

## ALVERNIA COLLEGE

**Honors Class:**  
**God, Science, and Designer Genes**  
**COL 460-N1/THEO 490-N1/ BIO 490-N1/LAS 590-NI**  
**Monday, 5:30 – 8:00 p.m.**  
**Bernardine Hall 214**  
**Spring 2005**

### Instructors:

|  |  |
|--|--|
| Dr. Donna Yarri, Assistant Professor, Theology                                 | Dr. Spencer Stober, Associate Professor,<br>Biology                          |
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| Office Hours: M & W, 11:30-1:00, 4-5:30  | Office Hours: M 1-4, T 2-4, Th 8-9 p.m.                                      |

**This interdisciplinary course can fulfill ONE of the following: Theology elective, Ethics requirement, Graduate program LAS requirement, or General Education Biology Requirement (does not include a lab); and also counts as an Honors class for Honors students.**

### Course Description

Modern genetic science is at the state where we can now control our genetic destinies. This course will address both the science behind this phenomenon, as well as some of the ethical and theological concerns, such as: Are we playing God? What is the relationship between religion and science? Issues such as cloning, stem cell research, gender selection, genetic discrimination, as well as other emerging technologies, will be explored through a variety of teaching methods, including videos, case studies, group activities, readings, and discussions.

### College Objectives

All courses at Alvernia are designed to foster the core Franciscan values of service, humility, peacemaking, contemplation, and collegiality, as set forth by Alvernia's Mission Statement, as well as to promote the General Objectives as outlined in the college catalog.

### Course Objectives:

1. Students will gain an understanding of hereditary mechanisms and current theories.
2. Students will gain a greater appreciation for the value of genetic diversity.
3. Students will gain an understanding of current technologies in the field of genetics.
4. Students will gain an understanding of the process of science.
5. Students will consider bioethical issues throughout the course.
6. Students will explore the interrelationship between religion and science.
7. Students will engage in critical thinking about complex ethical issues.
8. Students will explore interdisciplinary ways of addressing questions of religion and science.
9. Students will gain an appreciation for an ethical and religious approach to scientific questions.

The above objectives will be fulfilled through class lectures, large group discussions, small group discussions, selected readings, case studies, and written assignments

### Course Texts

Lewis, Ricki. *Human Genetics: Concepts and Applications*. 6<sup>th</sup> edition. Boston: McGraw Hill, Higher Education, 2005.

Peters, Ted. *Playing God? Genetic Determinism and Human Freedom*. 2<sup>nd</sup> edition. New York and London: Routledge, 2003.

Supplementary readings

### Course Technology

This course will utilize new technologies in the classroom, including both Web CT and the Smart Board.

#### **DESCRIPTION of WebCT<sup>®</sup> and the Interactive White Board (SmartBoard<sup>®</sup>):**

This course is designed to give students the opportunity for interactive communication within and outside the classroom. The following technologies are available to Alvernia students and will be fully utilized in this classroom: WebCT, Interactive White Board classrooms and access from off campus to the server (electronic files for students on the T-drive).

Lecture and classroom discussion will be conducted using the “**Interactive White Board**” (IWB). The IWB has a touch sensitive computer interface the size of a traditional white board and allows us to make annotations that can be stored in electronic format for review at a later date. This technology enables the instructor to enhance traditional electronic presentations with annotations that can then be saved in portable document format (PDF) and posted on the “T-drive” in a file available to students both on and off campus. The internet is an essential source for information on the human genome and technologies. The internet serves as a primary tool for accessing databases used in modern biological research (e.g., The National Center for Biotechnology Information or NCBI). Navigating these databases requires introduction by an experienced user of genetic information (in this case the professors). IWB will be used to visit reliable websites as students become aware of the plethora of known human genetic traits and our current knowledge of selected diseases (e.g., The National Institute of Health’s site called “Online Mendelian Inheritance in Man” or OMIM). The term “Interactive” applies here because professors and students will together interact with these sources using the IWB.

