

University of Massachusetts at Boston

Critical and Creative Thinking graduate program, Science in a Changing World track

College of Advancing & Professional Studies

Biology in Society: Critical Thinking

CrCrTh 645/ Bio 545

Syllabus, Fall 2014

I. Quick access to key information and links to bookmark on your browser

followed by

II. [Information to get started](#), orient yourself at the start of the course, and refer back to from time to time.

III. [Contract](#): Course requirements and assessment.

IV. [Schedule of classes](#): What is expected each session and why -- how each session contributes to the unfolding of the course. (This section starts links to specific sessions).

V. [Bibliography](#) (repeated, with links to pdfs, in [Readings](#))

POST-IT the start of each component in your [printed version](#) of this syllabus

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Class time & location	4-7pm, W-2-157 (Online students join all course sessions by google+ hangout, with URL listed on http://bit.ly/PJThangout)
Report glitches in online materials	using this form
BOOKMARK THIS! Syllabus	crcrth645.wikispaces.umb.edu/syllabus , with a menu of useful links at the top right
BOOKMARK THIS! Blog	http://blogs.umb.edu/crcrth645-f14/ for sharing work for peer reviewing & other comments related to the course

II. Information to get started, orient yourself, and refer back to from time to time

CATALOG DESCRIPTION

Current and historical cases are used to examine the political, ethical, and other social dimensions of the

life sciences. Close examination of developments in the life sciences can lead to questions about the social influences shaping scientists' work or its application. This, in turn, can lead to new questions and alternative approaches for educators, biologists, health professionals, and concerned citizens.

OVERVIEW

Critical thinking about the diverse influences shaping the life sciences. Topics include evolution and natural selection; heredity, development and genetic determinism; biotechnology and reproductive interventions. We interpret episodes in science, past and present, in light of scientists' historical location, economic and political interests, use of language, and ideas about causality and responsibility.

You address the course material on a number of levels: as an opportunity to learn the science and approaches to interpreting science; as models for working as an educator--construed broadly as stimulating greater citizen involvement in scientific debates; and as a basis for discussions about practices and philosophies of education and lifelong, collaborative learning.

You undertake individual semester-long "learning/engaging" project in an area of the life sciences in their social context about which you are interested in engaging others in learning and critical thinking. Each week you adopt or adapt the themes and activities from the previous session to apply to your project area. This provides many tools and perspectives on self-directed research (and thus serves as a research seminar for honors students).

Each session has 3 parts: a) a mini-lecture during the last part of the previous meeting; b) a check-in about how you are interweaving the course themes into your project; and c) an activity (or activities) on the topic of the session. Readings and exercises follow up on the mini-lecture and prepare you for the next meeting. (Students who miss a session can listen to the recordings of the mini-lecture and class meeting, undertake the activities, and, well before the next meeting, post on the blog their reflections related to four separate points spread across the class meeting.)

Each session is followed up in 3 ways: a) additional readings (optional); b) adopt or adapt the themes and activities to apply to your project area; and c) contribute to the revision of the chapters introduced and to an annotated collection of new readings and other resources. The chapters and the bibliography form part of a text in development; students who give permission will have their contributions to the revisions of the text acknowledged.

Individually and as a group, you already know a lot about learning, teaching, biology, society, and critical thinking. If this knowledge is elicited and affirmed, you are more able to learn from others. Many activities can help the course develop as a learning community, such as, weekly check-in on how you adopted/adapted themes, contributions on the chapters, peer commenting, miscellaneous reflections using the blog, and pair-wise or small-group work in class sessions. Over the course of the semester, you are encouraged to recognize that there is insight in every response and share your not-yet-stable aspects. The trust required for this takes time to establish.

Through activities, such as the [Critical Incident Questionnaire](#) , students are encouraged to approach this course as a work-in-progress. Instead of harboring criticisms to submit after the fact, we can find opportunities to affirm what is working well and suggest directions for further development.

TEXTS

Readings available for download from <http://crrth645.wikispaces.umb.edu/readings> (accessible to signed-

in students only).

