HNRS 445A: Explorations in Science, Technology, and Society, Fall 2014
From the Lab to the Page: Revolutions in Science, Literature, & Society

"... the central idea of revolution is the foundation of freedom, that is, the foundation of a body politic which guarantees the space where freedom can appear."

― from On Revolution, Hannah Arendt

“Lock up your libraries if you like; but there is no gate, no lock, no bolt that you can set upon the freedom of my mind.”

― from A Room of One's Own, Virginia Woolf

Contact Information:
Professor Toni Lefton
Stratton Hall 413
303-384-2332
tlefton@mines.edu
Office Hours: Tuesday & Thursday 2:00-3:00, Wednesday 3:00-5:00, and by appointment.

Professor Lincoln Carr
Meyer Hall 342
303-273-3759
lcarr@mines.edu (best way to contact me is during office hours)
Office Hours: Monday 2-4 pm, Wednesday 1-4

Course Description: Although the world of the arts is often viewed as somehow distinct from the world of science, in fact they are closely linked. This course explores these connections by focusing on revolutions in science, literature, and society. The synergy of the arts and sciences will be used as an instrument to explore technical, social, political, and cultural contexts of revolution. The course emphasizes that revolution achieves critical mass via a convergence of many apparently disconnected causes from different areas of history and thought. We will also explore the intellectual and personal courage of scientists working counter to mainstream ideas while discussing literature which attempts to shift the status quo towards race, class, and gender equity, freedom of speech, freedom of worship, and the extension of human rights.

Course Objectives: Students will learn to engage in broad-minded interdisciplinary critical thinking around the theme of revolution by reading scientific articles, philosophy, social theory, literature and poetry. Students who have completed this course will be able to do the following:

• Utilize a broad variety of primary and secondary sources to form and coherently express new ideas while evoking different types of evidence, exemplifying strong comparative reading skills.
• Unify scientific and literary thinking by connecting articles in the hard sciences with philosophy and literature.
• Articulate ideas in critical and creative assignments to improve high level writing skills towards publishable work.
• Increase public debate skills and effective communication styles suitable for professional presentations and group discussions.
Required Texts: Please order your books using the ISBN numbers listed below. Literally, we all want to be on the same page.

- All other course readings can be found on Blackboard and should be brought to class on the day of discussion.

Course Requirements: All students enrolled in this course must also be enrolled in Blackboard (BB). Homework assignments & announcements, supplemental information, and course communications happens there. If you are absent, please check BB for the missed material. All assignments as listed below are due by 3:00 pm Wednesdays the week of their due date. We will endeavor to evaluate and provide feedback on your work within one week; sometimes the Discovery papers may take up to two weeks to return.

*Blackboard reading synthesis journals* (20%): A two page response (500-750 words) to the weekly readings will be required as a prelude to class discussions. The emphasis is on synergy between the different readings; this is not a summary or a book report. All journals should be written in double spaced 1” margins, 12 pt. font and posted to BB. You cannot receive credit for a journal if it is posted after the discussion. Sometimes a creative assignment or set of questions will be posed for the weekly journals. Reading synthesis journals will not be assigned the week major papers are due (see below).

*Blog* (10%): There are three thematic units covered in this course: *Revolutionary Paradigms, Revolutions in Society*, and *Revolutions in Science & Technology*. Students will be asked to contribute weekly blog posts throughout the semester. Of these posts, a minimum of one new innovative thread per unit with a thoughtful response to two other peer posts for that particular unit are required. At least some of your posts should contain significant visual content; a blog is both written and visual. The blog will serve as a home to make key discoveries and broader connections between multidisciplinary readings and continue an online discussion with the course participants after class as well as selected members of the public and former students from this course. The blog is an excellent place to pose questions, hypothesize contextualized answers, and initiate dialogue on the subject of revolution. Participation on the blog requires the same standards of respect as in-class discussion.