**WebCT** is a web-based tool for managing interaction among students outside of class. WebCT, in addition to its function as a way to post assignments and grades, will be used to provide an electronic medium for students to post their dialogue journal entries for continued reaction beyond the normal classroom time. The intent of these postings is to seed discussion so that we can reflect collectively on our readings and experiences throughout this course. This electronic dialogue will be managed using the threaded discussion tool on WebCT and will occur throughout the course. The tone of journal postings should be similar to oral dialogue. We will use these journal postings to share our reactions to readings, class discussions and other related sources of information presented for this course. This process will help us to construct meanings, engage in collaborative interactions about perceptions and issues, and make connections between our learning and real world situations.

## Course Grading

Assignments will be weighted as follows:

- Final exam (take home) (25%)
- Research paper (25%)
- Dialogue Journals (25%)
- Class participation (25%)

## Alvernia College Grade Scale

|    |   |     |          |    |   |     |            |
|----|---|-----|----------|----|---|-----|------------|
| A  | = | 4.0 | (94-100) | C  | = | 2.0 | (73-76)    |
| A- | = | 3.7 | (90-93)  | C- | = | 1.7 | (70-72)    |
| B+ | = | 3.3 | (87-89)  | D+ | = | 1.3 | (67-69)    |
| B  | = | 3.0 | (83-86)  | D  | = | 1.0 | (63-66)    |
| B- | = | 2.7 | (80-82)  | D- | = | .7  | (60-62)    |
| C+ | = | 2.3 | (77-79)  | F  | = | 0   | (Below 60) |

Overall, the A range represents excellent work, the B range good work, the C range fair work, the D range poor work, and the F range failing/inadequate work.

## Course Outline

Class meets on Mondays only.

|             |  |
|-------------|--|
| January 24  | Introduction (syllabus, class introductions, survey)   |
| January 31  | Film: "Gattaca" and discussion<br><b>Journal #1 due</b><br>Reading: Short story: "Birthmark"   |
| February 7  | Topic: Introduction to science, and religion and science<br><b>Journal #2 due</b><br>Readings: Lewis, ch. 1, "Overview of Genetics"<br>Barbour, "Ways of Relating Religion and Science"<br>Peters, ch. 1, "Playing God with DNA"                                 |
| February 14 | Topic: Inheritance of genes, and selective abortion<br>Discussion of research paper<br><b>Journal #3 due</b><br>Readings: Lewis, chs. 4 & 5, "Mendelian Inheritance"<br>Asch, "Prenatal Diagnosis and Selective Abortion:<br>A Challenge to Practice and Policy" |
| February 21 | Topic: Sex Selection<br><b>Journal #4 due</b><br>Readings: Lewis, ch. 6, "Matters of Sex"<br>Newsweek article: "Sex Selection"<br>Peters, ch. 6, "The Question of Germline Intervention"   |
| February 28 | Topic: DNA structure and privacy issues  |

