



As part of the Science 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](http://scilit.uoregon.edu)

### When and where we meet

*Course number & CRN: Biology 140 CRN 26748*

*Tuesday Thursday 1000-1120 MacKenzie 240A*

*Wednesday Discussion Price Science Commons B042*

### Your Teaching Team

**Instructor:** Dr. Nicola Barber [nbarber@uoregon.edu](mailto:nbarber@uoregon.edu) tel: 541-346-7024

Please call me Nicola (or Dr. Barber).

**Office Location:** 15E Klamath

**GE:** Laura McCullough [lmccull2@uoregon.edu](mailto:lmccull2@uoregon.edu)

**SLP Fellow:** Felipe Campos-Cerda [fcamposc@uoregon.edu](mailto:fcamposc@uoregon.edu)

**For email, please use Bi140 in the subject header**

### Office Hours:

Dr. Nicola Barber	Mondays	1-2pm	15E Klamath
Laura McCullough	Mondays	10-11am	32 Klamath
Felipe Campos-Cerda	Thursdays	12-1pm	PSC B009

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. We invite you to come visit us, so we can meet you and learn more about your interests in the course.

### Course goals:

1. 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.
2. You will practice how to separate scientific fact from fiction and uncover appropriate and relevant content.
3. 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:

1. describe the underlying biology and explore how scientific reasoning and methods develop this understanding,
2. 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.

**Tentative Schedule: (subject to change, see Canvas for latest homework readings)**

Date		Homework
<b>Week 1</b>	<b>TOPIC I: STEM CELLS AND CLONING:</b> This topic is the source of a lot of controversy that receives considerable media coverage. What's the controversy all about?	
January 8	<b>Class 1 – What is this course about?</b> This class will provide an overview of the topics covered in this course and how they impact our lives. Students will be able to: <ul style="list-style-type: none"> <li>• discuss strategies that will be employed during the course to optimize learning,</li> <li>• examine how scientific research is portrayed in the media.</li> </ul>	
January 9	<b>Discussion 1 – Isolation of DNA</b> Students will be able to <ul style="list-style-type: none"> <li>• Isolate DNA from plants (and YOU) to understand methods used by research scientists to isolate DNA to study or modify its structure</li> <li>• Explain where in the cell DNA is located</li> <li>• Describe and consider the importance of DNA structure</li> </ul>	<b>Due</b> Scientist Spotlight 1: Jennifer Doudna- <b>On Canvas before discussion</b> Discussion #1 due at the end of class
January 10	<b>Class 2 – GATTACA: how far off is it really?</b> 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 that is leading us closer to designer babies. Students will be able to: <ul style="list-style-type: none"> <li>• explain what genetic testing is and what testing is done in Oregon,</li> <li>• examine why genetic testing is done routinely, and</li> <li>• evaluate where we currently stand relative to the future envisioned by the movie.</li> </ul>	<b>Watch</b> GATTACA <b>Read</b> Gilbert & Pinto-Correia (text) Ch. 1 Jolie (2013) Brody (2013)
<b>Week 2</b>		
January 15	<b>Class 3 – How do animals develop?</b> 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: <ul style="list-style-type: none"> <li>• describe the processes underlying sexual and asexual division of animal cells,</li> <li>• compare and contrast prokaryotic and eukaryotic cells including the location of DNA in both cell types,</li> <li>• compare how and when cells influence one another during development, and</li> <li>• interpret the types of experiments used to reveal the capabilities of developing cells.</li> </ul>	<b>Read</b> Gilbert & Pinto-Correia (text) Ch. 3 (all) and Ch. 5 (p. 83-94) Website: mitosis, meiosis, and fertilization
January 16	<b>Discussion 2 – How can we interpret scientific reports in the media?</b> Students will be able to <ul style="list-style-type: none"> <li>• Analyze media report on a science discovery</li> <li>• Interpret information from media report and relate it to the underlying science</li> </ul>	<b>Read</b> Holmes (2016) Bruzek (2014)
January 17	<b>Class 4 – What's the big deal about cloning?</b> The cloning process often involves taking a single cell from an animal and coaxing that	<b>Read</b> Cibelli et al. (2001)

