Part 1 to attempt to address the challenges and concerns raised by your assessor (and to make it shorter – <400 words – to make room for Part 2)
- Analyze the ways in which your technological artifact represents a selection of social values (i.e. how it is socially constructed to embody some social group's beliefs about the role and meaning of the technology)
- Arguably, every technology has unintended consequences; consider one or more unintended consequence of your technological artifact by explaining its effect. Consider how such unintended consequences undermine our notions of Social construction of technology and/or technological determinism.

Note: Parts 1 and 2 do not need to agree, or come together into a unified “essay.” In fact, it would be quite odd if they did. You can think of the two parts as being the two opposing sides in a debate.

Policy Problem (15%)

Due Friday, November 22 at the Division of Engineering Science Office (BA2110) (700 words)

Occasionally, engineers have the opportunity to contribute to public policy by bringing their expertise and judgment to situations that have gone wrong (e.g. the Roger's Report after the Challenger Shuttle disaster). Society depends on the expertise of the engineer to interpret the data to understand whether the catastrophe might have been averted, and how future, similar endeavours can avoid the failure.

Students will research a “technological” failure that has had social, cultural, political or environmental implications, and contemplate how society and the environment could be protected from such a failure in the future. The results will be submitted in the form of a “Summary for Policymakers.”

The bigger and more public the failure is, the more likely there will already be some policy or at least an investigation (such as the aforementioned Roger's Report). Students should consider those recommendations, but need to establish their own positions.

Seminar Quizzes (5%)

Each week, students will have a five-question quiz at the beginning of the seminar based on the week's reading. Students who have done the reading should find the quiz simple as the objective of the quiz is to ensure you do the reading and can, therefore, contribute meaningfully to the class discussion.

Seminar participation (15%)

Students will use the lecture and assigned course readings, along with posted discussion questions and small assigned tasks, to prepare for the seminars. Students should be prepared to actively engage in seminar discussion. Seminars will include mini-activities that encourage debate and discussion around the weekly topic. During the first seminar, students will help finalize the participation rubric. Every student, in pairs or triads will conduct one interactive

session based on a reading, which will constitute 5 marks of the 15% participation grade. Students will be provided with a midterm participation mark halfway through the semester.

Group Project: Case Study (25% Total)

Students, in groups of 4, will create an STS (Science, Technology and Society) case study, using group-based, self-directed research. In framing your STS case study, you may wish to consider a historical or current event, or a problem, challenge, dilemma, controversy, opportunity or issue. Your case study must:

- Highlight the complex interactions between technology and society and reflect specifically on concepts covered in class
- Give your peers an opportunity to actively engage in an STS topic relevant to their engineering education
- Look at an issue beyond Toronto (to move beyond Praxis II; students may make a case for a Toronto-based issue/problem if sufficiently different than the 2013 Praxis proposals).

You will be required to create a “case study package” for review in advance by your peers, and run a 50-minute in-person seminar for approximately 12-16 peers who have reviewed your case study. Students will be required to review and participate in four other case studies (beyond their own) during weeks 11 and 12 of the course. There will be no lectures or seminars during these weeks. Case studies will run as follows:

Week of November 18:	Week of November 25:
Monday 1-2	Monday 1-2
Tuesday 2-3	Tuesday 2-3
Thursday 9-10	Thursday 9-10
Thursday 10-11	Thursday 10-11
Friday 9-10	Friday 9-10
Friday 10-11	Friday 10-11
Friday 12-1	Friday 12-1
Friday 1-2	Friday 12-2

You must work with 3 other students who have their ESC203 seminar at the same time as you (they don’t have to be in the same seminar section).

Full instructions will be posted under “Case Study Project” on the course website.

- 1) Topic (Group): Pass/Fail
Due October 16 at 11:59PM by email to the course coordinator
 (“Fail” carries no penalty, but means you must offer a different topic)
- 2) Proposal (Group): 5%
Due October 30 in lecture
- 3) Case Study Package & Facilitation Plan (Group): 10%
Due November 8 in seminar
- 4) Facilitation (Group): 10%
November 18-29

Final Exam (25%)

Date will be set by the Registrar’s Office.

The final exam will test your knowledge of the course material and your ability to apply critical thinking skills to STSE case studies. No aids will be allowed.

ESC203: Engineering, Society and Critical Thinking, Fall 2013

Course Topics

Additional readings may be assigned and posted on the course website. On weeks when you have time, try to read one or more of the “optional reading” pieces. They are important parts of the course that will get touched on in lecture.