- Journal #5 due**  
 Readings: Lewis, chs. 9-11, "DNA Structure"  
 Group Activity: Creating Your Own DNA Report Card
- March 7 Topic: Multifactorial traits, and choosing for disability  
**Journal #6 due**  
 Readings: Lewis, ch. 7, "Multifactorial Traits"  
 Linda Mundy, "World of Their Own"
- March 14 **SPRING BREAK – NO CLASS**
- March 21 Topic: Genes and behavior, and DNA evidence  
**Journal #7 due**  
 Readings: Lewis, ch. 8, "Genetics of Behavior"
- March 28 **Easter break, but evening classes meet**  
 Topic: Cloning  
 DNA Fingerprinting Activity  
**Journal #8 due**  
 Reading: Peters, "Cloning"
- April 4 Topic: Genetic modification of humans and animals  
**Journal #9 due**  
 Readings: Lewis, ch. 19, "Genetically modified organisms"  
 Articles: "A Critical View of the Genetic Engineering of  
 Animals"  
 "The Frankenstein Thing"  
 Video: Animals as Organ Donors
- April 11 Topic: Gene therapy and genetic discrimination  
**Journal #10 due**  
**Draft due: Research paper**  
 Readings: Lewis, ch. 20, "Gene Therapy, Genetic Counseling"  
 Geller, "Current Developments in Genetic Discrimination"
- April 18 Topic: Reproductive technologies, stem cell research  
**Journal #11 due**  
 Readings: Lewis, ch. 21, "Reproductive technologies"  
 Peters, ch. 8, "Stem Cell Controversy"  
 Video: Law and Order episode (frozen embryos)
- April 25 Topic: Gene mutation and chromosomes, evolution  
**Journal #12 due**  
 Readings: Lewis, chs. 12 & 13, "Gene mutation and chromosomes"  
 Peters, ch. 9, "A Theory of Freedom"  
 Sandel: "Case Against Perfection"
- May 2 Conclusion, final assignments, presentations, handout of final exam

## Research paper due

### Due Date of Final Exam: Monday, May 9

#### Final Exam (25% of grade; due during final exam week, Monday, May 9)

This will be a take-home exam, which you will receive on the last day of class (May 2). It will be necessary for you to be able to synthesize material in order to answer essay questions. In order to best prepare for this exam, throughout the semester do all of the readings carefully, do the journal assignments thoughtfully, be active in class discussion, and be present in class.

#### Class Participation/Attendance Policy (25% of grade)

- You are expected to attend class regularly, do class readings in preparation for class, and turn in all written assignments on time. You may also be expected to engage in on-line discussion.
- Tardiness and excessive absences will result in a lowered grade or failure for the course.
- Missing or cutting part of a class will be counted as an absence (this includes lateness).
- There is a direct correlation between class attendance and grades on other assignments; thus, those who miss a lot of classes tend to do poorly on assignments as well.
- Excuses for absences will not be accepted **except** in the case of an extreme emergency (for which you need to contact us) that would prevent you from attending class for an extended period of time (such as hospitalization). If an emergency arises, contact us immediately so that we can discuss your situation.
- **Student athletes: all missed classes for athletic events must be documented in writing and given to us in advance.** Student athletes especially should plan to attend every class when a game is not scheduled, and must also provide documentation for any other missed classes.
- If you are absent, you should get the notes from another student in the class, as well as copies of any handouts that may have been distributed. You are also responsible for announcements of any kind which are made.
- Make-ups or extensions will require our prior permission (only for *serious* problems).
- **Recommendation:** Make every effort to attend every class
- Attendance and class participation will be incorporated together and graded as follows:
  - A     Must not miss more than 1 class AND actively voluntarily participate in virtually every class AND exhibit evidence of class preparation and knowledge of the readings
  - B     Must not miss more than 2 classes AND actively voluntarily participate in virtually every class AND exhibit evidence of class preparation and knowledge of the readings
  - OR
  - Miss not more than 1 class AND be prepared to discuss when called upon if there is not voluntary participation
  - C     The same as B, but includes not being prepared for class discussion most sessions
  - D     Missing 3 or more classes, regardless of class participation

F Excessive absences and complete lack of preparation for virtually every class

### Readings/Dialogue Journals (25% of grade)

**Bring appropriate texts/readings and journals to class each day.**

A **DIALOGUE JOURNAL** is a written conversation between two individuals—perhaps two students or a student and a teacher. A dialogue journal uses writing in conversational form to enrich thinking and learning. The “talking” is a shared responsibility—topics are generated by all participants. The dialogue occurs over time and the tone of the journal is similar to oral dialogue. We will use our journal entries to share our reactions to our readings of the text and our reflections about class discussions. During this process, we will construct meanings, engage in collaborative interactions about perceptions and issues, and make connections between our learning and experiences.