	<p>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"> <li>• describe the nuts and bolts of the cloning process,</li> <li>• explain how cloning can be used, and</li> <li>• discuss why some applications are controversial.</li> </ul>	<p>Gilbert &amp; Pinto-Correia (text) Ch. 7 (p. 129-134) and Ch. 8 (p. 151-166)  <b>Quiz #1</b> on Canvas before class</p>
<b>Week 3</b>		
January 22	<p><b>Class 5 – What are stem cells and what do they have to do with cloning?</b> 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"> <li>• give examples of when and where stem cells arise,</li> <li>• describe how stem cells can be made, and</li> <li>• predict what stem cells might be used for.</li> </ul>	<p><b>Read</b>  Gilbert &amp; Pinto-Correia (text) Ch. 7 (p. 134-140) and Ch. 8 (p.166-172)  Cyranoski (2016)  Kolata (2013)  Weiss (2007)  Cowell (2008)</p>
January 23	<p><b>Discussion 3 – Stem cells points of view</b> Students will be able to</p> <ul style="list-style-type: none"> <li>• Discuss ethical implications of stem cells and their regulation</li> <li>• Explain the process of cloning from a biological perspective</li> <li>• Understand what different types of stem cells there are, and what they can do</li> </ul>	<p><b>Due</b> Scientist Spotlight 2: Shinya Yamanaka-<b>On Canvas before discussion</b></p> <p><b>Read</b>  Zimmer (2017)</p>
January 24	<p><b>Class 6 – What policies regulate human cloning and stem cells?</b> 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"> <li>• evaluate concerns related to human cloning and stem cells,</li> <li>• evaluate the regulations that govern the use of human stem cells, and</li> <li>• assess the regulations that govern whether or not humans can be cloned.</li> </ul>	<p><b>Read</b>  Websites</p>
<b>Week 4</b>		
January 29	<p><b>Class 7 – Introduction to DNA and the genetic code.</b> 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"> <li>• characterize the relationship between DNA, genes, and proteins,</li> <li>• describe how information is stored in DNA and how changes in DNA structure result in changes in DNA function; and explain why the genetic code is the same in all living organisms on earth.</li> </ul>	<p><b>Read</b>  Website Transcribe and Translate a Gene</p> <p><b>Due</b>  Letter to Congress on Canvas</p>
	<p><b>TOPIC II: GENETICALLY MODIFIED ORGANISMS:</b> 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.</p>	
January 30	<p><b>Discussion #4 – Reacting to the Past Feeding (RTTP) Feeding Africa Preparation</b> Students will be able to</p> <ul style="list-style-type: none"> <li>• Discuss how are crops modified using genetic engineering</li> <li>• Explain advantages and disadvantages of GM crops</li> <li>• Use The Precautionary Principle</li> <li>• Discuss food distribution issues in the in Africa</li> </ul>	<p><b>Read</b>  Henderson (2011)  Gamebook</p>

	<ul style="list-style-type: none"> <li>Experience the role of international politics and trade in the scarcity of food</li> <li>Prepare for the three days of the Feeding Africa Game.</li> </ul>	
January 31	<p><b>Class 8 – What is CRISPR-Cas9?</b></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"> <li>describe the CRISPR-Cas9 system,</li> <li>describe applications of CRISPR-Cas9</li> </ul> <p>assess the regulations and ethics of new technologies.</p>	<p><b>Read</b></p> <p>Gilbert &amp; Pinto-Correia (text) Ch. 7 (p. 140-142) Yong (2018)</p> <p><b>Listen</b></p> <p>Radio Lab (2017)</p> <p><b>Quiz #2</b> (will include RTTP gamebook materials) on Canvas before class</p>
<b>Week 5</b>		
February 5	<p><b>Class 9 – Is it all in our genes? Genetics and epigenetics.</b> 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"> <li>generalize the basis of genetic inheritance,</li> <li>identify how environmental factors can affect DNA function and an animal's traits by a process referred to as epigenetics.</li> </ul>	<p><b>Read</b></p> <p>Cloud Websites</p>
February 6	<p><b>Discussion #5 – Feeding Africa Game Day 1</b> 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.</p>	<p><b>Due</b> Game Day 1 speeches (in class) and all Feeding Africa essays (on canvas before class)</p>
February 7	<p><b>Class 10 – Truth in advertising? Understanding scientific controversies.</b> 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"> <li>draw conclusions from different types of scientific studies,</li> <li>examine how scientific controversies arise, and</li> <li>articulate what types of research could help to resolve contradictory findings.</li> </ul>	<p><b>Read</b></p> <p>Willingham &amp; Helft (2014) The National Autistic Society (2009)</p> <p><b>Due</b> Scientist Spotlight 3: TBA-On Canvas before class</p>
<b>Week 6</b>		
February 12	<p><b>Class 11 – Making designer animals and plants by modifying their genes.</b> How are the genes of plants and animals modified? Students will be able to:</p> <ul style="list-style-type: none"> <li>describe how plant and animal husbandry has been used for thousands of years to select species with desirable traits, and</li> <li>recognize the modern molecular methods that are used to modify species, and some of the rationale for selecting traits to be modified.</li> </ul>	<p><b>Read</b></p> <p>Pollack (2009) Vincent (2017)</p> <p><b>Watch</b></p> <p>Bill Nye video</p>
February 13	<p><b>Discussion # 6 – Feeding Africa Game Day 2</b> 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>	<p><b>Due</b> Game Day 2 speeches (in class)</p>

