Syllabus - BIO 137 001

HEREDITY AND ETHICS - 4 Credit(s)
FIRAK, DEB - SPRING 2006
Days: TTh 10:00AM - 11:20AM  Room: A 211


Course Objectives:

Upon completion of this course, the student will be able to:

COGNITIVE
1. explain the major ethical theories and the ethical method of thinking about moral issues.
2. define the terms: allele, amniocentesis, autosome, chromosome, cloning, DNA, dominant, gene, gene pool, genome, genotype, karyotype, Mendelian trait, multifactorial trait, mutation, pedigree, phenotype, recessive, risk, RNA, sex chromosome, trisomy.
3. describe DNA, how it replicates and how it functions in protein synthesis.
4. describe the various cellular organelles, cell function, the cell cycle, eukaryotic cell division and stem cells.
5. describe the major components of human reproduction, reproductive technology and human embryological development.
6. describe how genetic engineering is used in genetic therapies and agricultural biotechnology.
7. describe the history of eugenetics and how it has impacted today’s bioethical concerns.
8. identify, compare and contrast the various viewpoints on controversial bioethical issues.
9. design an experimental study using the scientific method.

MANIPULATIVE
1. demonstrate the ability to use the microscope to visualize cells and chromosomes.
2. demonstrate the ability to form a pedigree, solve genetic problems using the Punnett square.
3. demonstrate the ability to perform DNA extraction and fingerprinting.
4. draw a simple molecule of DNA and show how it replicates.

AFFECTIVE
1. describe his/her appreciation for the importance of thinking rationally and critically about ethical issues.
2. describe an appreciation for different moral perspectives on genetic engineering, genetic therapies and cloning.

Course Description:

A course for non-science majors that addresses the moral and social implications of biological advances in genetics and biotechnology. This introduction to the science and ethics of genetics, human reproduction and development will include lecture, discussion, and lab.
3. describe an appreciation for the potential economic, ecological and evolutionary concerns related to genetic engineering.

**Course Outline:**

I. Week One:
   A. Introductions/Syllabus &
   B. General Overview: Ethical Thought & History of Eugenics
   C. Laboratory #1: Using the Scientific Method and Comparing Good Science to Bad Science

II. Week Two:
   A. Philosphic Thought and Moral Ethics
   B. Chemistry of Life: Basic Chemistry and organic molecules
   C. Laboratory #2: Using the Microscope to Study Cells
      Preparation of Plant Tissue Cultures

III. Week Three:
   A. Playing God
   B. Cell Structure & Function
   C. Laboratory #3: using the Microscope to study Mitosis & Meiosis & Plant Tissue Cultures
      (Stem Cell Study)

IV. Week Four
   A. Ethical Theories (Deontological/Utilitarian, etc.)
   B. Meiosis/Reproductive Physiology
   C. Laboratory #4: Human Reproduction

V. Week Five
   A. Reproductive Rights & Liberty
   B. QUIZ 1/Contraception
   C. Lab #5: Ethical Issues Related to Reproductive Technologies/ In Vitro Fertilization

VI. Week Six
   A. Ethics of Artificial Reproductive Technologies
   B. Development of Human Embryo/Fetus/Stem Cells
   C. Lab. #6: Study of Embryological Development of Sea Urchins

VII. Week Seven
   A. Status of the Embryo
   B. Mendelian Genetics and Exceptions
   C. Lab. #7: Genetics Problems, Activities, Blood Typing Exercise

VIII. Week Eight
   A. Embryological Stem Cells: Ethical Considerations
   B. Introduction to Central Nervous System and Behavior
   C. Lab. #8: OPEN LAB NOTEBOOK EXAM/ Create a Baby Exercise

IX. Week Nine
   A. Behavioral Genetics (first paper due)
   B. QUIZ #2/DNA Structure & Function

*McHenry County College, Crystal Lake, IL*
C. Lab. #9: Human Genome On-Line Activities/Translation & Transcription

