

UC 12290 135

CBM003 ADD/CHANGE FORM

Undergraduate Council
 New Course Course Change
 Core Category: Life/Phys Sci Effective Fall 2013-2014

or

Graduate/Professional Studies Council
 New Course Course Change
 Effective Fall 2013

1. Department: BIOL/BCHS College: NSM

APPROVED SEP - 4 2013

2. Faculty Contact Person: D. Wells Telephone: 3-2671 Email: dwells@uh.edu

3. Course Information on New/Revised course:

• Instructional Area / Course Number / Long Course Title:

BIOL / 1309 / Human Genetics and Society

• Instructional Area / Course Number / Short Course Title (30 characters max.)

BIOL / 1309 / HUMAN GENETICS AND SOCIETY

• SCH: 3 Level: FR CIP Code: _____ Lect Hrs: 3 Lab Hrs: 0

26.0101.00.02

4. Justification for adding/changing course: To meet core curriculum requirements

5. Was the proposed/revised course previously offered as a special topics course? Yes No

If Yes, please complete:

• Instructional Area / Course Number / Long Course Title:

____ / ____ / ____

• Course ID: _____ Effective Date (currently active row): _____

6. Authorized Degree Program(s): _____

• Does this course affect major/minor requirements in the College/Department? Yes No

• Does this course affect major/minor requirements in other Colleges/Departments? Yes No

• Can the course be repeated for credit? Yes No (if yes, include in course description)

7. Grade Option: Letter Instruction Type: Lect. (Note: Lect/Lab info. must match item 3, above.)

8. If this form involves a change to an existing course, please obtain the following information from the course inventory: Instructional Area / Course Number / Long Course Title

____ / ____ / ____

• Course ID: _____ Effective Date (currently active row): _____

9. Proposed Catalog Description: (If there are no prerequisites, type in "none".)

Cr. 3. (3-0). Prerequisite: MATH 1310 or 1311 or equivalent. Introduction to modern principles of human genetics and the impact of their application on society. Includes fetal development and prenatal

10. screening, mutations, cloning, human origins, gene therapy, and biotechnology. May not apply to course _____ or gpa requirements for a major or minor in natural sciences and mathematics.
 Form/Type Name: _____

RECEIVED APR - 4 2013

REQUEST FOR COURSES IN THE CORE CURRICULUM

Originating Department or College: Biology and Biochemistry

Person Making Request: Dan Wells

Telephone: x32671

Email: dwells@uh.edu

Dean's Signature: _____

Date: [Click here to enter text.](#)

Course Number and Title: Biol 1309 Human Genetics and Society

Please attach in separate documents:

Completed CBM003 Add/Change Form with Catalog Description

Syllabus

List the student learning outcomes for the course (Statements of what students will know and be able to do as a result of taking this course. See appended hints for constructing these statements):

1. Students will be able to understand and evaluate the impact that human genetics currently has on our society and how that impact will continue to grow. 2. Students will understand the scientific process (including the building and testing of hypotheses). 3. Students will develop communication and teamwork skills through classroom discussions, open ended case studies and a creative term project

Component Area for which the course is being proposed (check one):

***Note:** If you check the Component Area Option, you would need to also check a Foundational Component Area.

Communication

American History

Mathematics

Government/Political

Science

Language, Philosophy, & Culture

Social & Behavioral Science

Creative Arts

Component Area Option

Life & Physical Sciences

Competency areas addressed by the course (refer to appended chart for competencies that are required and optional in each component area):

Critical Thinking

Teamwork

Communication Skills

Social Responsibility

Empirical & Quantitative Skills

Personal Responsibility

Because we will be assessing student learning outcomes across multiple core courses, assessments assigned in your course must include assessments of the core competencies. For each competency checked above, indicated the specific course assignment(s) which, when completed by students, will provide evidence of the competency. Provide detailed information, such as copies of the paper or project assignment, copies of individual test items, etc. A single assignment may be used to provide data for multiple competencies.

Critical Thinking:

Classroom discussion and written homework assignments of case studies that require critical thinking. (Specific example of case studies provided) Group projects that require students to develop a creative project that is targeted to a specific population and demonstrates how it will be useful to that population. (copy of group project requirements attached; see syllabus).

