Social and Ethical Implications of Engineering
Fall 2017 LEAP 1501 – Sections 6, 7 & 8
[Social Science Foundation, Fulfills ABET criteria]
First Semester of Engineering Sequence for General Education

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Library Instructor:
Dale Larsen, Assistant Librarian
Marriott Library
801.581.8323
dale.larsen@utah.edu

<table>
<thead>
<tr>
<th>Peer Advisors</th>
<th>Section</th>
<th>Time</th>
<th>Class Room</th>
<th>Phone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Libby</td>
<td>6</td>
<td>9:10 am – 10:30 am</td>
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<tr>
<td>Jacob</td>
<td>7</td>
<td>10:45 am – 12:05 pm</td>
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<tr>
<td>Ben</td>
<td>8</td>
<td>12:25 pm – 1:45 pm</td>
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Engineering-LEAP [E-LEAP] Course Description
“Social and Ethical Implications of Engineering,” LEAP 1501, provides you with an understanding of the role of ethics in the engineering profession by focusing on specific issues set out by the Accreditation Board for Engineering and Technology [ABET]\(^1\): adhering to “…engineering standards and realistic constraints - economic, environmental, sustainability, ethical, health and safety, social and economic” and “an understanding of professional and ethical responsibility” (General Criteria 3. Student Outcomes: (c), (e), (f), (h), (i), and (j) respectively, Criteria for Accrediting Engineering Programs 2016-2017).

This semester, you will engage in a discussion of community by examining how the world of social sciences studies human institutions and you will apply social science concepts to engineering ethics and decision-making processes in national and global communities.

\(^1\) [http://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2016-2017/-outcomes](http://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2016-2017/-outcomes)
This course prepares you to recognize ethical issues in engineering contexts with the help of essays and case studies. You will look at some engineering failures in order to better understand why ethical thought is important for engineers and, in order to assess the consequences of these failures on public health, safety and human progress. In addition, you will identify and understand professional and ethical responsibility based on the codes of ethics from discipline-specific professional organizations and societies. Central to the discussions of ethics and professionalism are the *Fourteen Grand Challenges for Engineering in the 21st Century*, articulated by the National Academy of Engineering. This course offers you an opportunity to understand the import of these fourteen challenges within the purview of a social, and ethical perspective.

In order to understand the role of the engineer in local, national, and global settings, you will begin by asking:

- What is a society or community? How do engineers define a professional society? What is the purpose of professional engineering societies?
- How can engineers determine what is ethical in making decisions within different communities?
- What can engineers learn from social scientists and implement in dealing with other engineers, with corporations or government agencies, and with the public?
- How do social scientists study human behavior and institutions?
- What role do engineers and other social scientists play in our society in influencing public debate and public policy? What is the role of engineers as citizens and as technical advisors in shaping progress or changes in technology?
- How do social scientists and engineers analyze and respond to issues of globalization?

To understand the impact of engineering solutions in global and societal contexts, we will study concepts of local and global sustainability. We will examine the notion of sustainable development from the practicing engineer’s perspective. As a member of a team, you will research an engineering problem related to sustainability and ultimately present your team’s research project to the class in a mock-professional engineering conference at the end of the semester.

**Learning objectives for LEAP 1501**
At the end of the semester you should be able to:

1. Assess the social and ethical implications of creation and constructions of technology and its uses in the United States and in a global setting by using social science methods of inquiry
2. Acquaint yourself with the LEAP learning community, one in which students know each other, the E-LEAP faculty members, peer mentors, and the College of Engineering faculty
3. Acquire a more sophisticated knowledge of library technologies
   a. By being introduced to databases in the social sciences, applied sciences and engineering

b. By being introduced to research methodologies specific to their discipline

c. By learning how to evaluate internet sources

4. Develop sophisticated writing and oral communication strategies which allow the student to:

a. Demonstrate critical thinking skills in crafting written and oral assignments
b. Analyze professional communication skills
c. Assess levels of technical expertise in audiences
d. Use quantitative information in visual aids such as graphs and charts
e. Integrate library resources into a final, team-based research project

5. Learn team building skills

a. By practicing leadership skills in teams
b. By negotiating task assignments
c. By evaluating the outcomes of team projects

6. Explore a variety of campus activities and organizations in order to become part of the larger University community

Required Readings (All these articles can be found on CANVAS under the “files” tab):

- E. Babbie, “Human inquiry and social science,” in ____________.