X. Week Ten
   A. Ethics of Forensic Uses of DNA
   B. Gene Mutations/Chromosomal Abnormalities
   C. Lab. #10: DNA Extraction & Digestion

XI. Week Eleven
   A. Genetic Intervention/Therapies
   B. Recombinant DNA
   C. Lab. #11: DNA Fingerprinting/Gel Electrophoresis

XII. Week Twelve
   A. Genetic Justice
   B. QUIZ #3/Agricultural Biotechnology
   C. Lab. #12: Polymerase Chain Reaction (PCR) Analysis of DNA

XIII. Week Thirteen
   A. Wrongful Life
   B. Genetic Risk and Counseling
   C. Lab. #13: Running and Analyzing the PCR Gel

XIV. Week Fourteen
   A. Genetic Testing (second paper due)
   B. Video: Genetically Perfect Babies/Discussion
   C. Lab. #14: Fish Protein Electrophoresis

XV. Week Fifteen
   A. Cloning Ethical Considerations
   B. Wrap up: Final Exam
   C. On-Line Exploration and Role Playing/OPEN LAB NOTEBOOK FINAL
   D. Evaluations

XVI. Week Sixteen
   A. Final Exam Date, if necessary

**Special Needs Statement:**
McHenry County College offers support services for students with special needs. It is the student's responsibility to meet with the Special Needs Coordinator and provide current documentation regarding his/her disability. Please stop in or call the Special Needs Department, room A-257, 815-455-8676, as soon as possible if you would like more information about the accommodations that are available. In addition, it is important for you to discuss those accommodations with me so you are able to fully participate in this course.

**Academic Integrity:**
As an educational community, McHenry County College values the pursuit of academic excellence and integrity. In accordance with this philosophy and Chapter 10, Act 5 of the 1994 Illinois Community College Act, academic dishonesty in any form, including cheating, plagiarism, and all other acts of academic theft, is considered intolerable. Appropriate sanctions, up to and including suspension from the college will be imposed by authorized College personnel.

*McHenry County College, Crystal Lake, IL*
Copyright Policy:
The College will maintain current procedures and guidelines to ensure that all staff and students comply with applicable copyright laws and other intellectual property protection laws. The College will encourage staff and students to engage in the development of intellectual property and facilitate ownership protections with respect to such development of intellectual property.

The College expects that staff and students will act responsibly and ethically in a manner consistent with all copyright laws and College copyright procedures and guidelines. This policy authorizes the College to adopt and maintain such procedures and guidelines necessary to ensure compliance with copyright laws and to facilitate ownership protection with respect to the development of intellectual property.

Student Code of Conduct and the Judicial Process:
Consistent with the McHenry County College mission is an expectation that students will govern themselves in terms of appropriate behavior with emphasis on self-respect and respect for others. It is the practice of the College to respect the properly exercised rights of its students.

The College recognizes a student’s rights within the institution to freedom of speech, inquiry and assembly; to the peaceful pursuit of education; and to the reasonable use of services and facilities of the College.

The College has adopted a Student Code of Conduct and judicial process in order to maintain a learning environment of respect, civility, safety, and integrity for all members of the College community.

Whenever possible, sanctions for violations of the Student Code of Conduct may be educational in nature. However, violations affecting the health and safety of members of the College community are deemed to be the most serious. Therefore, acts of violence, threats or dangerous behavior are most likely to result in a suspension from the college. Violations of the academic dishonesty policy may also result in suspension or expulsion from the institution and/or reduced or failing grade.

Teaching Schedule:
The scheduling of the activities and teaching strategies on this syllabus, but not the objectives or content, may be altered at any time at the discretion of the instructor.
BIOLOGY 137: HEREDITY & ETHICS
SPRING 2006
COURSE POLICIES AND INFORMATION

Lecture: Tuesdays & Thursdays: 10:00am-11:20am…Room A211
Lab: Tuesdays: 11:30am-2:20pm…Room A222

