



**SCIENCE
LITERACY
PROGRAM**

As part of the Science Literacy Program we will pay special attention to uncovering the ways that science is connected to larger societal issues and big ideas across and within the discipline. SLP courses include General Education courses for non-science majors and courses for science majors taught by teams of faculty, graduate fellows, and undergraduate scholars, who will include opportunities during class time for you to engage with the class topics through a variety of activities. For more information about the program scilit.uoregon.edu

When and where we meet

Course number & CRN: Biology 140 CRN 31811

Tuesday Thursday 10:00-11:20 am McKenzie 240C

Thursday Discussion 12, 1, 2, 3 (50 min) Columbia 45 (except week 1 DNA lab in Klamath 13)

Your Teaching Team

Instructor: Dr. Nicola Barber *nbarber@uoregon.edu*

Please call me Nicola (or Dr. Barber).

GE: Narda Trivino *ntrivino@uoregon.edu*

GE: Madison Barney *mbarney3@uoregon.edu*

For email, please use Bi140 in the subject header. Reaching out through Canvas is preferable.

Office Hours:

Dr. Nicola Barber	Tues & Thurs	11:20-11:50 am	McKenzie 240C (or by appt Klamath 73a)
Narda Trivino	TBA	TBA	TBA
Madison Barney	TBA	TBA	TBA

We are here to help guide your learning and help you succeed during the course. We are available during office hours to answer questions about this course or provide additional resources.

Course goals:

- In this course, we will explore three current topics in biology that are widely discussed by the news media, portrayed in some popular television shows and movies, and used to make important scientific policy decisions:
 - stem cells and cloning,
 - genetically modified organisms, and
 - the human genome and human genetic diseases.
 All three of these topics are likely to have significant impacts on our lives, potentially affecting decisions we make about medical treatments, the environment, and what we choose to eat.
- You will practice how to separate scientific fact from fiction and uncover appropriate and relevant content.
- We hope you will enjoy reading and learning how biology relates to your everyday life and want to talk to others about what you learn to make scientific and policy connections outside of the classroom and continue to read science articles from Discover Magazine, Scientific American, or the New York Times or listen to Radiolab and Story Collider after the course is over.

Course outcomes:

For each specific topic (stem cells and cloning, genetically modified organisms, and the human genome and human genetic diseases), students will be able to:

- describe the underlying biology and explore how scientific reasoning and methods develop this understanding,
- discuss the types of policy decisions that regulate studies related to this biology or its application to human or environmental health,

3. evaluate scientific information so that you can distinguish reliable information from propaganda,
4. explain how scientific controversies can arise when the same scientific questions are approached in different ways,
5. explore why some types of biological issues trigger regulatory decisions that can affect both research that would deepen our understanding of the issue and application of the results of that research in policy,
6. write about scientists who are researching topics related to our course, and
7. read science writing published in popular media sources.

Because scientific research on the topics covered by the course is expanding nearly every day, leading to new policy decisions, the lectures and reading material in the syllabus are designated as *tentative*. Most, perhaps all, of the topics and reading materials will remain as they are listed in the syllabus. However, if new research, new controversies, or new policy issues arise related to the course topics, one or more of the lectures and associated readings may be changed to incorporate the new material.

Textbook and Packet**Available from Bookstore**

Gilbert, S., & Pinto-Correia, C. (2017). *Fear, Wonder, and Science in the New Age of Reproductive Biotechnology*.

Columbia University Press. [4 copies available in Price Science Commons & Research Library]

Henderson, D. (2011). *Food or Famine--Starvation or GM Foods?* (v4.4) Reacting to the Past Game Book.

Other readings posted to Canvas.