Recommended to help with writing, research, and group processes:

Daniel, D., C. Fauske, P. Galeno and D. Mael (2001). *Take Charge of Your Writing: Discovering Writing Through Self-Assessment*. Boston: Houghton Mifflin ("new" copies available well below list price on amazon.com)

Elbow, P. (1981). *Writing with Power*. New York: Oxford Univ. Press. (old editions are OK)

Taylor, P., J. Szteiter (2012) *Taking Yourself Seriously: Processes of Research and Engagement*. Arlington, MA: The Pumping Station. (Available in hard copy from online retailers or as pdf from <http://thepumpingstation.org>)

Online links may duplicate pages in this text, but, if you buy the printed or pdf text, you can refer to that instead of reading the pages online and you have a reference work to consult after the course.

PREREQUISITES and preparation assumed for this course

Graduate standing or permission of instructor. In lieu of other formal prerequisites, your previous studies should have prepared you to a. examine influences shaping the life sciences and their applications in society; b. engage others (e.g., students) in learning and critical thinking; c. formulate and pursue library research and internet exploration and d. write, seek feedback, and revise in systematic and efficient ways with minimal supervision (see [research and study competencies](#)).

TECHNICAL SET UP

- Make bookmarks on your browser to quick access links (see sect. I of syllabus); Set up access to online bibliographic databases via the library; Arrange bibliographic software for references; Know your official @umb.edu student email address and password; Accept the invite (to your UMB email) to join this wiki; Join <http://blogs.umb.edu> and inform instructor; Organize your computer (e.g., separate folders/directories for course work, downloaded readings, etc., replicate this file organization on a flash drive or other backup medium, and have a system for synchronizing and backing up files--see [research competencies](#) for more detail and other suggestions.) Face2face students: Bring laptop if you have one, registered for UMB wifi, to sessions 1, 2, 7, 13.
- For students from a distance: Sign up for [google+](#) and [install plugins](#) for hangouts; Establish high bandwidth internet access (e.g., ethernet cable into modem); Procure and use reliable headset; Practice on a hangout muting when not speaking and screensharing of document (see [tips](#)); Join <http://bit.ly/PJThangout> for access to hangout URLs.

WRITING SUPPORT: For graduate students, see <http://cct.wikispaces.umb.edu/writingsupport>.

ACCOMMODATIONS: Sections 504 and the Americans with Disabilities Act of 1990 offer guidelines for curriculum modifications and adaptations for students with documented disabilities. The student must present any adaptation recommendations to the professors within a reasonable period, preferably by the end of the Drop/Add period.

CODE OF CONDUCT: The University's [Student Code of Conduct](#) exists to maintain and protect an environment conducive to learning. It sets clear standards of respect for members of the University community and their property, as well as laying out the procedures for addressing unacceptable conduct. Students can expect faculty members and the Office of the Dean of Students to look after the welfare of the

University community and, at the same time, to take an educational approach in which students violating the Code might learn from their mistakes and understand how their behavior affects others.

Students are advised to retain a copy of this syllabus in personal files for use when applying for certification, licensure, or transfer credit.

This syllabus is subject to change, but workload expectations will not be increased after the semester starts. (Version 30 August '14)