Audiovisual Materials Linked on Canvas or Used in Class


Reference: The IEEE citation method is the reference style that will be required for this course. The best online guide to IEEE reference style is at the University of Murdoch in Australia: http://libguides.murdoch.edu.au/content.php?pid=144623&sid=1229928

Assignments and Grades

<table>
<thead>
<tr>
<th>Individual Assignments</th>
<th>Total for assignments: 115 points</th>
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<tbody>
<tr>
<td><em>Interview with an Engineer</em></td>
<td>20</td>
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<tr>
<td>Writing Assign on Engineering Disasters</td>
<td>10</td>
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<tr>
<td><em>Memo on Risk &amp; Complex Technology</em></td>
<td>20</td>
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<tr>
<td>Library quizzes/assignments [5 x 3 pts]</td>
<td>15</td>
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<tr>
<td>Midterm</td>
<td>25</td>
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<tr>
<td><em>Team Presentation evaluations</em></td>
<td>5</td>
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<tr>
<td>Mandatory Attendance days [5 x 1pt]</td>
<td>5</td>
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<tr>
<td><em>Reading Quizzes [3 x 5 pts]</em></td>
<td>15</td>
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Student conference presentation  
Total for team assignments: 115 points

Team Meeting #1: Choose research topic  
Write research proposal

Team Meeting #2: Edit Research proposal  
Add explanation of science and technology  
Add description of one industry/corporation

Team Meeting #3: Write research memo  
Articulate criteria for evaluating sustainability  
Evaluate technology in relation to criteria  
Include progress report on research/team issues

Team Meeting #4: Edit research memo  
Add ethical analysis of technology  
Add evaluation of current policy  
Propose suggested policy changes

Team Meeting #5: Draft PowerPoint presentation  
Organize PowerPoint Presentation  
Present draft to librarian in library class #5

Team presentation [30 min. max.]  
Final report – team written research report

Total  
230 points

Grading: I do not grade on a curve. Grades are assigned by percentages.

<table>
<thead>
<tr>
<th>Percentages</th>
<th>Letter Grade</th>
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<tr>
<td>94% and above</td>
<td>A</td>
</tr>
<tr>
<td>90-93%</td>
<td>A-</td>
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<tr>
<td>87-89%</td>
<td>B+</td>
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<td>84-86%</td>
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<tr>
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<td>D</td>
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<tr>
<td>Below 60%</td>
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Assignments

- Generally late assignments will not be accepted. However, if you have an emergency or a valid reason for turning in an assignment late, you may be able to turn in the assignment after the due date BUT ONLY if you have made arrangements with me prior
to the due date and have established a specific time you will turn in the assignment.

- Team assignments are precisely that – *team* assignments. By definition they demand that a team collectively invest effort and submit the assignment for a grade.
- You must attend five library sessions and contribute to your team research project to receive credit. Library sessions are designed to aid and assist you in successfully completing your team research project. Attendance at library classes is mandatory as are team meetings in class. *If you miss a library session, you will be ineligible to make up the library quiz/assignment assigned for that class.*
- Directions for major assignments (interview, midterm, memo, team presentation at mock engineering conference, and final report) will be distributed in written form and available on Canvas after they are explained in class.

**Extra Credit Points**
You may earn up to five (5) extra credit points during the semester if you attend/participate in any of the following:

- An engineering activity sponsored by the College or one of the engineering departments
- A LEAP activity
- A lecture on campus
- Your peer advisor’s office hour for a consultation on a class assignment

To receive the credit for the extra credit options listed above, please write a 150-word report on the activity - what you experienced and what you gained – and send it as an **email to your peer advisor**. All extra credit emails must be to the Peer Advisor by the end of the last week of class.

**LEAP 1060:** To receive credit for LEAP 1060, “Methods and Technologies for Library Research,” a 1-unit course you need to attend all of the library instruction sessions during the 2017-2018 academic year [5 during fall 2017 and 5 during spring 2018 semesters]. You will be eligible for this credit if you continue with LEAP for the spring 2018 semester. I will provide you with more information as we approach Spring-2018 semester registration.

**CANVAS:** We will be using the Canvas course management system to promote discussion and learning. I will post this syllabus on CANVAS, along with your grades, assignments and announcements. In addition, you will be using CANVAS to post assignments and to keep in touch with your team. **Note that participation and use of Canvas is required for this course.** Log in on a regular basis to check for postings from the professor and the Peer Advisor.

**Classroom Policies**
Because we have so much material to discuss in any given class period, and class will consist largely of discussion rather than lecture, you must come prepared by having done the reading in a thoughtful, responsive manner. Read the articles with critical skepticism, i.e., to identify the main ideas presented, to weigh and evaluate these ideas with an open mind, and to be prepared to share your responses about what you've read. **I expect regular, full-time, on time class**
attendance and participation.

Plagiarism: Claiming or suggesting that words or ideas of others are your own is a form of cheating. The University's policy on cheating is clear: plagiarism is appropriation of any other person's work and the unacknowledged incorporation of that work in one's own work offered for credit." It is theft. Punishment for plagiarism is an automatic NC [no credit for the course] and further disciplinary action may be taken.