*Presentation* (10%): The in-class presentations will be given individually or by a team of two students. Your presentation must connect to the overall course theme of revolution. We’ll ask you to use strong visual and interactive presentation tools, encouraging the team to move beyond reading slides to effectively engaging your audience. The goal for all presentations is to make the content and delivery memorable and by doing so ensure the retention of information. Your presentation will be 30 minutes, 10 minutes of which must be left for Q&A. We require you to provide at least three non-Wikipedia resources at the end of your presentation which you have read thoroughly. Please see the Presentation Folder on BB for further resources.
Participation and the structure of the weekly seminar (10%): The seminar will rely on students to critically and creatively examine issues raised by the literature. The focus will be on meaningful interaction between everyone in the class. Please always bring your texts so we can reference and share our close readings of the materials. Because a seminar emphasizes collaboration and the exchange of ideas, participation is essential for success. Your voice is important to this community; therefore, you must participate in class regularly in order to receive a B or higher. The participation grade depends on the clarity and courage of your ideas, and your preparation ahead of time by reading and thinking over assigned materials, writing your reading journal, and participation in the blog. You will be asked to turn in a self-evaluation at the end of the semester.

This class will not skirt around controversial material so we ask that you come with an open mind. Skepticism is at the heart of the sciences; therefore we expect you to be good skeptics, including about your own ideas and beliefs. Skepticism is not nihilism or disbelief; it is a key component of critical thinking. We are excited to collaborate and learn from each of you.

Discovery papers (30%): There will be three major papers, one for each course unit; each essay will be 6-8 pages (1500-2000 words) plus integrated creative material (see below). The formatting requirements are the same as for the reading synthesis journals. Assignments should be posted to BB (including all integrated creative material) and we do not require a hard copy. The essay could be an argument based off of your reading synthesis journal and blog posts, although we ask you not to cut and paste. This formal assignment is an opportunity to scaffold your ideas from early intuition (reading synthesis) to reflection (blog post) to ultimately seeing your critical thinking through to a coherently researched argument. Writing standards in the humanities are as high or higher than those found in engineering and the sciences; we encourage you to go the Writing Center if you are still struggling to meet these standards. As part of these major papers you must include integrated creative material as follows: poetry, art, mathematics, computer code, or some other non-essay content. This is a broad-minded class and we encourage you to explore your ideas in all modes of thought. For instance, if you want to demonstrate a point about chaos and you include output from the logistic map (http://en.wikipedia.org/wiki/Logistic_map), it would be a bona fide form of communication. Inclusion of such material should be at an appropriate level and length. A good guide is that your essay should be understandable to other honors students without extensive special knowledge beyond what is presented in the course. So a clear poem, mathematical illustration, engineering analogy, or half page drawing or graphic are all fine; a 10 page proof of a high level theorem, or a poem drawing on esoteric myth would not be useful, simply because your classmates could not understand you. We encourage you to think outside the box. Please see the Discovery Essays folder on BB.

Final project: Revolution Zine (20%): What is revolution? Over the semester we will examine that question in broad and varied contexts. By December, you will have gathered your own interpretations, definitions, and sense of the term and its meaning in your life. This final project asks you to create a Zine that explores and defines—through short essays, letters, creative vignettes, images, and personal reflection—Revolution. The collection should be crafted with an emphasis on comparative analysis of the literature we’ve studied, scientific development and its revolutionary effect on society, present day revolutions and the future you imagine from your
position in 2014. A zine is a small circulation, self-published work of original and/or appropriated texts and images. Since the invention of the printing press (if not before), dissidents and marginalized citizens have published their own opinions in leaflet and pamphlet form. Thomas Paine published an exceptionally popular pamphlet titled *Common Sense* that contributed to the American Revolution. Details can be found on BB in the Zine folder.

**Grading Scale:**

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**Late Assignments & Absences:**

In the professional world showing up late regularly, being absent frequently, and missing deadlines constitutes grounds for dismissal. Even though this is a class and not a career, we want you to be prepared for special circumstances and consider the consistency of your actions. We know life happens. Therefore, the policy is to allow each student one late assignment without penalty. You must request your extension before 3:00 pm Wednesday on the due date for the request to be granted. Once an extension is granted, you have up to one week after the due date to turn in your assignment. Presentations and Zines cannot be conducted late. No other late work will be accepted, even for partial credit.