INSTRUCTOR INFORMATION:
Instructor: Deb Firak
Office: B255- B
Office Hours: Mon. & Wed.: 4:00pm-5:00pm
Thurs.: 11:30am-1:30pm
Friday: 11:00am-12:00pm
Phone/Voicemail: 815-455-8567
Email: dfirak@mchenry.edu
Homepage: www.mchenry.edu/faculty/dfirak/index.html
Correspondence can also be left with the faculty secretary in B252: 815-455-8750

TEXTBOOK:

COURSE POLICIES

1. Personal responsibility:
   It is your responsibility to do the work necessary to succeed in this course.
   You should count on 2 hours of work outside class for every hour spent in class.
   We are more than happy to provide whatever assistance you need in order to help you succeed.
   Please contact one of us if you are having difficulty.

2. Attendance:
   Attendance will be taken; please be on time. We take points off for more than 2 unexcused absences.
   We reserve the right to ask you to drop the course if you miss too many classes.

3. Late Work:
   Late assignments will be penalized 5% for each class period it is late.
   No assignments will be accepted after the assignment has been returned and discussed in class.
   No make-up work will be accepted during final exam week.
4. **Neatness:**
   I expect all assignments to be typed, double-spaced and to look neat and clean. I also expect you to use proper grammar, spelling and punctuation.

5. **Lost Papers:**
   It is your responsibility to keep disk or photo copies of all work turned in. Lost papers are not the instructor's responsibility.

6. **Cheating:**
   We have zero tolerance for cheating and plagiarism. Being caught cheating will result in a zero on the assignment, a conference with the instructors and a distinct possibility of failing the course.

7. **Grading Standards:**
   The grading scale is
   - **A** = 90-100 (superior quality; outstanding performance in mastering the subject)
   - **B** = 80-89 (high quality; consistent performance beyond usual requirements of the course)
   - **C** = 70-79 (satisfactory performance demonstrating understanding of the subject sufficient for continued study in philosophy and genetics)
   - **D** = 60-69 (minimally acceptable performance demonstrating some understanding of the basic elements of the course)
   - **F** = 0-59 (does not demonstrate understanding of the basic elements of the course)

8. **Special Needs:**
   We wish to fully accommodate students with special needs in this course. Please inform us of your need for note-takers, tutors and other arrangements that the college offers.

9. **Blackboard Orientation:**
   Students will use the Blackboard Learning System for accessing their gradebook, some reading assignments (via links to specific web sites), and Discussion Board. An orientation packet will be distributed on the first day of class. Computers and internet access are available on campus. Computer access is available in the Academic Computing Labs and in the MCC Library.

   **Library Hours:**
   Monday-Thursday 8:00am-9:30pm
   Friday 8:00am-4:30pm
   Saturday 8:00am-2:00pm
Academic Computing Labs

MCC has two well-equipped computer labs available to both students and community members. Both labs are equipped with a combination of Pentium and Macintosh workstations with a variety of commonly used software including word processing, spreadsheet, data base, programming, desktop publishing, and graphics applications. Internet access is available for all students enrolled in credit courses. Printing is serviced by HP LaserJet printers and DeskJet color printers.

- Students enrolled in credit courses have access to MS Office and the Internet. Other software applications are available based on course requirement.
- Lab fees are included with registration costs for credit students.

**Students may print (HP laser jet and desk jet color printers) materials for NO CHARGE (these costs are covered by your registration fees) in the Academic Computing Labs. Cost for printing in the library is 10 cents per page.

10) The Sage Learning Center:

The Sage Learning Center, a general tutoring and learning facility located in A247 near the Atrium entrance, offers students currently enrolled in credit academic courses assistance in a variety of subject areas. Comprehensive support is provided in math and in writing and English. Assistance is also provided, whenever possible, in many other disciplines. The SLC is staffed by professional and peer tutors who work on a scheduled drop-in and appointment basis with individuals and small groups. Computer-assisted instruction, study groups, assorted handouts, videos, audiotapes, CDs, and DVDs as well as a resource library are also available. The SLC is open from 8 a.m. to 7 p.m. Mondays through Thursdays and from 8 a.m. to 4:30 p.m. on Fridays.

