**Biology 053 – Current Topics in Biotechnology: Genetically Modified Foods to the Sequence of the Human Genome**

**Spring 2019 Syllabus**

Class time: Tuesdays and Thursdays, 2:00–3:15 in Genome Sciences Building Room 1374.

Instructor: Jill Dowen (jilldowen@unc.edu)

Office: 3360 Genome Sciences Building

Telephone: 919-962-8132

Office hours: after class or at other times by appointment

**Course goals:** The aims of this course are i) to introduce you to the science behind biotechnology; ii) to discuss how advances in biotechnology affect our lives presently and may do so in the future; iii) to consider how entrepreneurs actually convert scientific advances into concrete commercial or social changes; and iv) to get you in the habit of asking questions and finding answers to them. In certain parts of the course, you will be asked to teach yourselves and each other through presentations and active discussion. The seminar format means that the class will be small enough to have lively discussions, and to air your views and ask questions. If you have questions or ideas, raise them in class.

We will first introduce genetics and recombinant DNA, which will help you to understand the specific examples of biotechnology that we will discuss later. We will discuss applications of biotechnology to medicine, human genetics, agriculture, and other topics. We will consider how these advances change our world view and our society. We will also visit labs at UNC and a biotechnology company, and guest experts will visit the class to tell us about selected topics.

**Grading:** Grades will be partly based on preparation for class and participation in discussions within our learning community. The quality and content of student discussions/questions/answers will demonstrate that you have performed the readings, research/assignments ahead of class time. I will use the following breakdown for grades:

20% Class preparation and participation

40% Quizzes and short writing assignments on Sakai

15% Group presentation

15% Essay

10% Final exam

All written assignments will be judged both on content (detail, relevance) and writing (grammar, style, etc.). Good writing is necessary in all fields.

**Electronic devices:** Please keep laptops, cell phones, or other similar devices away and off during class, except when there is a specific educational reason to use them. This will help you and others focus on discussions occurring in the classroom. Class participation points will be deducted for inappropriate usage of electronic devices.

**Readings and assignments:** Readings related to specific topics will be taken from the scientific and popular literature, and from the internet. Reading lists will be handed out periodically, and will be posted electronically on the course site on Sakai. It is important to read and think about the assigned material before you come to class. This will enable you to participate fully in class discussions. You should expect to spend 2-4 hours per week preparing for the class. If you find aspects of the reading difficult, or think of other related issues, prepare questions and we will address them in class.

I will distribute short quizzes and writing or research assignments based on the assigned readings. Quizzes are closed note and you are not allowed to consult any materials while you take the quiz. Students should bring their answers to hand in, or complete the assignment on the course website on Sakai (as instructed), and be prepared to discuss or present what they have learned in class.

Groups of students will research and present to the class information on an application of biotechnology, and the pros and cons of those applications. Topics may include use of performance-enhancing drugs by elite athletes; forensic genetics, and others.

In April, a 6-7 page essay will be due. Possible topics can include any aspect of biotechnology that you find interesting that has not otherwise been covered in detail in the course.

We will start many classes with a short video clip uncovered and introduced by a student. Videos can debunk a myth about science, explain a biotech issue, introduce a new product/service, etc. Students will send the link to Dr. Dowen before class.

Other assignments during this course will include attending an academic seminar, attending office hours once, and reading primary scientific literature.

**Copyright Policy:** All course materials including the slideshows, your class notes, class assignments, quizzes, and exams are covered by University Copyright Policy, @<http://www.unc.edu/campus/policies/copyright%20policy%2000008319.pdf>. This means it is both against the law and an honor code violation to share any course materials items with anyone not directly affiliated with this particular class. No uploading to non-class sharing sites, including online repositories. It is also an honor code violation to access or consult any course documents that may have been deposited by others. Sharing your notes directly with other individuals in the class is fine.

**Tentative syllabus:** Reading lists and assignments will be handed out separately. Details of the schedule may change later, according to availability of guest speakers and field trips. Presentation topics may also change according to student preferences. If you have ideas for particular topics, please suggest them.

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| **Class** | **Date** | **Topic** |
| 1 | January 10 | Introduction and course information |
| 2 | January 15 | What are genes made of? |
| 3 | January 17 | How are proteins made? |
| 4 | January 22 | Would you have your genome sequenced? |
| 5 | January 24 | Visit an academic lab |
| 6 | January 29 | Human genetics and inherited diseases |
| 7 | January 31 | Group 1 presentation |
| 8 | February 5 | Group 2 presentation |
| 9 | February 7 | Personalized medicine (Guest presentation by Dr. Jonathan Berg, UNC Genetics Department) |
| 10 | February 12 | Group 3 presentation |
| 11 | February 14 | Group 4 presentation |
| 12 | February 19 | Genome engineering with CRISPR |
| 13 | February 21 | Genetically Modified Organisms – plants and animals |
| 14 | February 26 | Group 5 presentation |
| 15 | February 28 | Group 6 presentation |
| 16 | March 5 | Group 7 presentation |
| 17 | March 7 | Cancer |
|  | March 12 | *Spring break, no class* |
|  | March 14 | *Spring break, no class* |
| 18 | March 19 | How the immune system functions. (Guest presentation by Dr. Ageliki Tsagaratou, UNC Department of Genetics) |
| 19 | March 21 | Combating Zika virus |
| 20 | March 26 | Reading primary scientific literature |
| 21 | March 28 | Visit a biotechnology company (Syngenta) |
| 22 | April 2 | Assisted reproduction |
| 23 | April 4 | Stem cells and regenerative medicine |
| 24 | April 9 | How our environment impacts health |
| 25 | April 11 | Intellectual property (Guest presentation by Dr. Kelly Parsons of UNC OCED) |
| 26 | April 16 | Livestock genetics (Guest presentation by Dr. Daniel Pomp, UNC Genetics Department) |
| 27 | April 18 | Poster presentation of a scientific paper |
| 28 | April 23 | Biotechnology in society – Economics, ethics, policy, global |
| 29 | April 25 | Synthetic biology |
|  | May 6 | Final Exam 12-3PM |