February 14	<b>Class 12 – How do GMOs impact the environment?</b> Many different types of organisms have been genetically modified, and it looks like genetically modified organisms (GMOs) are here to stay. Students will be able to: <ul style="list-style-type: none"> <li>describe the types of studies that are necessary to assess the impact of GMOs on the environment, and</li> <li>assess how development of new organisms can lead to unanticipated consequences.</li> </ul>	<b>Read</b> USDA (2002) Cornwall (2009) Charles (2014)  <b>Quiz #3</b> on Canvas before class
<b>Week 7</b>		
February 19	<b>Class 13 – What policies regulate GMOs?</b> 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: <ul style="list-style-type: none"> <li>evaluate concerns related to GMOs,</li> <li>describe the regulations that govern the use of GMOs, and</li> <li>assess the regulations that govern GMOs.</li> </ul>	<b>Read</b> USDA USFDA Pollack (2015) Simon (2018)
February 20	<b>Discussion #7 – Feeding Africa Game Day 3</b> 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.	<b>Due</b> Game Day 3 speeches (in class)
February 21	<b>Class 14 – What policies regulate GMOs? Part 2</b> 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: <ul style="list-style-type: none"> <li>evaluate recent concerns related to GMOs,</li> <li>describe how regulations that govern the use of GMOs have changed, and</li> <li>assess the regulations that govern GMOs.</li> </ul>	<b>Read</b> Hakim (2016) McFadden (2017)  <b>Due Scientist Spotlight 4</b> TBA: -On Canvas before class
February 22		<b>Due</b> Feeding Africa Reflection - On Canvas by 12noon
<b>Week 8</b>	<b>TOPIC III: GENES, GENOMES, AND HUMAN DISEASE:</b> 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.	
February 26	<b>Class 15 – Genetic diseases and genetic testing.</b> What is a genetic disease and how do you know if you have one? Students will be able to: <ul style="list-style-type: none"> <li>explain the basic principles of human inheritance,</li> <li>describe some causes of genetic diseases, and</li> <li>analyze methods used to diagnose them.</li> </ul>	<b>Read</b> Harmon (2007) Couzin-Frankel (2011) Genetics Home Reference (2015) Kalydeco webpage

February 27	<b>Discussion #8 – Understanding inheritance</b>	
February 28	<b>Class 16 – Genomes R Us?</b> 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: <ul style="list-style-type: none"> <li>• 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</li> <li>• analyze what they can reveal about our susceptibility to some kinds of genetic diseases.</li> </ul>	<b>Read</b> Goetz (2007) Science Daily (1998) FDA letter (2013)  <b>Quiz #4</b> on Canvas before class
<b>Week 9</b>		
March 5	<b>Class 17 – Time to change your genes? Part 1</b> Is there anything that can be done to repair a genetic disease? Students will be able to: <ul style="list-style-type: none"> <li>• generalize how research on animal models is contributing to development of therapies for human genetic diseases, and</li> <li>• relate therapies to the kinds of research that can be done on humans during clinical trials.</li> </ul>	<b>Read</b> Gilbert & Pinto-Correia (text) Ch. 7 (p. 140-150) Science Daily (2012) Pollack (2012) Wade (1999) Travis (2015)
March 6	<b>Discussion #9 – Relationship between SNPs, disease, and treatment</b> Students will be able to: <ul style="list-style-type: none"> <li>• To understand how SNPs are identified</li> <li>• To understand haplotype</li> <li>• To understand the relationship between SNPs, haplotype, and disease</li> <li>• To think about personalized medicine based on genetics and modern methods of DNA analysis</li> </ul>	<b>Due</b> Scientist Spotlight 5: TBA - <b>On Canvas before class</b>
March 7	<b>Class 18 – Time to change your genes? Part 2</b> Is there anything that can be done to repair a genetic disease? Students will be able to: <ul style="list-style-type: none"> <li>• generalize how research on animal models is contributing to development of therapies for human genetic diseases, and</li> <li>• relate therapies to the kinds of research that can be done on humans during clinical trials.</li> </ul>	<b>Read</b> Gallagher (2015) Reardon (2017)
<b>Week 10</b>		
March 12	<b>Class 19 – Bioethics: What policies regulate human genetic testing and gene modification?</b> 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"> <li>• evaluate concerns related to bioethics of human genetic testing,</li> <li>• describe the regulations that govern bioethics of human genetic testing, and</li> <li>• assess the regulations that govern bioethics of human genetic testing.</li> </ul>	<b>Read</b> Beaudet and Javitt (2010) Harmon (2010) Connor (2009) Hayden (2016)
March 13	<b>Discussion #10 – Preconceptions of Data</b> Students will be able to: <ul style="list-style-type: none"> <li>• Explore preconceptions and how it influences data interpretation</li> <li>• Discuss examples where preconceptions matter.</li> </ul>	
March 14	<b>Class 20 – Course finale: Can we regenerate extinct species?</b> You should identify scientific and policy questions and controversies that the movie Jurassic Park raised for you and be prepared to discuss	<b>Read</b> Nicholls (2009) Kolbert (2014)