Contacting the instructor or peer advisor
My office hours and office location are listed on the first page of this syllabus. Please email me to make an appointment if my office hours are not convenient. The peer advisor will post his/her office hour and contact information on Canvas.

Reasonable accommodation: Read the following statement and, if it applies to you, please visit the University's Center for Disability Services, 162 Student Union, or contact them at 581-5020 for information on how they can help you.

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the instructor and to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD) to make arrangements for accommodations. All printed information for this course can be made available in alternative format with prior notification to the Center for Disability Services.

Course Schedule
Subject to change with prior notice
Whatever reading is listed for a particular day should be done BEFORE you come to class on that day.

Week I – Introduction: Engineering Ethics & the Social Sciences
Aug 22 - [T]
1. Introduce course; distribute syllabus
2. Peer Advisor introductions
3. Announce LEAP Convocation & other upcoming events

Aug 24 - [TH]
1. Introduction to Ethics in Engineering
2. Introduction to Social Science
3. Interview with an Engineer assigned today

Readings:
- Babbie, Ch. 1, “Human Inquiry and Social Science” – On Canvas
- D. Metlay, “How social science informs engineering practice” – On Canvas

Week II – Engineering Ethics
Aug 29 - [T]
1. Engineering Ethics
2. Watch Engineering Disasters
3. Introduce short writing assignment, due by 11:59 pm, September 2nd.
   Readings:
   - Fleddermann textbook, ch. 2, “Professionalism and Codes of Ethics” – on Canvas
   - J. H. Matsuura, “Engineering Codes of Ethics: Legal Protection for Engineers” – On Canvas

Aug 31 - [TH]
   1. Theme: Macro-ethics and micro-ethics
   Readings:
   - J. M. Wetmore, “The value of social sciences for maximizing the public benefits of engineering” – on Canvas
   - V. Wadhwa, “Law and Ethics Can’t Keep Pace with Technology” – On Canvas

**Sept 2 – [Sat] Short Writing Assignment due on Canvas by 11:59 pm**

**Week III – Macroethics: Society & Technology**
Sept 5 - [T]
   1. Case Study: nuclear power
   Readings:
   - R. L. Whelchel, “Is technology neutral?” -- on Canvas
   - J. M. Wetmore, “Amish technology: Reinforcing values and building community” – on Canvas

Sept 7 - [TH]
   1. Case Study: nuclear power
2. Watch movie at home before attending class: “Meltdown at Three Mile Island”
   Readings:
   - Background on TMI,
   - To be announced -- article on US reaction to nuclear power
   - To be announced -- article on Fukushima, Japanese society reaction to nuclear power

**Week IV – Macroethics: Organizational failures**
Sept 12 - [T]
   1. Case Study: Challenger
2. Watch at home before attending class: Part I of video Challenger: The Untold Story
   Reading:
   - N. Pidgeon, “Complex Organizational Failures,” – On Canvas

Sept 14 – [TH]
   1. Discussion: Organizational failures
2. **Memo assignment handed out in class and posted on Canvas, due Saturday, Sept 23 by 11:59 pm on Canvas**

   Readings:

**Sept 16 – [Sat] Interview with an Engineer due on Canvas by 11:59 pm**

**Week V – Complex Technology & Global Society**

Sept 19 - [T]

1. Discussion of complex technology, risk, blame

   Reading:
   - T.W. Smith III & T.L. Hoke, “Protecting Dissent”
   - “What was Volkswagen Thinking?” – On Canvas
   - C. Holliday. “Ethics in Business” – On Canvas

Sept 21 - [TH]

1. Case Study: Bhopal

   2. **Watch Bhopal movie in class**

   3. **Study guide for the midterm posted on Canvas and handed out at end of class**

   Reading:
   - T. Donaldson, “The ethics of global risk,” -- on Canvas

   **Recommended Reading:**
   - D. Murphy-Medley, “Exportation of risk: The case of Bhopal”
     [http://www.onlineethics.org/Resources/19049/Bhopal.aspx](http://www.onlineethics.org/Resources/19049/Bhopal.aspx) - link is on Canvas

**Week VI – Conclusions – ethical engineers and society**

Sept 26 - [T]

1. Conclusion: Ethical Behavior in Engineering

2. Discuss: How to write a memo

   **Readings:**
   - To be assigned
   - To be assigned

Sept 28 - [TH]

   1. **Midterm in class**

**Week VII – Sustainability and Engineering**

Oct 3 - [T]

1. Discussion of Teams --Teams write a team contract

2. **Mandatory Attendance Day #1**

3. **Hand out description of semester team project**

**Oct 4 – [Wed] Memo on Risk & Complex Technology Due on Canvas by 11:59 pm**
**Oct 5 - [TH]**

**First Library Class**, meet in MLIB 1170 or 1120 (depending on your section)

Team Assignment #1: *Team drafts research proposal to be posted on Canvas by 11:59 pm, Saturday, October 7th.* [10 pts]