#### **DIALOGUE JOURNAL INSTRUCTIONS**

- You are required to submit a journal each week, prior to the class meeting at which it will be discussed.
- Journals will be submitted on WebCT, but you must bring a hard copy to class to use in class.
- Include on journal your name, the date submitted, and the journal entry #.
- List the TOPIC of your entry and one of the following items at the beginning of your paper:
  - o A quote from one of our course texts or articles (the one assigned for that particular day)
  - o A quote from a web site relevant to the class topic for that day
  - o An idea from class discussions
- Then write your RESPONSE to this item. This response should be several well-developed paragraphs.
- Avoid writing a simple summary, and instead use your critical and creative thinking abilities to do the following:
  - o Challenge and question ideas presented by the author(s), your fellow students, and the professors—your own thoughts and perceptions.
  - o Present additional facts, evidence, or arguments to support ideas in the text or to present an opposing point of view. Find flaws in arguments.
  - o Explain why you agree or disagree with the ideas.
  - o Share your opinions and interpretations.
  - o Make connections by relating the ideas to your educational, professional, or personal experiences.
- During class, some individuals will read selections from their journal to “seed” the discussion during each class.
- You will receive feedback on the first journal to let you know if you are on track; after that, journals will be graded as a whole and returned at the end of the semester.
- You will receive a point for every journal turned in on time, which totals 12 points.
- **However, turning all journals in does not guarantee a grade of 100. We will assess the quality of each student’s journals at the end and give a grade based on number and quality of journals.**

**IMPORTANT:** Although journals can reflect one or more ideas in the readings, you are still expected to do all of the reading assigned for each class session in advance of class, not simply to just pick out a sentence to write about. We would recommend that you first do each of the readings for the individual class session, and as you do them, jot down a few notes just for yourself so that you will be able to participate in class on the readings. Then write a journal about something in the readings.

### **Research Paper/Action Plan (25% of grade)**

You will need to turn in a draft (due April 11) for which you will receive feedback. The revised paper is due on May 2. The assignment is described below.

The **Action Plan for a real-life social/ethical issue** is to be based on one of the social and ethical issue sections in the text. This project requires library research and creativity, and is designed to cause students to consider solutions to real-life questions. Topics are to be selected and approved by the professors. Papers should be at least 10 pages of text (12 pt. type, double-spaced, in APA, MLA or another style format approved by the professors) with at least four primary sources and an average of two citations per page (web sources must be fully documented and should not exceed references cited). The paper should be of the highest quality and originality. Students should be prepared to discuss their project in class as it progresses throughout the semester.

#### **The Action Plan should have three sections:**

1. **The Introduction:** Identify the issue (cite the text) and provide a technical overview of the issue under consideration (this will require a review of the literature). This section should include scientific, legal, ethical and social considerations. Justify your answers with supporting research and a logical analysis.
2. **Action Plan.** Present a plan to mitigate the issue(s). Your plan should be “step-by-step” with specific action steps and supported by information presented in part one. The action plan may take the form of *action research* to seek information to consider alternatives.
3. **Anticipated Outcomes:** This section should begin with a summary and conclude with future implications. What are the anticipated outcomes of your plan? Are there additional implications that should be considered?

#### **Final Paper Assessment Form**

The paper will be graded on the basis of the following criteria:

- \_\_\_\_\_ Part 1: The Introduction
  - \_\_\_\_\_ Issue clearly stated
  - \_\_\_\_\_ Context and technical overview
  - \_\_\_\_\_ Scientific, legal, ethical and social considerations
  - \_\_\_\_\_ Logical analysis
- \_\_\_\_\_ Part 2: Action Plan
  - \_\_\_\_\_ Research/literature based
  - \_\_\_\_\_ Specific action steps
- \_\_\_\_\_ Part 3: Anticipated Outcomes
  - \_\_\_\_\_ Anticipated outcomes considered
  - \_\_\_\_\_ Future implications considered
  - \_\_\_\_\_ Logical analysis (Do the anticipated outcomes logically follow from parts 1 & 2?)
- \_\_\_\_\_ References listed and appropriately cited throughout
- \_\_\_\_\_ Overall organization (format, grammar, & etc.)