	<p>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></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>• explain the experiments used to elucidate these genomes as well as methods that could be used to regenerate extinct species and</li> <li>• evaluate some of the ethical issues involved.</li> </ul>	<p>Rich (2014) Tierney (2009)</p> <p><b>Quiz #5</b> on Canvas before class</p> <p><b>Watch</b> Jurassic park</p>
<b>Finals</b> March 18		<b>Final Take Home Exam due on Canvas 10am March 18</b>

### Bio 140 Winter 2019 Bibliography

#### Textbook and Packet Available at the Bookstore

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

Henderson, D. (2011). *Feeding Africa--Starvation or GM Foods?* (v4.2) Reacting to the Past Game Book.

#### Topic 1: Stem Cells and Cloning

Brody, JE. (2013 October 14). The tests that babies need. *The New York Times*.

Bruzek, A. (2014 September 23). More women skip some prenatal tests after learning about risks. *NPR*.

Cibelli, JB, RP Lanza, MD West, and C Ezzell. (2001). The first human cloned. *Scientific American*. January: 41-51.

Cohen, J. (2017). The birth of CRISPR Inc.: How a community fractured as a revolutionary genome-editing tool became a business. *Science* 355:6326:680-684.

Cummings, M. (2015). *Human Heredity: Principles and Issues* (11th Edition). Cengage Learning.

Cyranoski, D. (2016). Mouse eggs made in the lab. *Nature*. 536(7652): 301.

Harmon, A. (2017 February 14). Human gene editing receives science panel's support. *The New York Times*.

Holmes, J (2016 November 25). Flossing and the art of scientific investigation. *The New York Times*.

Jolie, A. (2013 May 14). My medical choice. *The New York Times*.

Kolata, G. (2013 February 16). DNA test for rare disorders becomes more routine. *The New York Times*.

Kupperman, M, S Pena, JT Bishop, S Nakagawa, SE Gregorich, A Sit, J Vargas, AB Caughey, S Sykes, L Pierce, and ME Norton (2014). Effect of Enhanced Information, Values Clarification and Removal of Financial Barriers on Use of Prenatal Genetic Testing: A Randomized Clinical Trial. *Journal of the American Medical Association*. 312(12):1210-1217.

NOVA special STEM Cells Breakthrough (2008). <http://www.pbs.org/wgbh/nova/body/stem-cells-breakthrough.html>

RadioLab (2017 February 24). Update: CRISPR. <http://www.radiolab.org/story/update-crispr/>

TED Talk (2015). We can now edit our DNA but let's do it wisely.

[https://www.ted.com/talks/jennifer\\_doudna\\_we\\_can\\_now\\_edit\\_our\\_dna\\_but\\_let\\_s\\_do\\_it\\_wisely#t-941105](https://www.ted.com/talks/jennifer_doudna_we_can_now_edit_our_dna_but_let_s_do_it_wisely#t-941105)

Weiss, R. (2007 November 15). Questions reappear with Oregon cloning success. *The Washington Post*.

Yong, E. (2018 November 26). A Reckless and Needless Use of Gene Editing on Human Embryos. *The Atlantic*.