Tentative Schedule: subject to change, see Canvas for latest readings, “in class” assignments, due dates

Date	
Week 1	TOPIC I: STEM CELLS AND CLONING: This topic is the source of a lot of controversy. What’s the controversy all about?
March 29	<p>Class 1 – What is this course about? This class will provide an overview of the topics covered in this course and how they impact our lives. Students will be able to:</p> <ul style="list-style-type: none"> • discuss strategies that will be employed during the course to optimize learning • examine how scientific research is portrayed in the media
March 31	<p>Watch GATTACA before class</p> <p>Class 2 – GATTACA: how far off is it really? You should identify scientific and policy questions and controversies that the movie GATTACA raised for you and be prepared to discuss them in class. During this lecture we will discuss current technological advances in genetic analysis, including newborn and adult testing in Oregon and other states, and how these relate to what was portrayed in GATTACA. We will also discuss current technology to make designer babies. Students will be able to:</p> <ul style="list-style-type: none"> • explain what genetic testing is and what testing is done in Oregon, • examine why genetic testing is done routinely, and • evaluate where we currently stand relative to the future envisioned by the movie.
March 31	<p>Discussion 1 – Cells, DNA, Molecules of Life Students will be able to</p> <ul style="list-style-type: none"> • Isolate DNA from plants to understand methods used by research scientists to isolate DNA to study or modify its structure • Explain where in the cell DNA is located • Describe the different molecules of life
April 1	Due: 1. Scientist Spotlight #1 2. Weekly Reflection
Week 2	
April 5	<p>Class 3 – How do animals develop? Before you can understand what stem cells are or how an animal is cloned, you need to know the basics of how cells work and the processes that occur during animal development. Students will be able to:</p> <ul style="list-style-type: none"> • describe the processes underlying sexual and asexual division of animal cells, • compare and contrast prokaryotic and eukaryotic cells including the location of DNA in both cell types, • compare how and when cells influence one another during development, and • interpret the types of experiments used to reveal the capabilities of developing cells.
April 7	<p>Class 4 – What’s the big deal about cloning? The cloning process often involves taking a single cell from an animal and coaxing that cell to develop into an adult. In this lecture we will talk about different types of clones and how they are made. Students will be able to:</p> <ul style="list-style-type: none"> • describe the nuts and bolts of the cloning process, • explain how cloning can be used, and • discuss why some applications are controversial.
April 7	<p>Discussion 2 – How can we interpret scientific reports in the media? Students will be able to</p> <ul style="list-style-type: none"> • Analyze media report on a science discovery • Interpret information from media report and relate it to the underlying science
April 8	Due: 1. Canvas Quiz #1 2. Weekly Reflection
Week 3	

April 12	<p>Class 5 – What are stem cells and what do they have to do with cloning? This lecture will draw on the discussions in previous lectures about cell structure and function, animal development, and cloning, to elucidate stem cells. Students will be able to:</p> <ul style="list-style-type: none"> • give examples of when and where stem cells arise, • describe how stem cells can be made, and • predict what stem cells might be used for.
April 14	<p>Class 6 – What policies regulate human cloning and stem cells? The controversies surrounding stem cells and cloning have resulted in sometimes bewildering regulatory policies. Students will be able to:</p> <ul style="list-style-type: none"> • evaluate concerns related to human cloning and stem cells • evaluate the regulations that govern the use of human stem cells, and • assess the regulations that govern whether or not humans can be cloned.
April 14	<p>Discussion 3 – Research and citations (stem cells) Students will be able to:</p> <ul style="list-style-type: none"> • find science references using electronic databases • identify primary versus secondary sources • paraphrase when writing about science • properly cite sources
April 15	Due: 1. Scientist Spotlight #2 2. Weekly Reflection
April 17	Letter to Elected Officials due Sunday April 17
Week 4	TOPIC II: GENETICALLY MODIFIED ORGANISMS: Should you care whether your food is genetically modified? Understanding how it's done and potential environmental impacts is an important aspect of answering this question.
April 19	<p>Class 7 – Introduction to DNA and the genetic code. Before you can understand how plants or animals are genetically modified, you need to know about the molecule that carries the genetic code: DNA. Students will be able to:</p> <ul style="list-style-type: none"> • characterize the relationship between DNA, genes, and proteins, • describe how information is stored in DNA and how changes in DNA structure result in changes in DNA function; and <p>explain why the genetic code is the same in all living organisms on earth.</p>
April 21	<p>Class 8 – What is CRISPR-Cas9?</p> <p>We will explore CRISPR-Cas9 (including discovery and controversies) in more detail. Students will be able to:</p> <ul style="list-style-type: none"> • describe the CRISPR-Cas9 system, • describe applications of CRISPR-Cas9 • assess the regulations and ethics of new technologies.
April 21	<p>Discussion #4 – Reacting to the Past Feeding (RTTP) Food or Famine Preparation Students will be able to</p> <ul style="list-style-type: none"> • Discuss how are crops modified using genetic engineering • Explain advantages and disadvantages of GM crops • Use The Precautionary Principle • Discuss food distribution issues in the in Africa • Experience the role of international politics and trade in the scarcity of food • Prepare for the three days of the Food or Famine Game.
April 22	Due: 1. Canvas Quiz #2 2. Weekly Reflection
Week 5	