For spring semester 2006, the Sage Learning Center opens to assist students at 8 a.m., Monday, January 23. The center will be open from 8 a.m. to 7 p.m. Monday through Thursday and 8 a.m. to 4:30 p.m. on Fridays. SLC has tutors, twenty-four computers, videos, tapes, CDs, specialized software, a Kurzweil computerized reader, and a variety of texts and printed resources. However, we do not have all the software programs available on the computers in the two MCC computer labs, and SLC computers cannot be used for e-mailing, playing games, or online shopping.

11. Additional Notes:

The instructors have the right to alter or adjust this syllabus as needed. Any exceptions to this syllabus are at the instructors’ discretion.
<table>
<thead>
<tr>
<th>COURSE:</th>
<th>BIO 137: HEREDITY AND ETHICS</th>
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<tbody>
<tr>
<td>CREDIT</td>
<td>4 CREDIT HOURS</td>
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<tr>
<td>CONTACT HOURS</td>
<td>3 LECTURE CONTACT HOURS 3 LABORATORY CONTACT HOURS</td>
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</tbody>
</table>
| COURSE GOALS | Students will be able to:  
1. Understand biological information about genetics, heredity and human reproduction and development.  
2. Think scientifically and ethically about the moral implications of genetic research and technology.  
3. Differentiate between valid and invalid scientific information and ethical viewpoints.  
4. Speak and write analytically and persuasively about the science of ethics and genetics.  
5. Correctly operate laboratory equipment.  
6. Use the scientific method to design experiments. |
| CATALOG DESCRIPTION | A course designed for non-science majors. It addresses the moral and social implications of biological advances in genetics and biotechnology. This introduction to the science and ethics of genetics, human reproduction and development will include lecture, discussion and lab. |
| REQUIRED MATERIALS | Cummings, Michael R. 2005  
*Human Heredity: Principles and Issues* by (Thomson/Brooks/Cole)  
Additional readings as handouts or as reserve library materials.  
| STUDENT EVALUATION | Students will be assessed based on their performance on the following items:  
Lecture Exams (4) – 40%  
Lab Notebook Exams (2) - 20%  
Written Discussion Papers - 20%  
Discussion Board/Class Participation – 10%  
Project/Scrapbook – 10%  
The student's final grade will be determined based upon percentage and will be awarded in accordance with the following scale:  
90%-100% = A  
80%- 89% = B  
70%- 79% = C  
60%- 69% = D  
below 60% = F |
| MEETING TIMES | Lecture: Tuesdays and Thursdays: 10:00am-11:20am.  
Lab: Tuesdays: 11:30am-2:20pm |
<p>| INSTRUCTOR POLICIES | Please see attached. |</p>
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<tr>
<th>GENERAL TOPICAL OUTLINE</th>
<th>WEEK</th>
<th>LECTURE TOPIC</th>
<th>LABORATORY</th>
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<td></td>
<td>1</td>
<td>Introduction/Syllabus Genetics/Inheritance Ethical Frameworks</td>
<td>January 17, 2005 Lab #1: Using the Scientific Method Comparing Good vs. Bad Science</td>
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<td></td>
<td>2</td>
<td>Chemistry of Life</td>
<td>January 24 Lab #2: Use of the Microscope to Study Cells and Media Preparation for Plant Tissue Cultures</td>
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<td>3</td>
<td>Cell Structure &amp; Function/Enzymes</td>
<td>January 31 Lab #3: Mitosis &amp; Meiosis: Using the Microscope to Study the Phases of Mitosis Plant Tissue Cultures (Stem Cell Study)</td>
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<td>4</td>
<td>Ethical Theories Cell Structure &amp; Function, cont.</td>
<td>February 7 Lab #4: Human Reproduction: Male &amp; Female Reproductive Anatomy &amp; Gamentogenesis</td>
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<td>5</td>
<td>Mitosis &amp; Meiosis</td>
<td>February 14 Lab #5: Why Use Aseptic Technique? Growing Microbes/Reproductive Technologies Web-Exercise</td>
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<td>6</td>
<td>Meiosis/Reproduction &amp; Reproductive Technologies</td>
<td>February 21 Lab #6: Embryological Development of Zebrafish</td>
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<td>7</td>
<td>Eugenics Development &amp; Status of Embryo</td>
<td>February 28 Lab #7: Genetics Problems, Activities, Blood Typing Simulation</td>
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<td>8</td>
<td>Mendelian Genetics, Exceptions, Mutations Chromosomes</td>
<td>March 7 OPEN LAB NOTEBOOK MIDTERM EXAM Lab #8: Human Genome Project: Primers, materials, etc.</td>
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<td>9</td>
<td>DNA Structure, Replication &amp; Function</td>
<td>March 14 Lab #9: Molecular and Chromosomal Genetics Bioinformatics: On-Line Activities at National Center for Biotechnology Information (NCBI)</td>
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<td>10</td>
<td>Ethics of Crime Scene Investigations Behavioral Genetics</td>
<td>March 21 Lab #10: DNA Extraction and Digestion</td>
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<td>March 28 NO CLASSES: SPRING BREAK</td>
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<td></td>
<td>12</td>
<td>Recombinant DNA &amp; GMO’s &amp; Ethics</td>
<td>April 4 Lab #11: DNA Fingerprinting: Gel Electrophoresis</td>
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<td>Week</td>
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<td>13</td>
<td>Genetic Technology: The Ethics of Agricultural Biotechnology</td>
<td>Lab #12</td>
<td>April 11</td>
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<td>13</td>
<td>GMO’s/Gene Therapy &amp; Ethics</td>
<td>Lab #13</td>
<td>April 18</td>
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<td>14</td>
<td>Cloning &amp; Ethics</td>
<td>Lab #14</td>
<td>April 25</td>
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<td>15</td>
<td>The Genetics of Disease: Cancer, Immunity &amp; HIV Wrap Up</td>
<td>OPEN LAB NOTEBOOK FINAL EXAM</td>
<td>May 2</td>
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<td>Lab #15</td>
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Lab #15: On-Line Exploration: Human Genome Project, Discussion and Role Playing: Actual Bioethical Issues in the News Today