**ADDITIONAL SOURCES (optional):**

- Cibelli, J.B., Lanza, R.P. and West, M.D. (2002). "The First Human Cloned Embryo," *Scientific American* 286(1) 44-51.
- Davies, J. and Resnikoff. (1992). *Milestones in Biotechnology: Classic Papers in Genetic Engineering*. Boston: Butterworth-Heinemann.
- Cavalli-Sforza, L.L., P. Menozzi, and A. Piaazza (1994). *History and Geography of Human Genes*. Princeton N.J.: Princeton University Press.
- Chrispeels, M.J. and Savdava, D.E. (1994). *Plants, Genes, and Agriculture*. Boston: Jones and Bartlett.
- Cronin, H. (1991). *Ant and the Peacock, Altruism and Sexual Selection from Darwin to Today*. Cambridge U.K.: Cambridge University Press
- Dawkins, Richard (1995). *River Out of Eden: a Darwinian View of Life*. New York, NY: Basic Books.
- Fox, M.W. (1992). *Superpigs and Wondercorn. The Brave New World of Biotechnology and Where It All May Lead*. New York: Lyons and Burford.
- Darwin (1859). *The Origin of Species*
- Hamer, Dean and Copeland, Peter. (1998). *Living With Our Genes (The groundbreaking book about the science of personality, behavior, and genetic destiny)*, New York: Anchor Books a Division of Random House (ISBN0-385-48584-0)
- Hamer, Dean and Copeland, Peter. (1994). *The Science of Desire: The Search for the Gay Gene and the Biology of Behavior*. New York: Simon and Schuster (ISBN 0-684-80446-8).
- Jegalian, K. and Lahn, B.T. (2001). "Why the Y Is So Weird," *Scientific American* 284(2) 56-61.
- Olshansky, S.J. Carnes, B.A. and Butler, R.N. (2001). "If Humans Were Built to Last," *Scientific American* 284(3), 50-55.
- Ridley, Matt (2003). *Nature via Nurture*. New York: Harper Collins (ISBN 0-06-000678-1).
- Ridley, Matt (2003). *The Agile Gene: How Nature Turns on Nurture*. New York: Harper Collins (ISBN 0-06-000679-X).
- Wilson, E.O. (1992). *Diversity of Life*, New York: W.W. Norton.

**WEB sources (others sources to be provided as needed):**

HUGO Gene Nomenclature Committee: [www.gene.ucl.ac.uk/nomenclature](http://www.gene.ucl.ac.uk/nomenclature)

Human Chromosome Launchpad: [www.ornl.gov/TechResources/Human\\_Genome/launchpad](http://www.ornl.gov/TechResources/Human_Genome/launchpad)

National Center for Biotechnology Information: [www.ncbi.nlm.nih.gov/Omim](http://www.ncbi.nlm.nih.gov/Omim)

### **General Considerations**

- To do well in this class, you should spend a sufficient amount of time on assignments. This is both an honors-level and 400-level course, so the work will be more than for many other classes.
- Feel free at any time to raise your hand and offer comments, reflections or questions on the material being covered. No question is a stupid question! If you do not understand any part of a reading assignment, or if you are not following any part of a lecture, it is extremely important that you ask a question immediately.
- Take good notes. These will serve as the key source for preparing for the final exam. It would be a good idea to review the notes from the previous class before coming to class, as well as to review your notes on the readings for that night so that things will flow more easily and so you will be able to see the connections with what we have already covered.
- If you are having difficulties of any sort that interfere with your keeping up in class, please let us know before the situation gets out of hand. It is much easier to work out difficulties early on than it is to deal with weeks of accumulated missed assignments, classes, etc.
- If you have any concerns or questions about the course, always feel free to speak to us during our office hours. No matter, however seemingly small, is trivial, if it has become a matter of anxiety.