For courses that meet once a week, students can miss two class meetings without penalty. Upon a third absence, a student’s entire letter grade for the course will be reduced by one whole letter (e.g. from a B to a C). We do not distinguish between excused and unexcused absences. In addition, promptness is expected and appreciated, and factors into your participation grade. For serious illnesses or other emergencies, we refer students to the undergraduate bulletin for CSM's policy. Please note that paperwork must be generated through the Associate Dean of Students.

**CSM Policy on academic integrity/misconduct:** The Colorado School of Mines affirms the principle that all individuals associated with the Mines academic community have a responsibility for establishing, maintaining and fostering an understanding and appreciation for academic integrity. In broad terms, this implies protecting the environment of mutual trust within which scholarly exchange occurs, supporting the ability of the faculty to fairly and effectively evaluate every student’s academic achievements, and giving credence to the university’s educational mission, its scholarly objectives and the substance of the degrees it awards. The protection of academic integrity requires there to be clear and consistent standards, as well as confrontation and sanctions when individuals violate those standards. The Colorado School of Mines desires an environment free of any and all forms of academic misconduct and expects students to act with integrity at all times.

Academic misconduct is the intentional act of fraud, in which an individual seeks to claim credit for the work and efforts of another without authorization, or uses unauthorized materials or fabricated information in any academic exercise. Student Academic Misconduct arises when a student violates the principle of academic integrity. Such behavior erodes mutual trust, distorts the fair evaluation of academic achievements, violates the ethical code of behavior upon which
education and scholarship rest, and undermines the credibility of the university. Because of the serious institutional and individual ramifications, student misconduct arising from violations of academic integrity is not tolerated at Mines. If a student is found to have engaged in such misconduct sanctions such as change of a grade, loss of institutional privileges, or academic suspension or dismissal may be imposed.

Academic integrity and intellectual honesty are important issues. We strongly encourage students to collaborate and work together creatively; in fact, that is a key part of this course, both in and out of class. Plagiarism, in contrast to collaboration, is a serious offense that may result in course failure. CSM policy defines plagiarism as “Copying or adopting the scientific, literary, musical, or artistic composition or work of another and producing or publishing it as one’s own original composition or work. To be liable for plagiarism it is not necessary to exactly duplicate another’s work: it is sufficient if unfair use of such work is made by lifting a substantial portion thereof, but even an exact counterpart of another’s work does not constitute plagiarism if such counterpart was arrived at independently.”

The policy of the Liberal Arts and International Studies Division is as follows:

- For a first offense, the student will receive an F in the course, and the Vice President for Student Life and Dean of Students will be notified.
- For a second offense, the student will also receive an F in the course and further action, normally suspension from CSM, will be taken by the Vice President for Student Life and Dean of Students. The incident will also become a permanent part of the student's transcript.

Students are encouraged to seek academic support if struggling with course material. Information on Tutoring, Academic Excellence Workshops, and Academic Coaching can be found at http://academicservices.mines.edu. The Writing Center, located in Alderson Hall 133, is here to help all members of the Mines community with writing projects at any stage of the writing process. To make an appointment, please visit the online scheduling system at: http://mines.mywconline.com.

Students who may qualify for disability accommodations must apply with Student Disability Services. Once eligibility is determined, a Letter of Required Accommodations is sent on behalf of the student to each professor to explain accommodations required for exams and coursework. More detailed information can be found at http://disabilities.mines.edu.
Course Outline: Schedule of Readings & Due Dates
This is a draft schedule and is subject to change. Students should always check BB for the most up-to-date assignments and announcements. Films should be viewed before class. We highly recommend that you sign up for a Netflix or Amazon account.

8/20: McBride welcome dinner, introductions & syllabus overview

8/27: Introduction: What is Revolution?