April 26	<p>Class 9 – Is it all in our genes? Genetics and epigenetics. The DNA we inherit from our parents encodes all of our traits. However, DNA doesn't operate in isolation; other factors also affect what goes on in our cells. Students will be able to:</p> <ul style="list-style-type: none"> • generalize the basis of genetic inheritance, • identify how environmental factors can affect DNA function and an animal's traits by a process referred to as epigenetics.
April 28	<p>Class 10 – Truth in advertising? Understanding scientific controversies. Controversies surround the interpretation of scientific results related to many aspects of human health. Students will be able to:</p> <ul style="list-style-type: none"> • draw conclusions from different types of scientific studies, • examine how scientific controversies arise, and • articulate what types of research could help to resolve contradictory findings.
April 28	<p>Discussion #5 – Food or Famine Game Day 1 The first game session is opened by the UN WFP representative. Then each African nation may make a very brief introductory statement if they wish. The remainder of the time is used primarily for the opposing sides to present their arguments. The African representatives are welcome to ask questions as they go. All essays (except for African leaders) due before class</p>
April 29	Due: 1. Scientist Spotlight #3 2. Weekly Reflection
Week 6	
May 3	<p>Class 11 – Making designer animals and plants by modifying their genes. Part 1. How are the genes of plants and animals modified? Students will be able to:</p> <ul style="list-style-type: none"> • describe how plant and animal husbandry has been used for thousands of years to select species with desirable traits, and • recognize the modern molecular methods that are used to modify species • understand some of the rationale for selecting traits to be genetically modified
May 5	<p>Class 11 – Making designer animals and plants by modifying their genes. Part 2. How are the genes of plants and animals modified? Students will be able to:</p> <ul style="list-style-type: none"> • describe how plant and animal husbandry has been used for thousands of years to select species with desirable traits, and • recognize the modern molecular methods that are used to modify species • understand some of the rationale for selecting traits to be genetically modified
May 5	<p>Discussion # 6 – Food or Famine Game Day 2 The second game session is opened by the UN WFP representative. During the second game session, it is important for the African nations to take a more active role in challenging the various sides.</p>
May 6	Due: 1. Canvas Quiz #3 2. Weekly Reflection
Week 7	
May 10	<p>Class 13 – How do GMOs impact the environment? Many different types of organisms have been genetically modified, and genetically modified organisms (GMOs) are here to stay. Students will be able to:</p> <ul style="list-style-type: none"> • describe the types of studies that are necessary to assess the impact of GMOs on the environment, and • assess how development of new organisms can lead to unanticipated consequences.