III. Contract: Course requirements and assessment

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- The course revolves around weekly written assignments as well as participation items, which include active participation during class based on preparation between classes, peer commentary on draft installments, and more. The basic description of what is expected is given below; additional guidance on how to think about the specific assignments can be drawn from the material in the [Chapters](#).
- It is expected that you will spend at least 6.5 hours per session outside class time reading, researching, and writing. You should view each assignment and each session in relation to the unfolding of learning during the course. (That is, do not expect the syllabus and online links to allow you to cut to the chase about what to do at the last minute for the next class.) The course works by building from topic to the next so not being prepared or late submissions detract significantly from the learning possible in class sessions.
- You can ask for extensions on two assignments or participation items, moving the due date as far back as the last session. Also, to accommodate the contingencies of your lives, 20% of the assignments and participation items can be skipped altogether without penalty. (No explanation is needed for extensions or skipped work. Simply record these on your assignment checklist and keep up with other assignments and participation items.)
- Use an assignment checklist (copied from [Checklist](#)) to keep track of due dates and record assignments and participation items submitted/fulfilled. Do not expect class-time or meetings with the instructor to be taken up reminding you. (See policy for requesting an [Incomplete](#).)
- The written assignments are commented on, but not graded. Not grading keeps the focus on [Dialogue around written work](#) , which provides guidance on Revision and Resubmission tailored to each student's specific interests and needs. You are expected to read comments carefully, consult with the peer commenter or instructor if you don't understand a comment they made, revise thoughtfully in response to the comments, and resubmit until you receive an OK/RNR (=OK, revision and resubmission not requested).
- You should aim for OK/RNR on at least 9 of the 12 written assignments as well as fulfilling 32 of 40 participation items. If you reach this target—and the goal is to work with everyone to achieve that—you get at least a B+ and a [rubric](#) is used to determine B+, A- or A. The instructor gets the final say on assessment using the rubric, but students are encouraged to supply their own self-assessment. If you do not reach the automatic B+ level, 5.5 points are given for each OK/RNR assignment, 3 points are given for other drafts submitted *on time*, and .75 points for each participation item, up to a maximum of 80. (See [Rationale for the Assessment system](#) .)
- Overall points are converted to letter grades as follows: The minimum grade for A is 95 points, for A- is 87.5, for B+ is 80, for B is 72.5; for B- is 65; for C+ is 57.5; and for C is 50 points.
- *For CCT graduate students only*: The process review or the final report should be suitable for inclusion in the required [Reflective Practitioner's Portfolio](#) because the project is on a topic that has evolved during the course of the semester as you integrate the perspectives from each session and

look ahead to future research and engagement on a topic that involves science and its relation to social context.

A. Written assignments (2/3 of grade)

A semester-long "learning/engaging" project allows you to adopt or adapt the themes and activities from each session into an area of the life sciences in their social context about which you are interested in engaging others in learning and critical thinking. Engagement might range from teaching, to activism, to personal/professional development. It also means you are engaged--the area should be one you want to learn more about. A sequence of 12 assignments is required--initial description (draft due session 3), installments (350-600 words) in which you adopt or adapt the themes and activities from each session (initial draft due sessions 4-11), presentation (in session 12), complete draft report (due session 13), and final (1500-2500 words) report (due one week after session 13).

- Post drafts to the blog and replace later with the revision.
 - Begin with "DRAFT," "REVISION", "REVISION2 (etc.) (if needed), a 1-3 sentence summary, then the "more" marker.
 - Feel free to upload any assignment to google drive as a pdf or on your personal blog, then, after the summary, provide a link to that instead of the more marker.
 - Drafts can be made password-protected if you want only the instructor and (by arrangement) a peer reviewer to see them.

Initial description: Building on what you arrive at after the in-class [workshop](#) of session 2 and comments from the instructor, compose a paragraph (or two) that conveys a) the area in which you are interested in engaging others in learning and critical thinking, audience (i.e., who you envisage those "others" to be), and the kind of learning and critical thinking you have in mind; b) your background and context in so far as it illuminates why **you** are interested in what you described under a); c) any key references or other sources that you might build on; and d) challenges you foresee or areas you would like guidance on.

Installments, in which you adopt or adapt the themes and activities from each session 3-10 (350-600 words; drafts due sessions 4-11):

- Examples of past students' installments are linked to the [Readings](#), but each project and student is different. It is primarily through comments on your initial submissions that you see how to make the process expand your thinking about the specific project you choose (see [Dialogue around written work](#)). Recommended steps—Write down for yourself the themes of the session (as emerge from the preparatory reading(s), the class activity, and any additional reading you do). Think about an aspect or extension of your project for which the themes would be relevant.
 - E.g., To adapt PBL to your area, if your audience were other teachers involved in a program to heighten students' awareness of addiction in the brain, you might imagine a retreat where you had 90 minutes to get the teachers aware of the wider social context around efforts to emphasize the effects on the brain. You would design a rapid PBL that opened up exploration of changing economic considerations as they have led to growing abuse of prescription medicine, successes and failures of efforts in other areas to alter behaviors, new addictions after bariatric surgery, etc. In short, your installment would be the PBL and accompanying explanation of how you would run the PBL.
 - E.g., To use the ideas of nature as ideas about favored social order theme (of session 3), if your project were about conservation biology (a.k.a. protecting biodiversity), you might search for writing that speaks of how loss of biodiversity threatens the "balance of nature." What kind of balance is that (fragile? long-standing?...) and what does this balance say about how