Revised: 12/21/05
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<td>January 17</td>
<td>Introduction/Syllabus</td>
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<td>Genetics is the Key to Biology</td>
<td>Chap. 1</td>
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<td>January 19</td>
<td>A Perspective on Human Genetics</td>
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<td>Ethical Frameworks/“Bioethics”</td>
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<td>January 24</td>
<td>Cells</td>
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<tr>
<td>January 26</td>
<td>Cells: Structure &amp; Function</td>
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<td>January 31</td>
<td>Cells: Cell Division: Mitosis &amp; Meiosis</td>
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<td>February 2</td>
<td>Cells: Cell Division: Mitosis &amp; Meiosis</td>
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<td>February 7</td>
<td>EXAM 1/Heredity: Mendelian Genetics</td>
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<td>Heredity: Variations on Mendelian Genetics</td>
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<td>Pedigree Analysis</td>
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<td>March 2</td>
<td>Ethics of Genetic Testing</td>
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<td>March 23</td>
<td>Mutations</td>
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<td>March 28</td>
<td>NO CLASSES: SPRING BREAK!</td>
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<td>April 4</td>
<td>Recombinant DNA &amp; Cloning</td>
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<td>April 6</td>
<td>EXAM 4/Biotechnology &amp; Society</td>
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<td>April 11</td>
<td>Ethical Frameworks revisited</td>
<td>Selected reading</td>
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<td>The Human Genome Project/Ethical Concerns</td>
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<td>April 20</td>
<td>Beyond the Human Genome Project</td>
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<td>April 25</td>
<td>Reproductive Technology: Genetic Counseling</td>
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<td>Reproductive Technology: Ethical Concerns</td>
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<td>May 2</td>
<td>Genetics of Behavior/Ethical Concerns</td>
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<tr>
<td>May 4</td>
<td>Putting it All Together</td>
<td>Selected readings</td>
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