### **Classroom Protocol**

Disruption of the classroom learning environment will not be tolerated. The following behavior is expected:

- Respect for the opinions of others
  - not talking while other students are talking
  - not laughing at other students' comments
  - not talking while professors are talking
- Alertness in class
  - no napping in class (if that tired, don't come to class, or at least try to act alert)
  - no reading of other materials or doing homework
- Staying for entire class
  - no leaving class early without permission
- No general disruption of class (includes but not limited to passing notes, leaving and returning in the middle of class)
- Participation in group work

### **Alvernia College Academic Honesty Policy**

Cheating will not be tolerated in this class. The penalty for cheating will be an "F" on the assignment, and a second incident will result in an "F" for the course.

All students are expected to adhere to the college's Academic Honesty policy, as outlined in the *Student Handbook*. It is your responsibility to read and understand the policy; failure to do so does not excuse you from adhering to the policy. In keeping with the mission statement of Alvernia College regarding moral integrity and a values system, violation of academic honesty ("cheating") is considered a serious offense. The following includes examples of violation of academic honesty:

- 1. Plagiarism:** failure to cite a source of an idea or direct quotations from another. Includes:
  - a. Copying, paraphrasing, or summarizing from any published or unpublished source without citing the reference;
  - b. Copying a paper or parts of a paper from another, or submitting as your own work any work that is not your own;
  - c. Submitting as one's own parts or the entirety of another's computer program, works of art, or musical composition;
  - d. Using the exact words of another without quotation marks enclosing those words.
  
- 2. Cheating:** Includes:
  - a. Overt copying of another student's assignment or test answers;
  - b. Using crib sheets of any form during an examination;
  - c. Getting someone else to take a test for you;
  - d. Discussing questions and answers with another student during an examination;
  - e. Stealing test notes, or actual tests, from a student or a faculty member;
  - f. Altering an answer sheet and reporting to the instructor that a computer error has been made.
  
- 3. Fabrication:** Submitting or falsifying information or data on any academic assignment. Includes but is not limited to changing the title paper by altering either the student's name or title of the paper.
  
- 4. Multiple Submission:** Handing in the same assignment to fulfill an academic requirement for more than one course without prior permission of the instructor.
  
- 5. Misrepresentation of Academic Records:** Tampering with information on records such as transcripts or other academic forms (add/drop, registration) or forging a faculty or staff member's signature.

### **Accommodations for Learning Disabilities**

The *American with Disabilities Act* (ADA) is understood and carried out in this class. Therefore, anyone covered by the ADA who has specific needs will receive reasonable accommodations. Before the third week of class, students are required to inform Jennifer Reimert (Office of the Registrar) if accommodations are required. Following a review of your IEP and/or ADA assessment, Ms. Reimert will create accommodation letters for you to deliver to your instructors.

### **Schedule Change, Canceled Classes, and Snow Policy**

It is possible that changes can be made in course lectures and assignments. You will be informed about any changes as soon as possible and well in advance.

In case of missed classes (due to snow or other factors), keep to the schedule of the syllabus, and we will make adjustments to the schedule if necessary. If assignments are due or a test is scheduled on a day that class is canceled, they will be required at the next class session.

To find out if Alvernia has closed due to weather, consult the last sheet of this syllabus for contact information. If weather is bad but school is open, and you want to find out if our class in particular will be held, call our office for a pre-recorded message by 4:00 p.m that afternoon. If there is no special message saying that class will not be held, then you should assume that we will be meeting.

You are required to wait 20 minutes for all professors for their classes. If the professor does not show up within 20 minutes, you are permitted to leave.