industries should be organized and regulated? In your search you may come across writing about biophilia, about people's need to spend time in undisturbed wilderness, and so on. You might then look for analogies with the Romanticism of 200 years ago when people wrote of similar needs at exactly the same time as humans were, through industries and mining, ramping up their interventions in non-human nature (and in relations among humans). After some exploration, you might start to see how for your intended audience you could foster learning and critical thinking using the theme that ideas of nature as ideas tell us about the writer's/artist's favored social order.

[Presentation](#), 10 minutes (to be confirmed) for presentation and discussion. Quickly set the scene -- reminding listeners of your area of biology in society and the audience that you are trying to engage in critical thinking and learning -- then convey the way your thinking evolved over the semester, including any stumbling blocks, and, in order to prime discussion and feedback, express where you need to develop your thinking further.

Report: A synthesis of the installments, but note:

1. Some of the themes and activities from the sessions may seem more important than others when it comes to adapting or adopting them into the area in which you are interested in engaging others in learning and critical thinking. So spread out your installments, take a fresh look at them as a set. Feel free to rearrange and highlight selected installments if that helps your overall approach to engaging others in learning and critical thinking come across most forcefully.
2. If your ideas about who to engage and how change over the course of the semester, feel free to include a narrative of the development of your thinking.
3. Even if you got an OK/RNR for an installment, there may still be more thinking you can do in response from comments from me. Take a fresh look at my comments and feel encouraged to revise before inserting any installment into the report.
4. Preparing your session 12 presentation and the feedback you get will help you to see how the installments fit together into a single report on "engaging others in learning and critical thinking" about the life sciences in their social context.
5. For the report to be counted as final, you must have revised in response to comments from instructor and peers on a complete draft. (The draft must get to the end to count as complete, even if some sections along the way are only sketches.) Additional investigation and thinking may be entailed.

Also:

There are two audiences you are writing your report to: 1) each installment has material directed at engaging your defined audience (e.g., middle school science students) in learning and critical thinking; and 2) each installment probably has some text that explains your choices about how to do this. In any case, the report should include such explanatory text. You should not think of the audience for this text as the instructor but as people interested in the life sciences and society and/or in fostering learning and critical thinking, but people who do not know what we read and did in the course. If you write as if the instructor is the reader you run the risk of assuming the readers can fill in where you leave gaps because they know the course and what you were working on.

Participation and contribution to the class process (1/3 of grade)

B. In order to get oriented to the various course materials and mechanics, complete the "[syllabus quiz](#)" and submit week 2 by email to the instructor.

C. Building learning community

C1. Prepared participation and attendance at class meetings (=13 items)

Prepared participation in class sessions is expected. One item fulfilled for each class you participate in (except not if you are unprepared). Participation includes being punctual, not taking cell phone calls, not checking email etc., and, for online students, arranging reliable internet connection and head set.

C2. Contributions to the revision of the chapters [previously called "cases"] introduced in sessions 2-11 or to an annotated collection of new readings and other resources (due start of sessions 3-12; 6 times = 6 items)

The hope is that the revised chapters and the bibliography will form part of a text to be published. Fashion your contributions so that the chapter works better from a student's point of view, is brought up to date, and includes precis of readings. (Instructor will let you know if you need to flesh out the contributions.) (See [examples](#) by the instructor.)

D. Weekly check-in on how you adopted/adapted themes (sessions 3-11) (=9 items)

In 1-2 minutes describe how you interwove the themes and activities of the previous session into your project (as you will have described in more detail in your written installment).