Topic	Description	Required Reading	Optional Reading
Week 1: Sep 9-13			
Course Introduction, Future Studies	<ul style="list-style-type: none"> -The course: its role and approach -Visioning a technological future -Facilitation techniques 	<ul style="list-style-type: none"> -Textbook Introduction -Section 1 Introduction - Neil Postman, “Five things we need to know about technological change” https://www.student.cs.uwaterloo.ca/~cs492/papers/neil-postman--five-things.html - Bill Joy “Why the Future Doesn’t Need Us” (Text 6) 	Freeman J. Dyson, “Technology and Social Justice” (Text 1)
Week 2: Sep 16-20			
Technology & Society Studies	<ul style="list-style-type: none"> - Responsible reasoning, argument and critical reading - The relationship between technology and society - Technological Determinism 	<ul style="list-style-type: none"> - James Rachels, “The Challenge of Cultural Relativism” http://www3.nd.edu/~bgoehrin/literature/Rachels.html -Textbook Section 2 Introduction Student-Led Reading: - Robert L. Heilbroner, “Do Machines Make History?” (Text 7) 	
Week 3: Sep 23-27			
Technology & Values	Social Constructivism, Technological Momentum, Actor Network Theory – the theoretical underpinnings of analysis	<ul style="list-style-type: none"> - Trevor J. Pinch and Wiebe Bijker, “The Social Construction of Facts and Artifacts” (Text 8) Student-Led Reading Thomas P. Hughes, “Technological Momentum” (Text 9) 	Bruno Latour, “Where are the Missing Masses?” (Text 10)
Week 4: Sept 30-Oct 4			

Technology, Dependence and Progress	<ul style="list-style-type: none"> - Distribution of the advantages and disadvantages of technology -The embedded social, political and economic values of technology -How gender and culture are, or are not, reflected in the design of technology 	<ul style="list-style-type: none"> -Textbook Section III Introduction - Rachel Weber, "Manufacturing Gender in Commercial and Military Cockpit design" (Text 16) - Lawrence Lessig, "Code is Law" (Text 11) Student-Led Reading: - Patrick D. Hopkins, "The Intersection of Culture, Gender and Technology" (Text 12) 	<ul style="list-style-type: none"> - Langdon Winner, "Do Artifacts Have Politics?" (Text 13)
Week 5: Oct 7-11			
Connectivity and Community	<ul style="list-style-type: none"> -Globalization and connectivity -Reliance, compliance, automation and control -Human adaptation to technology though our work and social lives -Framing and scoping STS issues 	<ul style="list-style-type: none"> - Daniel Sarewitz "Pas de Trois: Science, Technology and the Marketplace" (Text 17) Student Led Reading: - Jameson M. Wetmore "Amish technology: reinforcing values and building community" (Text 18) 	<ul style="list-style-type: none"> George Ritzer "Control: Human and Nonhuman Robots" (Text 14)
Week 6: Oct 14-18			
Engineering Ethics	<ul style="list-style-type: none"> -The difference between micro and macro ethics -Moral reasoning, major ethical theories, moral relativism -Applications of ethics to engineering -Ethics and justice in engineering practice 	<ul style="list-style-type: none"> - Fabio Salamanca-Buentello et al. "Nanotechnology and the Developing World" (Text, 27) - Noela Invernizzi and Guillermo Folardori "Nanotechnology and the Developing World: Will Nanotechnology Overcome Poverty or Widen Disparities?" (Text, 28) Student-Led Reading: Sabine Roeser, "Emotional Engineers: Toward Morally Responsible Design" 	
Week 7: Oct 21-25			

ESC203: Engineering, Society and Critical Thinking, Fall 2013

Framing & Communicating Science & Technology; Introduction to Public Consultation	<ul style="list-style-type: none"> -How scientists and journalists frame science and technology -The purpose of academic discourse and peer review -Public engagement and research -Introduction to public consultation 	<ul style="list-style-type: none"> -Framing Science (Nisbet and Mooney, Science, 2007) -The Risks and Advantages of Framing Science (Kavanagh, Science, 2007) Roopali Phadke, "People's Science in Action: The Politics of Protest and Knowledge Brokering in India" (Text, 29) Andrew Colombo and Bryan Karney, "Why engineers need public policy training and practice" (<i>Journal of Policy Engagement</i>, 2009) <p>Student-Lead Reading:</p> <ul style="list-style-type: none"> - W. Patrick McCray, "Will Small Be Beautiful? Making Policies for Our Nanotech Future" (Text, 19) 	
Week 8: Oct 28-Nov 1			
Technology & the Environment	<ul style="list-style-type: none"> -Public consultation continued -Sustainability -Environmental decision-making 	<ul style="list-style-type: none"> - David Elliott, "Energy, Society, and Environment: Technology for a Sustainable Future" (Text, 32) <p>Student-Lead Reading:</p> <ul style="list-style-type: none"> - Kristin S. Shrader-Frechette, "Introduction to Environmental Justice: Creating Equality, Reclaiming Democracy" (Text, 33) 	
Week 9: Nov 4-8			
Technology, Privacy & Security	<ul style="list-style-type: none"> -Intersection of privacy, freedom of speech, access to information and internet technology -Issues of cyberwarfare, sensorship and surveillance 	<ul style="list-style-type: none"> - Torin Monahan, "Questioning Surveillance and Security" (Text 31) <p>Student-Lead Reading:</p> <ul style="list-style-type: none"> - Bruce Schneier, "Security Trade-Offs Are Subjective" and "Technology Creates Security Imbalances" (Text 30) 	
Week 10: Nov 11-15			
Global Engineering	<ul style="list-style-type: none"> -What is Global Engineering? -The role of technology in International Development 	<ul style="list-style-type: none"> -Chan and Fishbein, "A Global Engineer For the Global Community" (<i>Journal of Policy Engagement</i>, 2009) 	