Advance reading/film:
Universal Declaration of Human Rights (on BB)
“A Mother in a Refugee Camp” by Chinua Achebe (on BB)
How to read a poem (on BB)

PART I: REVOLUTIONARY PARADIGMS:

9/3: IA. Three global paradigms: unity, complexity, and harmony

Advance reading:
Ancient unity: Platonic dialog, Plato’s Meno (on BB)
Ancient harmony: from The Book of Zhuangzi (also written Chuang Tzu) (on BB)
“Unity” by Pablo Neruda (on BB)

9/10: IB. Time, Space, and Causality

Advance reading:
First half of Einstein’s Dreams by Alan Lightman, pages 1-65 (required course text)
Aristotle’s four types of causality from Stanford Encyclopedia of Philosophy (on BB)
Original paper on Theory of Special Relativity by Albert Einstein (on BB) (http://www.fourmilab.ch/etexts/einstein/specrel/www/)

Presentation topic 1: Global Positioning System (GPS): actively research credible online sources, figure out how it works, and explain it to the class. Why is GPS revolutionary?

9/17: IC. Metaphysics and Dreaming

Guest philosopher, speaking on metaphysics, TBA

Advance reading:
Excerpt from Lucid Dreaming, Chapters 1 and 4 by Stephen Laberge; contrast to excerpt from Tibetan dreaming text, editor’s preface and Chapter 1 (on BB)
Peruse [http://www.lucidity.com/](http://www.lucidity.com/), especially the FAQs
Second half of *Einstein’s Dreams* by Alan Lightman, pages 65-140 (required course text)

9/24: **ID. Poetry, Creative Genius, and Metaphor**

**Advance reading:**
* A Guide to Metaphor (on BB)
  “Secrets of the Creative Brain,”
  “The Crosstalk between Science and Literature: Carving Out New Territories” from *World Literature Today* (introductory article) and 3 short corresponding texts (on BB):
  “Bridging the Two Cultures: A Conversation between Alan Lightman and Rebecca Newberger Goldstein”
  “Science and Poetry: Predation or Symbiosis,” by Pireeni Sundaralingam
  “Poet in a White Coat (how medicine and poetry converge) by Dr. Dannie Abse

**Discovery paper #1 Due**

**PART II: REVOLUTIONS IN SOCIETY**

10/1: **IIA. Women in science and literature**

**Advance reading:**
“Shakespeare’s Sister” from *A Room of One’s Own* by Virginia Woolf (on BB)
“In Search of Our Mother’s Gardens” by Alice Walker (on BB)
“Diving Into the Wreck” by Adrienne Rich (on BB)
“How it Feels to be Colored Me” by Zora Neale Hurston (on BB)
Learn about Noether’s theorem: [http://math.ucr.edu/home/baez/noether.html](http://math.ucr.edu/home/baez/noether.html)
Feynman’s description of Noether’s Theorem, from *Feynman Lectures on Physics*, Volume I, sections 52-1 through 52-3 (on BB)

Selected poems from *Against Forgetting: Twentieth Century Poetry of Witness*:
“From the Bridge” by Claribel Alegria, pgs. 589-592

**Presentation topics 2-4:**
Biographies/life stories of three women scientists. Contrast between early 20th and early 21st centuries. Who were/are these scientists and what were/are their scientific and cultural contributions?
- Emmy Noether, famous mathematical physicist
- Marie Curie, Nobel prize winner
- Kate Kirby, present executive officer of American Physical Society
10/8:  *IIIB. Political Revolutions I: Autobiography of Revolution*

Panel I: Alex Gorodinski, Tim Haddon, and Toni Lefton.