#### Topic 2: Genetically Modified Organisms

Charles, D. (2012 March 9). Insect experts issue 'urgent' warning on using biotech seeds. *NPR*.

Cloud, J. (2010 January 6). Why your DNA isn't your destiny. *Time*.

Cornwall, W. (2014 January 29). The missing monarchs. *The State of the Universe*.

Hakim, D. (2016 October 29). Doubts about the promised bounty of genetically modified crops. *The New York Times*.

Henderson, D. (2011). *Feeding Africa--Starvation or GM Foods?* (v3.10) Reacting to the Past Game Book.



- McFadden, BR. (2017). The unknowns and possible implications of mandatory labeling. *Trends in Biotechnology* 35(1): 1-3.
- Pollack, A. (2009 February 6). F.D.A. approves drug from gene-altered goats. *The New York Times*.
- Pollack, A. (2015 November 19). Genetically engineered salmon approved for consumption. *The New York Times*.
- Simon, M. (2018 July 24). A Major Victory for the Impossible Burger, the Veggie 'Meat' that Bleeds. *Wired*.
- The National Autistic Society. (2009). The genetics of autism spectrum disorders: a briefing.
- US Food and Drug Administration (USFDA). (2010 July). Regulation of genetically engineered animals. FDA Consumer Health Information.
- US Department of Agriculture (USDA). Coordinate Framework.
- USDA-Agriculture Research Service, Cornell University, University of Guelph, Iowa State University, University of Maryland, University of Nebraska, Purdue University, and Monarch Watch. (2002). Butterfiles and Bt corn: Allowing science to guide decisions. *ARS Publication*.
- Vincent, J. (2017 January 19). The first GMO non-browning apples will go on sale in the US next month. *The Verge*.
- Willingham, E and L Helft (2014 September 5). The autism-vaccine myth. NOVA.

### Topic 3: Genes, Genomes, and Human Disease

- Beaudet, AL and G Javitt (2010). Which way for genetic-test regulation? *Nature* 466 (12): 816-818.
- Connor, S. (2009 August 26). Gene therapy for the unborn. *The Independent*.
- Couzin-Frankel, J. (2011). What would you do? *Science* 331: 662-665.
- FDA Letter (2013). Letter to 23AndMe.
- Gallagher, J. (2015 February 25). UK approves three person babies. *BBC*.
- Genetics Home Reference (2015). Cystic fibrosis. US National Library of Medicine.
- Goetz, T. (2007 November 17). 23AndMe will decode your DNA for \$1,000. Welcome to the age of genomics. WIRED.
- Harmon, A. (2007 November 17). My genome, myself: Seeking clues in DNA. *The New York Times*.
- Harmon, A. (2010 April 21). Indian Tribe Wins Fight to Limit Research of Its DNA. *The New York Times*.
- Hayden, EC. (2016 February 25). Tomorrow's children: What would genome editing really mean for future generations? *Nature* 503: 402-405.
- Kalydeco. Drug website.
- Kolbert, E. (2014 March 12). Martha, My Dear: What De-Extinction Can't Bring Back. *The New Yorker*.
- Learning Genetics Single Gene Disorders webpage [Cystic Fibrosis](http://learn.genetics.utah.edu/content/disorders/singlegene/)  
<http://learn.genetics.utah.edu/content/disorders/singlegene/>
- NHS Choice (2015 July 3). Gene therapy breakthrough for CF.
- Nicholls, N. (2009). Ten extinct species that could soon walk the earth again. *New Scientist* 2690: 24-28.
- Pollack, A. (2012 July 20). European Agency Backs Approval of a Gene Therapy. *The New York Times*.
- Reardon, S. (2016 September 28). 'Three-parent baby' claim raises hope--and ethical concerns. *Nature News*.
- Rich, N. (2014 February 27). The Mammoth Cometh. *The New York Times Magazine*.
- Science Daily (2012 October 24). New gene therapy method tested in human cells ... And it works, researchers report.
- Science Daily. (1998 July 30). Gene patterns can predict when--but not whether--Alzheimer's will strike. Johns Hopkins School of Public Health.
- Tierney, J. (2009 February 19). Why Not Bring a Neanderthal to Life? *The New York Times*.
- Travis, J. (2015 December 4). Inside the summit on human gene editing: A reporter's notebook. *Science*.
- Wade, N. (1999 November 29). Patient Dies During a Trial Of Therapy Using Genes. *The New York Times*.