E. Office hours with the instructor on your project and other assignments, by sessions 6 and 10 (=2 items)

for discussion of comments on assignments (see [Dialogue around written work](#)), ideas for course project, and the course as a whole. They are important to ensure timely resolution of misunderstandings and to get a recharge if you get behind. Appointments missed without notifying instructor in advance count as a participation item not fulfilled.

F. Peer commentary on other students' installments, initial description & draft report (6 times, by session after posting, sessions 4-13; 6 items)

To indicate that you will be commenting on a draft, insert your name in the comment box following the posted draft installment, then edit the box to add your comments within 5 days. (Don't comment on a draft if someone else already is, unless there are no others to comment on. Try to find a draft from someone you have not commented on before.)

When you decide what approaches to commenting you ask for as a writer or what approaches you use as a commentator, keep Elbow and Belanoff's (2000) [variety of responses](#) in mind. (Elbow 1981, chapters 3 and 13 on sharing and feedback is relevant here as well.) After all, although some commentators fill the margins with specific suggestions for clarification and changes, the response of students to the suggestions often goes no further than touching up—the desired re-thinking and revising of ideas and writing rarely happen. It seems a better use of an commentator's time to capture where the writer was taking you and make a few suggestions that might clarify and extend the impact on readers of what was written. As writers, we all value comments that show us that we have been listened to and our voice, however tentative, has been heard. ([examples](#) of commentary on draft reports in another course; peer commentary on 645/545 installments is new in 2014)

G. Assignment [Checklist](#) Filled-in during semester and submitted to instructor by email at time of final submissions (1 item).

H. Process review (posted to blog) -- Identify 4-6 examples that capture the process of development of your work and thinking about fostering "critical thinking about the diverse influences shaping the life sciences."

Journaling, freewriting, drafts, etc. may be included, that is, not simply your best products. Explain your choices in a 250-500 word cover note and through annotations for each item.

I. Narrative course evaluation completed via <http://bit.ly/CCTEvals> and code submitted to cct@umb.edu (before time of final submissions)

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Rubric

For each quality "fulfilled very well" you get 2 points or 1 point if you "did an OK job, but there was room for more development/attention." You get 0 points if "to be honest, this still needs serious attention."

Quality	Self-assessment
1. A sequence of assignments keeping to the weekly due dates with timely revisions,	
2. often revised thoroughly and with new thinking in response to comments.	
3. Project innovative, well planned and carried out with considerable initiative, and	
4. indicates that you will be able to engage others in learning and critical thinking on your topic.	
5. Project report clear and well structured,	
6. with supporting references and detail, and professionally presented.	
7. Active, prepared participation for and learning from session activities.	
Active contribution to building the class as learning community, evident in	
8. contributions to the revision of the chapters and to the annotated reading and resource list, and	
9. comments on presentations and peer review of drafts.	
Weekly check-ins, installments, and process review, which show:	
10. Consistent work outside sessions,	
11. deep reflection on your development through the semester, and	
12. map of the future directions in which you plan to develop.	

IV. Schedule of classes: What is expected each session and why -- how each session contributes to the unfolding of the course

TOPICS AT A GLANCE

[0 \(9/3\)](#) Pre-course meeting to get set up

[1 \(9/10\)](#) Introductions to the course, the other participants, and project-based learning (PBL)

[2 \(9/17\)](#) Workshop to develop initial ideas of activities to engage others in critical thinking about the life sciences in their social context

[3 \(9/24\)](#) Interpreting ideas about nature as ideas about society

[4 \(10/1\)](#) Biological origin stories and their structure

[5 \(10/8\)](#) Multiple layers of a scientific theory: Reconstructing Darwin's presentation of natural selection

[6 \(10/15\)](#) What causes a disease? -- Beriberi

[7 \(10/22\)](#) Metaphors of control and coordination in development

[8 \(10/29\)](#) What causes a disease? -- Pellagra (Styles of causal explanation & their relation to ideas about politics or social action)

[9 \(11/5\)](#) How changeable are IQ test scores?