		Student-Lead Reading: Gary Chapman, "Shaping Technology for the Good Life: The Technological Imperative versus the Social Imperative" (Text 25)	
Week 11: Nov 18-22 Case Study Week			
Week 12: Nov 25-29 Case Study Week			
Week 13: Dec 2-4			
Conclusions & Exam Review	-Course Wrap-up -Exam review	Michael Bess, "Icarus 2.0: A Historian's Perspective on Human Biological Enhancement" (Text 34)	

ESC203: Engineering, Society and Critical Thinking, Fall 2013

Course Policies

Students are reminded that they are expected to adhere to the “Code of Behaviour on Academic Matters”, available online at:

<http://www.utoronto.ca/govcncl/pap/policies/behaveac.html>

They are also expected to adhere to the “Code of Student Conduct” available online at:

<http://www.utoronto.ca/govcncl/pap/policies/studentc.html>

Students are also encouraged to explore and consult with the University of Toronto Academic Integrity Office or with their course instructor if they have any questions or concerns regarding academic integrity, and in particular plagiarism. Further information on the Integrity Office can be found online at:

<http://www.utoronto.ca/academicintegrity/>

There are several types of academic dishonesty that you should be aware of for this course, including but not limited to:

- Bringing unauthorized materials to the final exam

- Copying another source in a writing assignment, such as an article, book or another student’s assignment, without using quotation marks and citing the reference

- Using ideas of others without attribution

Late Penalties

Facilitating and participating in a discussion seminar is very difficult when other students are arriving late and interrupting. For the benefit of your peers and the facilitator, please arrive on time. *Late penalty*: 10% off the seminar grade for any student arriving late, but within the first ten minutes of seminar. A further 1% late penalty will be applied for every minute beyond the first ten.

Any assignments submitted late are subject to a 15% penalty per day and will be accepted up to 3 days after the due date. If a student can not submit an assignment or participate in a seminar due to illness or personal matters, the student is expected to submit a term work petition on their return to school. The term work petition form is available on the registrar’s office website.

Electronic Communication

Email communication in this course will follow the “University of Toronto Policy on Official Correspondence with Students”, available online at:

<http://www.utoronto.ca/govcncl/pap/policies/studentemail.html>

Be aware that this policy mandates that official communications to students will only be sent to a sanctioned email address (for example @utoronto.ca and @ecf.utoronto.ca). Messages from students to course staff should also be sent from a sanctioned email address. Messages sent from other accounts (e.g. @gmail.com or @hotmail.com) may be filtered by University email servers or by Mail User Agents. Students should expect a response to their communications within two business days.

Turnitin

Normally, students will be required to submit their written assignments to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site.

Students who object to the use of turnitin.com can be granted an exemption, but must consult with the course coordinator *before* beginning work on the assignment.

Public Disclosure

Students agree that by taking this course all submitted deliverables **may** be used for teaching and learning purposes, in this or subsequent courses, or to support research into improving engineering education. Should such use take place, any content identifying the student will be removed.

Contesting Grades

Students have 7 business days to contest a grade. Students are asked to review their assignments carefully, reflect, and write a short memo outlining the reasons for re-submission BEFORE re-submitting the assignment. Assignments will not be reviewed prior to 1 business day after assignment re-distribution.

This ESC203 syllabus will be followed as closely as possible, however details are subject to change. Any changes will be reported to students.

This site is devoted to promoting the iCalendar standard, which includes specifications, resources, a validation tool and PHP library. iCalendar is an open standard for exchanging calendar and scheduling information between users and computers. Description of the calendar. Use \n to separate lines. The field accepts plain text. The description is used on the calendars subscribe page, e.g. <https://www.addevent.com/calendar/ic14>. Save a calendar. Save a calendar. Description. Event Calendar is a flexible calendar plugin that allows you to connect to your database and show up your event days on a view. Calendar can render a Day, Week, Month and Resource calendar view. The also provides an interface for manipulating and formatting dates and times. Each event box has a link to the original event you defined in your calendar. Event Calendar Premium. All Calendar Demo Types. Event Calendar FAQ. Event Calendar User Manual. Support Forum. Features.