May 12	<p>Class 14 – What policies regulate GMOs? How do you know whether the food you buy in the grocery store is genetically modified? Who decides whether genetically modified organisms or products derived from them can be marketed? Students will be able to:</p> <ul style="list-style-type: none"> • evaluate recent concerns related to GMOs, • describe how regulations that govern the use of GMOs have changed, and • assess the regulations that govern GMOs.
May 12	<p>Discussion #7 – Food or Famine Game Day 3 The third game session is opened by the UN WFP representative. The first 20 minutes of this session allow continued debate. During this session, the African national representatives should ask pointed questions aimed at determining how they will vote. The final 20 minutes should be reserved for the African nations to debate among themselves. This debate should be public, and anyone may comment if they wish to try to persuade reluctant nations. The session ends with each African nation announcing their position.</p>
May 14	Due: 1. Scientist Spotlight #4 2. Weekly Reflection 3. Food or Famine Reflection 4. African Leaders Essay (African Leader roles only)
Week 8	TOPIC III: GENES, GENOMES, AND HUMAN DISEASE: Can we genetically modify humans? Should we do so? What do we know about the role of genes in human disease? How safe is our genetic information? Answering these questions has implications for a variety of choices we make about the ways we decide to live.
May 17	<p>Class 15 – Genetic diseases and genetic testing. What is a genetic disease and how do you know if you have one? Students will be able to:</p> <ul style="list-style-type: none"> • explain the basic principles of human inheritance, • describe some causes of genetic diseases, and • analyze methods used to diagnose them.
May 19	<p>Class 16 – Genomes R Us? Amazing technological advances over the last few years make it possible for each of us to learn about many of the genetic variations in our DNA. Students will be able to:</p> <ul style="list-style-type: none"> • discuss how these variations in DNA are found, what they can tell us about our ancestry, and how they may define our physical traits, and • analyze what they can reveal about our susceptibility to some kinds of genetic diseases.
May 19	<p>Discussion #8 – Relationship between SNPs, disease, and treatment Students will be able to:</p> <ul style="list-style-type: none"> • Explain how SNPs are identified • Understand the relationship between SNPs, haplotype, and disease • Explain precision (or personalized) medicine based on genetics and modern methods of DNA analysis
May 20	Due: 1. Canvas Quiz #4 2. Weekly Reflection
Week 9	
May 24	<p>Class 17 - Time to change your genes? Part 1 Is there anything that can be done to repair a genetic disease? Students will be able to:</p> <ul style="list-style-type: none"> • explain how gene therapy works. • evaluate the bioethical implications of gene therapy. • relate therapies to the kinds of research that can be done on humans during clinical trials.

May 26	Class 18 – Time to change your genes? Part 2 Is there anything that can be done to repair a genetic disease? Students will be able to: <ul style="list-style-type: none"> • explain how gene therapy works. • evaluate the bioethical implications of gene therapy. • relate therapies to the kinds of research that can be done on humans during clinical trials.
May 26	Discussion #9 – Genetic Testing and Privacy Students will be able to: <ul style="list-style-type: none"> • Explain how much DNA we share with our family members. • Consider the ethical implications of widespread genetic testing.
May 27	Due: 1. Scientist Spotlight #5 2. Weekly Reflection
Week 10	
May 31	Class 19 – Bioethics: What policies regulate human genetic testing and gene modification? Who decides whether someone should be tested for a genetic disease, or have their genes modified? Who decides how genetic information can be used? Students will be able to: <ul style="list-style-type: none"> • evaluate concerns related to bioethics of human genetic testing, • describe the regulations that govern bioethics of human genetic testing, and • assess the regulations that govern bioethics of human genetic testing.
June 2	Watch Jurassic park (1993) before class Class 20 – Course finale: Can we regenerate extinct species? You should identify scientific and policy questions and controversies that the movie Jurassic Park raised for you and be prepared to discuss them in class. Similar to what is portrayed in the movie, the genomes of several extinct species have recently been elucidated. <i>You will need to watch the movie Jurassic Park before Lecture 19.</i> Students will be able to: <ul style="list-style-type: none"> • explain the experiments used to elucidate these genomes as well as methods that could be used to regenerate extinct species and • evaluate some of the ethical issues involved.
June 2	Discussion #10 – Thinking scientifically Students will be able to: <ul style="list-style-type: none"> • Explore preconceptions and how it influences data interpretation • Separate scientific from unscientific thinking • Evaluate claims
June 3	Due: 1. Canvas Quiz #5 2. Weekly Reflection
Finals Week	
June 10	Final Take Home Exam due on Canvas Friday, June 10 8am

Grading:**40% Formative Assessments**

- 10% Discussion (the lowest Discussion Assignment will be dropped)
- 6% Daily Reading Questions on Canvas (lowest Reading Question score will be dropped)
- 10% Quizzes (the lowest Quiz score will be dropped)
- 10% Scientist Spotlights
- 4% Participation - in-class clickers, discussions & surveys etc.