Communication Skills:

Classroom discussion and written homework assignments of case studies that require critical thinking. (Specific example of case studies provided) Group projects that require students to develop a creative project that is targeted to a specific population and demonstrates how it will be useful to that population. (copy of group project requirements attached).

Empirical & Quantitative Skills:

Students will be required to be able to master a number of quantitative skills, such as: 1. pedigree analysis and prediction of inherent risk to a family member to have a disease phenotype or be a carrier of a disease phenotype; 2. be able to utilize Hardy Weinberg equations to make predictions about disease populations; 3. be able to calculate and understand the implications of Body Mass Indices. (specific examples attached, these will be assessed through exams.)

Teamwork:

Student will work in teams of up to 5 students to develop projects that focus on some aspect of Human Genetics; target a specific population; and is useful to that population. (copy of group project requirements attached; see syllabus).

Social Responsibility:

Click here to enter text.

Personal Responsibility:

Click here to enter text.

Will the syllabus vary across multiple section of the course? Yes No

If yes, list the assignments that will be constant across sections:

[Click here to enter text.](#)

Inclusion in the core is contingent upon the course being offered and taught at least once every other academic year. Courses will be reviewed for renewal every 5 years.

The department understands that instructors will be expected to provide student work and to participate in university-wide assessments of student work. This could include, but may not be limited to, designing instruments such as rubrics, and scoring work by students in this or other courses. In addition, instructors of core courses may be asked to include brief assessment activities in their course.

Dept. Signature: _____

The following courses have been reviewed and approved by the NSM Curriculum Committee to meet the new core requirements. Given the length of the individual submissions I have elected to submit these requests by electronic means only.

Natural Sciences: Core Courses

~~BIOL 1309 - Human Genetics and Society~~

BIOL 1310 - General Biology

BIOL 1320 - General Biology

BIOL 1361 - Introduction to Biological Science I

BIOL 1362 - Introduction to Biological Science II

CHEM 1301 - Foundations of Chemistry

CHEM 1331 - Fundamentals of Chemistry I

CHEM 1332 - Fundamentals of Chemistry II

GEOL 1302 - Introduction to Global Climate Change

GEOL 1330 - Physical Geology

GEOL 1340 - Introduction to Earth Systems

GEOL 1350 - Introduction to Meteorology

GEOL 1360 - Introduction to Oceanography

GEOL 1376 - Historical Geology

PHYS 1301 - Introductory General Physics I

PHYS 1302 - Introductory General Physics II

PHYS 1321 - University Physics I

PHYS 1322 - University Physics II

Mathematics: Core Courses

MATH 1310 - College Algebra

MATH 1311 - Elementary Mathematical Modeling

Math/Reasoning: Core Courses

COSC 1306 - Computer Science and Programming

MATH 1330 - Precalculus

MATH 1431 - Calculus I

MATH 1432 - Calculus II

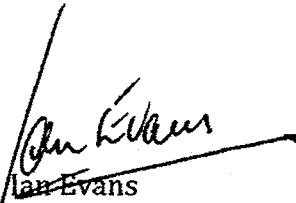
MATH 2311 - Introduction to Probability and Statistics

Writing in the Disciplines: Core Courses

BCHS Biochemistry Lab II

BIOL 3311 - Genetics Lab

PHYS 3313 - Advanced Lab I



Ian Evans

Associate Dean

4/4/13

BIOL1309: HUMAN GENETICS AND SOCIETY

Lecture Time: TTh 4:00-5:30

Classroom: SR 117 (Science and Research Building I, Room 117)

Instructors: Dr. Dan E. Wells and Dr. Dan Graur

Office: 370 SR2 (DW), 352 SR2 (DG)

Email: dwells@uh.edu, dgraure@uh.edu

Office Hours: By email appointment.

Textbook:

Human Genetics: Concepts and Applications by Ricki Lewis, 10th Edition (older editions may be used but some information will be outdated).

BIOL1309: Human Genetics and Society is a non-majors course, designed to fulfill the core science requirement. It will not count as a biology-biochemistry elective for either majors or minors in Biology or Biochemistry. If you are a Biology or Biochemistry major, you should not take this course.