**Advance reading:**
Autobiographical readings related to panelists (folder on BB)
Chapters 6-8 from *Infinite Potential: The Life and Times of David Bohm*, by F. David Peat (on BB)

Selected poems from *Against Forgetting: Twentieth Century Poetry of Witness*:
“The Berlin Wall Tune” by Joseph Brodsky pgs. 141-143
“A white low sun,” “from Poems to Czechoslovakia” by Marina Tsvetayeva pgs. 124-126
“Dedication,” and “On Angels” pgs 442-443 by Czeslaw Milosz
“On the Island,” and “Prayer” by Dennis Brutus, pgs. 720-724
“I Think It Rains,” by Wole Soyinka, pgs. 731-732

10/15:  *IIIC. Political Revolutions II: Modern Times*

Panel II: Speakers TBA. How do we listen to poetry?
**Advance reading:** Spoken Word Poetry/Poetry Slam (links on BB)

Self-Selected poems from *Against Forgetting: Twentieth Century Poetry of Witness*:
Read the sections “War in the Middle East” pgs. 529-567, “Revolutions and the Struggle for Democracy in China” pgs. 751-763 and “The Struggle for Civil Rights and Civil Liberties in the United States” pgs. 621-677.

**Poetry Hand-out and Poetry Challenge:** *Poetry & Revolution: The Body Politic* (on BB), Due in class (and posted on BB as the week’s reading synthesis journal).

10/22:  *IID. Human Rights*

**Advance Reading/Film:**
Watch *We Are the Giant*
Reread Universal Declaration of Human Rights (on BB)
US Bill of Rights (on BB)
Universal Islamic Declaration of Human Rights (on BB)
South African Declaration of Human Rights (on BB)

**Presentation topics 5-7:**
- Pull together source material to tell story of Tunisian protestor Tarek al-Tayeb Mohamed Bouazizi, who sparked the Arab spring after self-immolation
- Human rights story of your choice– subject of study must be an individual
- Human rights story of your choice– subject of study must be a well-defined group

For the presentations, please consider the following:
1. Who is this person or group? (brief bio.)
2. What is significant about their ideas? How have the applications/acceptance/advocacy of those ideas shaped the lives of others? What is the local, national, and/or international context?
3. How are these life stories revolutionary? What specific changes do they promote?

**Discovery paper #2 Due**

**PART III: REVOLUTIONS IN SCIENCE AND TECHNOLOGY**

10/29: IIIA. Energy

**Advance Reading:**
*Feynman Lectures on Physics*, Volume I, chapter 4: Conservation of Energy (on BB)
“The Calorie Man” by Paolo Bacigalupi (on BB)
“Discovery” by Wislawa Szymborska (on BB)
Chapter 9 from *The Structure of Scientific Revolutions* by Thomas Kuhn (on BB)

11/5: IIIB. Nuclear medicine and world destruction

**Advance Reading:**
Chemotherapy/Cancer survivor poems (on BB)
“Testimony of J. Robert Oppenheimer” by Ai (on BB)
“The Menace of Mass Destruction,” speech excerpted from *Out of My Later Years*, by Albert Einstein (on BB)

**Presentation Topics 8-9:**
- Nuclear medicine: *what is it, what are the applications, and how is it revolutionary?*
- Nuclear weapons: *what’s the historical context, modern context, and how is it revolutionary?*

11/12: IIIC. Drones and autonomous machines

Drone and robot demo, Prof. Jeff Squier, Makers club and/or CSM robotics club

**Advance Reading:**
*Do Androids Dream of Electric Sheep?* by Philip K. Dick. Read complete novel by this date (required course text)

**Presentation Topic 10-11:**
- Specifics of revolutionary drones: *what is it, what are the applications, and how is it revolutionary?*
- Specifics of autonomous machine technology: *what is it, what are the applications, and how is it revolutionary?*
11/19: **III. Transhumanism.** Exploration of identity, self, and what it means to be human

Finish discussion of *Do Androids Dream of Electric Sheep?*

**Advance Reading:**

**Discovery paper #3 Due**

11/26: Thanksgiving, no class

12/3: Conclusion: *What is Revolution?* Presentation of Zines (due for final class)

“If Galileo had said in verse that the world moved, the inquisition might have let him alone.”
—Thomas Hardy