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**Oct 7th – [Sat] Team Assignment #1 due online by 11:59 pm**

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**[Week VIII – Fall Break  [Oct 9 - 15] – No Class]**

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**Week IX -- Sustainability and Team Project**

Oct 17 - [T]

1. Theme: Sustainability
2. Review how to effectively work in teams

3. **Reading QUIZ #1 in class**

Readings:

- S. Beder, “The role of technology in sustainable development”
- J.R. Herkert, “Engineering and sustainable development” [focus on definition of sustainability]

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Oct 19 - [TH]

**Second Library Class**, meet in MLIB 1170 or 1120 (depending on your section)

Team Assignment #2: *Team produces a research memo that evaluates science and engineering details of the technology. Research memo with powerpoint slides is to be posted on Canvas by 11:59 pm, Tuesday, October 24.* [10 points]

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**Week X – Sustainability and Team Project**

Oct 24 - [T]

1. Team Meeting in class (45 minutes)
2. **Mandatory Attendance Day #2: please bring laptop**

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* **Team Assignment #2 due online by 11:59 pm**

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Oct 26 - [TH]

**Third Library Class**, meet in MLIB 1170 or 1120 (depending on your section)

Team Assignment #3: *Team produces a research memo that evaluates technology and sustainability connections. Memo includes a progress report on research problems to date. Research memo with powerpoint slides is to be posted on Canvas by 11:59 pm, Tuesday, November 7.* [10 points]

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**Week XI – Teamwork and Materials Life Cycle**

Oct 31 - [T]
1. Team meeting in class (45 minutes)
2. *Mandatory Attendance Day #3: please bring laptop*

Nov 2 - [TH]
1. Criteria for evaluating sustainability
2. Watch video on materials life cycle
3. **QUIZ #2** (on readings and film)
   Readings:
   - P. T. Anastas and J. B. Zimmerman. “Design through the 12 principles of green engineering” on Canvas
   - Review: S. Beder, “The role of technology in sustainable development” – On Canvas

**Week XII – Teamwork and Technology Policy**
Nov 7 - [T]
1. Theme: Technology and Public Policy
2. Discussion on how policy affects sustainability of technology
3. **Reading QUIZ #3**
   Reading:
   - Reading to be assigned

* **Team Assignment #3 due online by 11:59 pm**

Nov 9 - [TH]
**Fourth Library Class**, meet in MLIB 1170 or 1120 (depending on your section)
Team Assignment #4: *Team edits the research memo and includes the ethical and policy implications of the technology/research. The edited research memo with PowerPoint slides is to be posted on Canvas by 11:59 pm, Tuesday, November 14. [10 points]*

**Week XIII – Team Research and Preparation for Presentation**
Nov 14 - [T]
1. Team meeting: 45 minutes in class
2. *Mandatory Attendance Day #4: please bring laptop to class*
3. Problem-solve research issues with policy and ethical implications of a particular technology
4. Discuss “Professional presentation strategies – How to present effectively”

* **Team Assignment #4 due online by 11:59 pm**

Nov 16 - [TH]
**Fifth Library Class** meet in MLIB 1170 or 1120 (depending on your section)
Team Assignment #5: *Please post the team’s PowerPoint, which includes a “Notes” section, on Canvas by midnight, Wednesday, November 22. [10 points]*
**Week XIV – Team Research and Preparation for Presentation**

Nov 21 - [T]
1. Team Meeting in-class:
2. *Mandatory Attendance Day #5: please bring laptop to class*
3. *Team Final Report assignment handed out in class, due on last day of class during finals week*

**Nov 22 – [Wed] Team Assignment #5 due online by 11:59 pm**
Nov 23 - [TH] -- *Thanksgiving – No class*

**Week XV – Prepare for Team Presentation**

Nov. 28 - [T]
1. In class workshop – work on research reports/presentations for mock engineering conference
2. Faculty and Peer Advisors review PowerPoint and presentation notes w/teams

Nov 30 - [TH]
Two Team Presentations

**Week XVI – Team Presentations**

Dec 5 - [T]
Two Team Presentations

Dec 7 - [TH]
Two Team Presentations

**Week XVII -- FINALS WEEK**

Final for Section 6
Dec 14 – [TH] 8:00 am to 10:00 am
One team presentation
* *Hard copy of the team final report due in class*

Final for Section 7
Dec 11 – [M] 10:30 am to 12:30 am
One Team Presentation
* *Hard copy of the team final report due in class*

Final for Section 8
Dec 12 -- [T] 10:30 am to 12:30 am
One Team Presentation
* *Hard copy of the team final report due in class*