60% Summative Assessments

- 20% Unit 1 Letter to your elected official
- 20% Unit 2 Food or Famine Reacting to the Past essay and speech
- 20% Unit 3 Take Home exam

***Note - We will emphasize self-evaluative learning reflections. Students will have an opportunity to reflect on their grade based on the grade outline above and make a case for what final grade they feel they have earned. This will be taken into account when assigning final grades.**

Communication:

Our class will communicate through our Canvas site. Announcements and emails are archived there and automatically forwarded to your UO email, and can even reach you by text. Check and adjust your settings under Account > Notifications.

Work Load:

The expectation for this four-credit course is that you will have four hours of instruction in class each week and spend twelve hours (3:1) each week outside of class doing the reading, writing daily reading questions, writing scientist spotlights, preparing your summative assessments, and studying for quizzes.

Formative Assessments**Readings:**

There is no perfect textbook for this course. The required textbook covers some of the material we will investigate this term, but not all of it. Therefore, there will be additional readings, outside of the textbook, for most of the lectures and for some of the discussions. These readings are posted on **Canvas** as pdf files that can be downloaded. In some cases URLs for websites, podcasts, or videos will be given instead of or in addition to pdfs. In total you can expect to do several hours of reading per week. The course is about science and policy: we won't directly discuss politics, rather we will discuss what triggers policy decisions and how they are made. Since some of the topics we will cover are controversial, there will be some discussion of ethical implications, as this is often what drives policy decisions.

Reading Assignments:

Reading assignments should be completed **before** the class or discussion section. Reading Questions based on the daily learning objectives will be posted on **Canvas** and are due the evening **before** the class. Read the questions before doing the reading to help guide you to the key points of each reading. The lowest reading question score will be dropped.

Scientist Spotlights:

During weeks 1, 3, 5, 7, and 9 you will watch a video, read an interview, or listen to a radio story about a scientist who has researched the topics we'll be learning about in class. These are an opportunity to meet the real people behind the work and learn about their work in the scientists own words.

Quizzes:

During weeks 2, 4, 6, 8, and 10 you will complete an online quiz on the course content. This will include material from the readings, discussions, and class sessions. Frequent testing helps students to better learn and remember material. The lowest quiz score will be dropped.

Discussion Assignments:

These are posted on **Canvas** under the appropriate discussion date. Completed Discussion Assignments will be due at the end of the day.

Summative Assessments:

For each of the three units, you will complete a written assignment:

- **Unit 1** you will write a letter to one of your elected officials about stem cells, cloning, CRISPR or COVID-19.
- **Unit 2** you will participate in a Reacting to the Past game, *Food or Famine*, set in 2002 in South Africa at a summit on GMOs. For this unit you will write an essay, give speeches, and write reflections from your given character's perspective. The game play will take place during your discussion section.
- **Unit 3** you will complete a take home exam that builds on many different aspects from the course.

Reacting to the Past

This course employs an exciting approach to learning called Reacting to the Past. Reacting courses consist of elaborate games, set in the past, in which students are assigned roles informed by historical texts. In this class, you will learn to construct arguments from these texts and then support your positions through reasoned, sometimes impassioned, writing and speeches. As you take control of an unfolding historical drama and struggle for your characters to prevail, you will become deeply engaged, both intellectually and emotionally, with the subject matter. I will act as the gamemaster, determining your roles, preparing you to play, grading your work, and occasionally nudging the games as they develop. The game will be held during Discussion Section. For those that cannot participate synchronously we will have a video submission of your speech to deliver during Discussion Section.

Food or Famine, 2002: Genetically Modified Foods or Starvation

This game is set in an African conference at which nations facing famine are confronted with the choice between accepting GM corn from the USA and the risk that they will not be able to export their agricultural products to the EU as a result, or allowing people to starve. Students learn about GM foods, the controversies over their safety, both for health reasons and ecological reasons. The subtext for the controversy in this game is a trade war between the USA and the EU over GM foods.

General Policy on Missed/Late Assignments:

The general policy of this course is that assignments should be turned in on time. However, we understand that disruptions continue to be likely this quarter. If you are ill or have an emergency and cannot complete work on time, please contact one of the course instructors. It is best if you can contact an instructor prior to missing an exam or an assignment.