Course Goals and Emphasis:

The study of genetics is fundamental to most areas of modern biology. The primary goal of the course is to gain and appreciation of the fundamentals of this unifying field and to do this in a way that inspires a continuous drive for learning. This course is specifically designed to enable the student to “appreciate, understand, and evaluate” the impact that human genetics currently has on our society and how that impact will continue to grow. In addition, students will gain an appreciation for the scientific process (including building and testing theories) through discussion and evaluation of a variety of experimental processes by which human genetic data is collected and evaluated. It will provide students with the background they need to explore more advanced topics and to be able to function with a degree of "genetic literacy" needed to make informed choices in our society. Current events, as well as, ethical, legal, and moral considerations to the application of human genetics will be integrated throughout the lectures to address the question of why it is important to understand human genetics.

Student Learning Outcomes:

- Students will be able to understand and evaluate the impact that human genetics currently has on our society and how that impact will continue to grow.
- Students will understand the scientific process (including the building and testing of hypotheses).
- Students will develop communication and teamwork skills through classroom discussions, open ended case studies and a creative term project

General Course Information and Policies:

- Attendance in class is strongly encouraged, past experience indicates a strong correlation between attendance, comprehension of course material, and good grades.
- The textbook for the class is not cheap and is not strictly required (no specific assignments from the text will be given). All exam material will come from the lectures, however the text and figures from the book will be referred to regularly. Unless you have a good background in Biology, we recommend that you obtain access to the textbook.

Blackboard Vista

- The Blackboard Vista website will be used in this course. If you have not used Blackboard Vista for any of your other courses, you can go to <http://www.uh.edu/blackboard/>. If you have problems, there is a Student Help link at the top of the page. Only students that are officially enrolled in the course may access the BIOL 1309 course page.
- Lecture notes, learning objective, sample exams, cases studies, discussion boards and other course information will be posted on Blackboard Vista but will otherwise not be distributed, so it is important to get familiar with this site.

Term Project

The term project is designed to develop creativity, original thought, and an awareness of the needs of the broad community that relies on knowledge of Human Genetics. The term projects can be done in groups of up to 5 students. Groups will be self-selected, and some class time will be allocated to group meetings.

Project Expectations:

- **Originality:** This is meant to be an original and creative project. This originality and creativity can come from a basic idea or concept, from the presentation, or from both.
- **Presentation:** The projects is expected to be neatly and clearly presented. It should be as close to professional quality as could be reasonably expected.
- **Usefulness:** The project must be useful to a clearly defined segment of the population (university students, the general community, family members affected by a genetic disease, elementary school students, etc.) The target group and how it will be useful to that group should be part of the final report.
- **Effort:** A significant amount of effort is expected. No consideration will be given to small groups, if you choose to work alone, be prepared to work harder.

Project outline:

On November 15, 2012, a written outline of each project will be submitted to the instructor. This outline is expected to be well thought out, and will be assigned a score of 0-20 points. Late outlines will be penalized at a rate of one point per day. If the final project significant deviates from the outlined plan (including a change in group members), up to 5 point will be subtracted from the final score.

The outline should include the following information:

- A project title (each project must have a title).
- A statement as to the type of project, general concept and main components of the project (this should be in paragraph form and should provide enough detail so that the instructors understand the nature and scope of the project).
- A list of expected external resources that will be used. (We would like to ascertain that you have conducted a serious preliminary study to ensure feasibility.)
- A list of the each group member and a statement as to the contribution each will make to the project.
- A statement as to your target audience (be specific).
- A statement as to the potential usefulness of the project to the target audience.

Project presentation

All projects will be due on December 13, 2012. A maximum of 20 points will be awarded in each of the following categories: Originality, Presentation, Usefulness, and Effort. All members of the group will receive the same score. The projects are nonreturnable; keep a duplicate copy. In addition to the project itself, you will need to turn in the following information:

- The project title.
- A list of all group members.
- A list of external resources used for the project.
- A statement as to how the project addresses the criteria of Originality, Usefulness, and Effort.