[10 \(11/12\)](#) Social negotiations around genetic screening

[11 \(11/19\)](#) Intersecting processes -- Complexities of environment and development in the age of DNA

11/26--No class meeting

[12 \(12/3\)](#) Presentations on learning/engagement units and their development over the semester

[13 \(12/10\)](#) Taking Stock of Course: Where have we come and where do we go from here?

The mini-lecture introducing each session happens at the end of the previous class. The lectures from 2012 are archived on <http://crrth645.wikispaces.umb.edu/av> if you miss one from 2014. Preparation for each class is detailed on the link given for each session. ***The following check-ins, assignments, and participation items are not listed in the schedule after the first time:***

Each class from session 3-11 begins with a check-in where you say briefly how you adopted/adapted the themes or activities of the previous session to apply to the area chosen for your "learning/engaging" project. The 350-600 word draft installment is due posted on the blog on the day of the class. Follow-up on each session 2-11 includes contributions to revision of the chapters introduced in the sessions or to an annotated collection of new readings and other resources related to the chapters. Links to the chapter write-ups will go live after the class meeting. ([Chart](#) showing rhythm of assignments and related participation items.)

Session 0 Preview & Set Up

(9/3):

4pm Face2face honors students (optional for graduate students): Course description; Conception of research running through the course; Interview students from previous year

5pm [Online students only](#) : Practice connecting with hangout and screensharing

Session 1 Introductions

Preparation: Reading: Taylor, "Developing Critical Thinking is Like a Journey"

(Don't expect the significance of everything to be clear on the first reading. This article is also assigned at the end of the course, with the expectation that students will see a difference in their appreciation of the issues raised.)

[Syllabus quiz](#), which includes: review the syllabus; [rhythm of sessions](#); get set-up to use the [internet and computers](#); etc.

Face2face students: Bring laptop to class if you have one; sign up for UMB wifi on it

Session (9/10):

- Personal and professional development (PPD) goals ([worksheet](#)); Fellow students and their concerns
- Rapid Project-based learning activity ([worksheet](#))

Follow-up: Sign up for first conference, to help get on top of course materials and expectations, to discuss project ideas, etc.

Post PPD worksheet on the blog under Profile category

Work due this session: [Syllabus quiz](#)

Session 2 Project-based learning (PBL) about biology in society

Mini-lecture (given 9/10): Project-based learning

Preparation: Read the [PBL guided tour](#) and [two PBL cases](#) based on an embryo mix up ([details \(see #1 & 2\)](#))

Bring laptop to class if you have one

Session (9/17):

- a. [Dialogue hour](#) on PBL and comparison of the two cases.
- b. Workshop to generate initial ideas for semester-long "learning/engaging" project ([Session2Worksheet](#))

Follow-up: [Contributions to revision](#) of the chapter and PBL guidelines introduced in the session. Use [blog post](#) to make suggestions or to provide an annotation to a new reading or other resource.

Reading (optional): Greenwald, "Learning from problems"

Session 3. Interpreting ideas about nature as ideas about society, which involves exposing what is only implicit, what is not literally stated

Mini-lecture (given 9/17): Interpreting images of society and nature in the West since the middle ages (slide show)

Preparation: Reading: Williams, "Ideas of nature" ([details \(see #1 & 2\)](#))

Session (9/24):

Check-in: Description of your project and how you adopted/adapted themes from last class.

Review timelines of changing and contrasting ideas of nature.

Multi-party conversation among contrasting views about nature ([Session3Worksheet](#))

Part 2: October 15, 3-5pm for facetoface students: "Scavenger hunt" in Harvard Museum of Natural History to identify features that are consistent or discordant with the theme of the session ([Session3Worksheets](#)).

(Online students identify a local natural history museum, zoo, or aquarium to visit.)

Follow-up: [Contributions to revision](#) of the chapter.

Reading (optional): Berger, "Why look at animals," Worster, chaps. 1 & 2.

Work due this session: Initial description of your semester-long "learning/engaging" project, including how you would adopt or adapt PBL into your area.

Comment posted on [this link](#) to make suggestions about last session's chapter or to provide an annotation to a new reading or other resource related to the chapter.