Email Etiquette:

If you email a faculty instructor, a co-instructor, a GE, or other students in the class, please be respectful in your email which includes signing your name to the email. When emailing instructors, please use Bi140 in the subject line of the email. We will endeavor to answer email as quickly as possible typically within one business day. However, if you send an email in the evening or on weekends, we may not respond to your email until the following weekday.

Campus resources to support your learning

Tutoring and Academic Engagement Center Free drop-in math and writing support in addition to tutoring, study skills support, and Class Encore. <https://engage.uoregon.edu/>

Counseling Center Call anytime to speak with a therapist who can provide support and connect you with resources. Located on the 2nd Floor of the Health Center (541)346-3227

Accessible Education Center The University of Oregon is working to create inclusive learning environments. If there are aspects of the instruction or design of this course that result in barriers to your participation, please notify us as soon as possible. You are also encouraged to contact the Accessible Education Center. If you are not a student with a documented disability, but you would like for us to know about class issues that will impact your ability to learn, we encourage you to come visit during office hours so that we can strategize how you can get the most out of this course. Located on the 1st Floor of Oregon Hall (541) 346-1155, uoaec@uoregon.edu

Center for Multicultural Academic Excellence (CMAE) mission is to promote student retention and persistence for historically underrepresented and underserved populations. We develop and implement programs and services that support retention, academic excellence, and success at the UO and beyond. We reaffirm our commitment to all students, including undocumented and tuition equity students. Located on the 1st Floor of Oregon Hall (541) 346-3479, cmae@uoregon.edu

Inclusiveness:

Open inquiry, freedom of expression, and respect for difference are fundamental to a comprehensive and dynamic education. We are committed to upholding these ideals by encouraging the exploration, engagement, and expression of divergent perspectives and diverse identities. If there are aspects of the instruction or design of this course that results in barriers to your participation, please notify me as soon as possible. You are also welcome to contact the Accessible Education Center (AEC) in 164 Oregon Hall at 346-1155 or uoaec@uoregon.edu. If you are not a student with a documented disability through AEC, but you would like for us to know about class issues that will impact your ability to learn, we encourage you to come visit with during office hours so that we can strategize how you can get the most out of this course.

Duty to Report:

As instructors of this course, we are Student-Directed Employees. As such, **if you disclose sensitive information to us, we will respond to you with respect and kindness. We will listen to you and will be sensitive to your needs and desires. We will not judge you. We will support you.** We will direct students who disclose sexual harassment or sexual violence to resources that can help and **will only report the information shared to the university administration when the student requests that the information be reported.** As Student-Directed Employees, we can offer privacy because we are not required to report certain information to the university. However, we cannot be bound by confidentiality in the same way that a counselor or attorney is. Unless someone is in imminent risk of serious harm or is a minor, we will keep your disclosure private. Please note the differences between confidential and private. For more information on reporting obligations of employees and specific details about confidentiality of information, visit titleix.uoregon.edu

Discrimination and Harassment Resources

Additional help and resources for any student who has experienced sexual assault, relationship violence, sex or gender-based bullying, stalking, and/or sexual harassment are available at safe.uoregon.edu or by calling the UO's 24-hour hotline 541-346-7244 [SAFE] or the non-confidential Title IX Coordinator at 541-346-8136. Students experiencing any other form of prohibited discrimination or harassment can find information at respect.uoregon.edu or aaeo.uoregon.edu or contact the non-confidential AAEO office at 541-346-3123 or the Dean of Students Office at 541-346-3216.

Academic Integrity:

You are expected to do your own work on homework, discussion section assignments, and exams. You are encouraged to discuss ideas with each other and to study together, but don't copy someone else's work and don't allow someone else to copy your work. By taking an online quiz or assignment, you are certifying that you are the student entitled to log in using a specific set of credentials. Allowing someone else to log in under your name, or logging in under someone else's name, to complete a homework assignment is a breach of university regulations. Similarly, it is a breach of university regulations to use an i>clicker registered to someone else or to allow someone else to use an i>clicker registered to you. All students are expected to conform to the student conduct code (<http://integrity.uoregon.edu/>); students not in compliance will be brought to the attention of the university.