Class Discussions and Case Studies

Four case studies will be assigned throughout the semester (1 prior to each exam) and will be counted as part of your exam grade. We will also have weekly classroom discussion on the Case studies as well as other topics of interest.

Course Outline and Dates

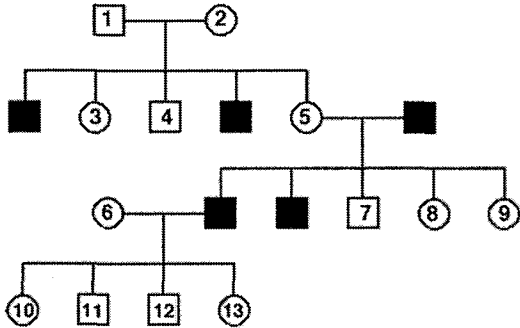
Shown on next page. Exact dates and assignments may vary slightly depending on circumstances.

Course Outline

Date	Topic	Assignment	Instructor
August 28	1. Introduction to Human Genetics and Societal Impacts	Chapter 1	DEW
August 30	2. Cells and Development I	Chapters 2+3	DEW
September 4	3. Cells and Development II	Chapters 2+3	DEW
September 6	4. Transmission Genetics I	Chapters 4+5	DG
September 11	5. Transmission Genetics II	Chapters 4+5	DG
September 13	6. Sex and Sex Determination	Chapter 6	DG
September 18	<i>Exam 1</i>	Chapters 1-6	
September 20	7. Multifactorial Genetics	Chapter 7	DG
September 25	8. DNA, Genes and Proteins I	Chapters 9-11	DEW
September 27	<i>Work on Projects</i> (+ optional consultation)		
October 2	9. DNA, Genes, and Proteins II	Chapters 9-11	DEW
October 4	10. Mutation	Chapter 12	DEW
October 9	11. Cytogenetics	Chapter 13	DEW
October 11	<i>Exam 2</i>	Chapters 7, 9-12	
October 16	12. Population Genetics I	Chapter 14	DG
October 18	13. Population Genetics II	Chapter 15	DG
October 23	14. Human Ancestry and Evolution	Chapter 16	DG
October 25	<i>Work on Projects</i> (+ optional consultation)		
October 30	15. Genetics of Behavior	Chapter 8	DG
November 1	16. Genetics of Immunity	Chapter 17	DEW
November 6	<i>Exam 3</i>	Chapters 8, 13-16	
November 8	17. Genetics and Cancer	Chapter 18	DEW
November 13	18. Genetic Technologies	Chapter 19	DG
November 15	19. Genetic Testing and Treatment	Chapter 20	DG
November 20	20. Reproductive Technologies	Chapter 21	DG
November 22	<i>Thanksgiving Holiday</i>		
November 27	21. Genomics I	Chapter 22 + handouts	DG
November 29	22. Genomics II	Chapter 22 + handouts	DG
December 4	<i>Work on Projects</i>		
December 6	<i>Exam 4</i>	Chapters 17-22	
December 13 until 11:00 AM	<i>Submission of Final Projects</i>		

Sample exam questions

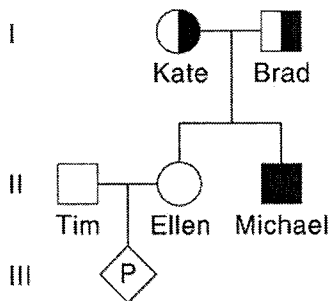
1. In the following pedigree the squares in black denote males affected by an autosomal recessive disease.



Which individuals in the pedigree must be carriers?

2. Genetic predictions.

- Ellen's brother, Michael, has sickle-cell disease (autosomal recessive), but Ellen does not.
- The family of Ellen's husband, Tim, shows no evidence of sickle cell disease.
- Assuming Tim is not a carrier, what is the overall chance that Ellen child will be a carrier of sickle cell disease?



Ellen's brother, Michael, has sickle cell disease.

3. PKU (phenylketourea) occurs on 1/10,000 US Caucasians? If two US Caucasians have a child, what is the risk of PKU?

Case study example

Beryllium Screening and Genetic Privacy

Beryllium is used in nuclear power plants, electronics, and in the manufacturing of fluorescent powders.