### Grading:

#### 40% Formative Assessments

- 10% Discussion (the lowest Discussion Assignment will be dropped)
- 3% Daily Reading Questions on Canvas (lowest Reading Question score will be dropped)
- 15% Quizzes (the lowest Quiz score will be dropped)

10% Scientist Spotlights

2% Clickers & Participation (90% of total clicker pts for full credit)

**60% Summative Assessments**

20% Unit 1 Letter to your elected official

20% Unit 2 Feeding Africa Reacting to the Past essay and speech

20% Unit 3 Take Home exam

**Extra Credit Opportunities**

*\*You will be asked to complete a survey about Science Literacy during week 1 and week 10, if you complete these surveys, you will also receive an extra 0.5% per survey on your final course grade. There are no other extra credit opportunities.*

**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.

**Website:**

All class information will be posted on **Canvas**. This course is part of the UO Science Literacy Program (more information at [scilit.uoregon.edu](http://scilit.uoregon.edu)).

**Required Texts:**

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

Henderson, D. (2011). *Feeding Africa--Starvation or GM Foods?* (v3.10) Reacting to the Past Game Book.

**Required Supplies:**

i>clicker 2 (available in the Duck Store): Be sure to register your i>clicker on Canvas

1 package of 3x5 index cards

**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 **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.

**Surveys:**

There will be two online surveys in weeks 1 and 10. They are for a total of 1% extra credit. Instructions for completing this will be posted on **Canvas**.

**Discussion Assignments:**

These are posted on **Canvas** under the appropriate discussion date. The Discussion Assignments should be downloaded, printed, and brought to the Discussion Section. Completed Discussion Assignments will be due at the end of the Discussion Section meeting, according to the schedule. Attendance at Discussion Sections is mandatory. If for some reason you cannot attend your normal Discussion Section, due to space limitations and logistics you may not attend another discussion section. If you must miss a Discussion Section, please contact your GE and Co-Instructor, preferably before your absence. The lowest discussion assignment score will be dropped.

**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, or CRISPR.
- **Unit 2** you will participate in a Reacting to the Past game, *Feeding Africa*, 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.

**Feeding Africa, 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 Assignments:**

The general policy of this course is that: 1) Assignments must be turned in on time; 2) Because Discussion Assignments cannot be completed without attending Discussion Section, there are no make ups for missed Discussion Assignments. If you are ill or have an emergency and cannot attend class, or you miss an exam or an assignment because of illness or an emergency, please contact one of the course instructors. It is best if you can contact an instructor prior to missing an exam or an assignment. If you will miss Discussion Section because of illness or an emergency, please also contact your Co-Instructor and Graduate Teaching Fellow (GTF).

**Classroom Etiquette:**

1. Please be respectful of your fellow students. Many of the subjects we will discuss are controversial, and people in the class may have widely differing views about them. At times we may have discussions of such controversial topics. During these discussions, it is important to respect the feelings and opinions of other members of the class.
2. Please arrive on time. Lectures and discussion sections will start promptly on the hour.
3. You may not use cell phones or iPods during lectures. This means no emailing, texting, listening to music, or web surfing during lectures. Laptops are not encouraged but permitted for accessibility.
4. You may not use computers, cell phones or iPods during MOST Discussion Sections. However, some Discussion Section exercises will require that you use a computer or a compatible electronic device. These are listed in the Discussion Section information.
5. Please don't leave lecture early, as this is very disruptive to everyone. If you have an unusual circumstance and must leave early, then please sit near the exit so you can leave unobtrusively.

**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, co-instructors or the GE, please use Bi140 in the subject line of the email. Instructors, co-instructors, and the GEs will endeavor to answer email as quickly as possible. However, if you send them email in the evening or on weekends, they may not respond to your email until the following weekday.

**Campus resources to support your learning**

**Tutoring and Learning Center (TLC)** Drop-in math and writing support in addition to tutoring, study skills support, and Class Encore. Located in the 4<sup>th</sup> Floor Knight Library (541) 346-3226, [tlc@uoregon.edu](mailto:tlc@uoregon.edu)

**Counseling Center** Call anytime to speak with a therapist who can provide support and connect you with resources. Located on the 2<sup>nd</sup> 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 1<sup>st</sup> Floor of Oregon Hall (541) 346-1155, [uoaec@uoregon.edu](mailto: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 1<sup>st</sup> Floor of Oregon Hall (541) 346-3479, [cmae@uoregon.edu](mailto: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](mailto: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](http://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](http://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](http://respect.uoregon.edu) or [aaeo.uoregon.edu](http://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.