Session 4. Biological origin stories and their structure

Mini-lecture (given 9/24): The structure of Genesis, chapter 1

Preparation: Readings: Martin, "The egg and the sperm: How science has constructed a romance," Lewin, "The storytellers," Hrdy, "An Initial Inequality."

Examine biology texts for the gender bias claimed by Martin and others ([details \(see #1 & 2\)](#))

Session (10/1):

Pairwise discussion of Martin's interpretation and analysis of structure of Hrdy, followed by whole-class discussion

Follow-up: Contributions to revision of [the chapter](#)

Reading (optional): Landau, "Human Evolution as Narrative," Beldecos, et al. "The importance of feminist critique," Fausto-Sterling, "Society writes biology," "Life in XY Corral"

Session 5. How did Darwin try to convince people of Natural selection as the mechanism of

evolution? (Multiple layers of a scientific theory--argument, analogy, metaphor, and defences)

Mini-lecture (given 10/1): Introduction to close reading of Darwin. Natural selection as a metaphor.

Preparation: Reading: Darwin, On the Origin of Species, Introduction & Chaps. 1, 3, part of 4, using [Session5Worksheet](#) (details (see #1 & 2))

Session (10/8): Close reading, using [Session5Worksheet](#) and reconstruction of Darwin's exposition of his theory of natural selection.

Follow-up: Contributions to revision of [the chapter](#)

Readings (optional): Moore, "Socializing Darwin," Orel, "Scientific animal breeding," Rudge, "Does being wrong," Taylor, "Natural Selection: A heavy hand."

Session 6. What causes a disease?--Beriberi

Mini-lecture (given 10/8): Introduction to the case and historical case-based learning

Preparation: This session involves completion of programmed, historical case-based learning that happens outside the class meeting. It is asynchronous and you can start any time. It will work best if you all try to complete it by Saturday, 10/18. ([case, with instructions at the start](#))

Session 10/15: Continuation of session 3 (above): Field Trip to Harvard Natural History Museum [26 Oxford St., Cambridge](#). Bring student ID or MA license to get in free, arrive any time after 3pm, and use [worksheet](#) to guide your exploration. Meet outside Museum at 5pm to go to the [Greenhouse Cafe](#) for debriefing and (optional) dinner.

Follow-up: Contributions to revision of [the chapter](#)

Work due this session: First office hours conference must be completed before class 6 to discuss the course and course project. Schedule second meeting before class 10.

Session 7. Metaphors of control and coordination in development

Mini-lecture (given 10/15): Metaphors in science and in interpretation of science & Multiple views of heredity c. 1900

Preparation: Reading: Gilbert, "Cellular Politics," "Animal development," Lakoff and Johnson, "Concepts We Live By" (on metaphors) ([details \(see #1 & 2\)](#))

Bring laptop to class if you have one

Session (10/22):

[Game of Life](#) and analogies with Development

Inventing alternative metaphors of control and co-ordination, incl. discussion of Just vs. Goldschmidt

Follow-up: Contributions to revision of [the chapter](#)

Goodwin, [How the Leopard Changed its Spots](#), Oyama, "Boundaries," Sapp, "Struggle for Authority"

Session 8. What causes a disease?--the consequences of hereditarianism in the case of pellagra

Mini-lecture (given 10/22): Styles of causal explanation & their relation to ideas about politics/social action: Review of beriberi case & introduction to pellagra

Preparation: Reading: Chase, "False Correlations = Real Deaths" ([details \(see #1 & 2\)](#))

Session (10/29):

Take the roles of Goldberger and Davenport to convince others to act on your scientific account

Follow-up: Contributions to revision of [the chapter](#)

Reading (optional): Harkness, "Vivisectors and vivishooters" (human experimentation); Marks, "Epidemiologists explain"

Session 9. How changeable are IQ test scores?