- Chronic beryllium disease (CBD) is caused by a severe reaction to beryllium exposure and can be fatal.
- Immune response to dust or vapor causes damage to lungs, shortness of breath, fatigue, loss of appetite, weight loss.
- Fever and night sweats can also indicate CBD.
- Prednisone can usually control most symptoms.
- Genetic tests are available and are 85% accurate in predicting susceptibility to CBD.
- The DOE and some private companies have required the tests for all employees and prohibited anyone who tests positive from working near beryllium.

On the surface it seems like a good idea to protect people against this potentially fatal disease.

But it is still controversial.....

- Everyone varies to some degree in their response.
- The screening isn't perfect
- Many workers have complained, saying they want to make their own choices, and worry that have a positive test will raise insurance rates.

Is this an "invasion of genetic privacy" to require this test??

Take a stand (pro or con) and defend your position.

Case study example

Blaming our genes

It has become fashionable to blame genes for our shortcomings. The aggressive gene, the infidelity gene, the addiction gene, the thrill seeking gene, the mean gene, etc. A talk-show host suggested that people who had inherited the "mean gene" be sterilized so they couldn't pass on the tendency. Even when a behavior is associated with a particular DNA polymorphism or even linked to a specific mutation, environmental influences remain important.

Consider a 1993 study of a Dutch family that had "a syndrome of borderline mental retardation and abnormal behavior."

- Family members had committed arson, attempted rape, and shown exhibitionism.
- Researchers found a mutation in a gene that made biological sense.
- Alteration of a single DNA base in the X-linked gene encoding an enzyme called monoamine oxidase A (MAOA) rendered the enzyme nonfunctional.
- This enzyme normally catalyzes reactions that metabolize the neurotransmitters dopamine, serotonin, and norepinephrine, and it is therefore important in conducting nerve messages.
- Studies since 1993 have confirmed that some combinations of alleles of the MAOA gene correlate with highly aggressive behavior, and others with calmer temperaments

One attorney tried to use the "MAOA deficiency defense" to free a client from a scheduled execution for committing murder.

What do you think???

List three reasons why MAOA deficiency defense might be valid and three reasons why it is not valid. What other "genetic defenses" could you imagine?

When is Cloning an Option?

Newspaper headlines screamed it, everyone was talking about it - A SHEEP WAS CLONED! Scientists created an exact duplicate of a sheep from a body cell. For some time no one could duplicate the work done in the Scottish lab. Then a mouse was cloned, and now a number of mice clones have been produced.

In the sheep and mouse cloning, a body cell was removed and its nucleus placed into another animal's egg cell. Then, an electrical current was sent through the cell, and it started dividing.

A physicist in Chicago has announced that he is setting up a laboratory to do human cloning. If laws are passed against it, he says, he will move his lab to another country.

Anthony Luning was more than curious about cloning. Starting with one apartment building, he now owned enough land to make him the richest man in Charlotte. Being rich, however, doesn't keep tragedy from happening to you. One day his five-year-old daughter, Lucy, was crossing the street and was hit by a drunk driver. By the time the ambulance came, she had suffered serious brain damage. In the emergency room, doctors put her on a respirator, and her heart was beating normally. Mr. Luning was told, however, that she probably would never regain consciousness. He was devastated.

In Charlotte, a group of scientists was working on cloning a cow from the body cell of a cow that was a high milk producer. They used Mr. Luning's property for their herd, and he had been following their progress. As a businessman, he saw the potential for the process. Now, as a parent, he had another idea.

Dr. Irene Smith was the head scientist on the project. Mr. Luning called her several weeks after the accident. He told her he was willing to spend every cent he had to bring his daughter back. He wanted her to clone his daughter from one of her body cells. If the doctor in Chicago could do it, so could she.

1. What should Dr. Smith do? Give three reasons why Dr. Smith should not clone Lucy, and three reasons why she should.
2. If Mr. Luning offers her not only money, but future funding for her research, should this make a difference in Dr. Smith's decision?
3. Should scientists do everything that they are technologically capable of doing?
4. Will there be a market for human cloning? Why or why not?