Mini-lecture (given 10/29): Interpreting parent-offspring height patterns

Preparation: Lewontin-Jensen-Lewontin exchange on intelligence ([details \(see #1 & 2\)](#))

Session (11/5):

Map arguments, counter-arguments, and missing arguments in the exchange

Follow-up: Contributions to revision of [the chapter](#)

Reading (optional): American Psychological Association, "New model of IQ development,"

Session 10. Social negotiations around genetic screening

Mini-lecture (given 11/5): PKU--Substituting a genetic condition for chronic illness and second-generation effects (& introduction to intersecting processes)

Preparation: Readings: Rapp, "Moral pioneers," Paul, "The history of newborn phenylketonuria screening" ([details \(see #1 & 2\)](#))

Session (11/12):

Design a forum to help supplement advances in genetic screening with communities developing a) greater tolerance for normal variation; b) social measures to care for people suffering from abnormal variation; and/or c) multiple voices/constituencies/ethical positions around gene-based medicine.

Follow-up: Contributions to revision of [the chapters](#) on PKU and on genetic screening

Reading (optional): Yoxen, 157-173

Work due this session: Second office hours meeting must be completed before class 10 to discuss evolving course projects.

Session 11. Intersecting processes -- Complexities of environment and development in the age of DNA

Mini-lecture (given 11/12): Intersecting processes in the social origins of mental illness

Preparation: Readings: Taylor, "What can we do," American Psychological Association, "New model of IQ development" ([details \(see #1 & 2\)](#))

Session (11/19):

Diagramming intersecting processes (to analyze change as something produced by intersecting economic, political, linguistic, and scientific processes operating at different scales)

Follow-up: Contributions to revision of [the chapter](#)

Reading (optional): Taylor, "Distributed agency," Underhill, "Life shaped," Freese et al., "Rebel without a cause," Pollitt, "When is a mother"

No class, Wednesday 11/26

Session 12. Presentations on learning/engagement units and their development over the semester

Workshop (run on 11/19) on preparing report and presentation; no mini-lecture

Preparation: Presentations on learning/engagement units and their development over the semester, with visual aids emailed to instructor in advance. Length = 10 minutes, incl. feedback (to be confirmed)

(Because you cannot possibly cover everything you did, begin by quickly setting the scene -- reminding listeners of your area of biology in society and the audience that you are trying to engage in critical thinking and learning -- then convey the way your thinking evolved over the semester, including any stumbling blocks. Finally, in order to prime discussion, express where you need to develop your thinking further. Visual aids should *aid* what you say, not repeat all your words.

Although students usually do [work-in-progress presentations](#) in my courses that help clarify the project definition and priorities, you have been clarifying with each installment, so presentations are near the end.)

Session (12/3):

10-minute Presentations on learning/engagement units and their development over the semester, with peer comments

Follow-up: Commentary on another student's draft report

Work due this session: Complete Draft of Project Report, uploaded to blog

Session 13. Taking Stock of Course: Where have we come and where do we go from here?

Preparation: Reading: Taylor, "Developing Critical Thinking is Like a Journey"

(What learning themes outlined in this article (see summary in the coda) were evident during the course? What were missing? What additional learning themes did you see?)

Review your profiles from week 1 on what you brought to the course and where you would like to be by the end.

(Take note of how differences between these session 1 plans and where you actually got to. Make notes to assess the difference -- what did you gain that you hadn't prefigured and what did you not gain that you would have liked to.)

Bring laptop to class if you have one

Session (12/10):

[Dialogue hour](#) on how we might foster critical thinking about science-in-society

Course evaluations, via <http://bit.ly/CCTEvals>

This is one of the multiple angles of end-of-semester course evaluation with the aim of:

- a) feeding into your future learning (and other work), you take stock of your process(es) over the semester;
- b) feeding into instructor's future teaching (and future learning about how students learn); Instructor takes stock of how you, the students, have learned.

Work due this session: Commentary on another student's draft report, uploaded to blog

One week after session 13 Work due: Final version of Project Report

Process Review

Assignment Check-list maintained by student & ready for review

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(For deeper consideration of the issues raised in both biomedical sciences and in interpretation, critical thinking, and ethical and political analysis, review student and instructor comments on the chapters for annotated reading suggestions.)

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