I. Instructor:
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This course would be offered under the Center for Applied Genetics and Technology through the Department of Molecular and Cell Biology.

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III. Proposal Title:
Honors GenEd Core: *The Genetics Revolution in the Post-Modern World*
INTD: *Genetic legacies: a Connecticut slave's story*

IV. Course Goals and relationship to central theme:

Honors GenEd Core: *The Genetics Revolution in the Post-Modern World*

Paradigm shifts in the sciences often have immediate repercussions in society and culture. Relativity and quantum mechanics ushered in the nuclear age and irrevocably altered, and still alters, the geo-political landscape. While fragments or "knowledge bytes" of a scientific revolution sometimes filter into culture –Einstein's iconic formula, $E=mc^2$, for example—the lay public is not usually compelled to assimilate a working knowledge of the new science. The genetics revolution has changed all that. Obtaining an appropriate health care regimen may require that a patient know the complex inheritance of a multigenic disease; trial by jury may require jurors to understand population genetics at the level of a graduate student in the field. The knowledge that has filtered into culture from the genomics revolution informs, for better or worse, debates at the core of modern society. Traditionally, science courses are geared to those students who will pursue an undergraduate career in a science discipline. Advances in genetic analyses and technologies, and more importantly the impact of such advances on policy, medicine and healthcare, have created a dilemma for instructors of undergraduate science courses: attracting and educating students, of all disciplines, in genetics.

Various media forms used in popular culture profoundly influence our view of society and modern science. For example, advances in genetic engineering formed the backdrop of Michael Crichton's bestselling book, and eventual blockbuster film, *Jurassic Park*. Unfortunately, the lay public often has difficulty separating fact from fiction; soon after the release of this film, fears that scientists would really develop new dinosaur breeds became the fodder of many news clips and talk shows. Nevertheless, movies, books and art that embrace science can provide educators with the case-studies from which to develop a genetic curriculum for the student who is likely *not* to pursue a career in science.

Course design:

I propose to use film, books and art exhibits to develop a genetics curriculum for a general education course. This course would be broad reaching and will cover topics of genetic analysis, genetic engineering, cloning and DNA forensics in the context of how they are used in various forms of popular culture and how they influence society, attitudes towards science, domestic and foreign policy as well as medical practice and law. The inclusion of either a second instructor or several guest instructors from different departments at UCONN will be sought to facilitate the blending of real-world examples of

scientific discovery with the interpretation of these discoveries in popular culture and their incorporation into societal attitudes. Table 1 contains a list of possible course materials and topics. This is not intended to be all-inclusive nor will all of these materials be included in one semester. A basic genomics/genetics textbook (such as *A Primer of Genome Science*, Gibson and Muse or *Genomics: Applications in Human Biology*, Primrose and Twyman, or *From Genes to Genomes: Concepts and Applications of DNA Technology*, Dale and Schantz) will be selected to support the genetics curriculum.

Film (an example) - The movie *GATTACA* will serve to outline a series of lectures on the basics of DNA identification, forensics, and genetic engineering of embryos. From this foundation, we will discuss how the science in the film is right or wrong and how correcting inconsistencies may have affected the plot development. I will then introduce specific examples of how DNA typing has affected policy decision (i.e. real-world examples), such as the court case of a woman fired from her position for testing positive for a gene (alpha-a antitrypsin) that predisposes her to lung disease, notable in the absence of any symptoms. This section would conclude with an ethical discussion of how such technology should or should not be developed as well as what moral obligations society would hold in the event these technologies emerge. I will include a discussion on how policy is developed based on genetic identification and the ethical issues surrounding such developments.

Table 1. Examples of film, fiction and non-fiction literature and the corresponding genetics and cultural curriculum to be developed for this course. I will likely select a short-list of movies, one fiction and one non-fiction piece for inclusion in the course.

Media	Genetic curriculum	Cultural Curriculum
Film		
GATTACA	Genetic engineering, DNA typing and profiling	Legal implications, ethics of eugenics, social implications of genetic technology, use of science fiction in postmodern film, efficacy of genetic determinism
Boys from Brazil *The Island*	Cloning by nuclear transfer	Ethics of cloning, egg donation, "nature vs nurture", therapeutic cloning policy and societal impact
Bladerunner *Lilo and Stitch*	Genetic engineering and embryonic stem cell manipulation	Start of "life", legal rights of embryos, genetic manipulation, science fiction in children's films
Corn	Transgenic plants	"Frakenfoods", environmental and health risks, policy and land management
Literature		
Darwin's Radio, G. Bear	Landscape of the human genome, structure and	Impact of viral evolution on society, epidemiology of

	function of genes, DNA and "junk DNA", viral evolution	pandemics, globalization of health care management
Intuition, A. Goodman	Research society and education	Pressures posed by grant-driven research, psychological impact of "publish or perish"
Non fiction- in total or excerpts		
Genes in Conflict: The Biology of Selfish Elements, Burt and Trivers	Mechanisms and consequences for genomes of the action of mobile DNA	Evolution and cognition
Natural Selection and Social Theory: Selected Papers of Robert Trivers	The influence of intragenomic conflict on the expression of genes	behavioral evolution and sociobiology, the structure of human families and societies
Evolution in Four Dimensions: Genetic, Epigenetic, Behavioral, and Symbolic Variation in the History of Life, E. Jablonka	Epigenetic inheritance and the assembly and propagation of chromatin structures	Philosophical Issues in Biology and Psychology

Art- Several exhibitions using DNA and genetic engineering as a central theme in mixed media presentations (photographs, oils, sculptures and mixed media) have been presented in a variety of venues. Selections of these "DNA Art" pieces will be included in the curriculum to elicit dialog on the aesthetic influences that genetics has on our view of society and culture. An example is shown in Figure 1.

Figure 1. This piece by Hunter O'Reilly in mixed media exemplifies the merging of genetics and art while touching on the politics of gender in science. The centerpiece is Rosalind Franklin, one of the discoverers of the structure of DNA. As a woman scientist in the 1950's, however, her pivotal involvement in that work went virtually unrecognized in her lifetime.

For each section of the course (broken down by scientific topic), each week will consist of a one-hour lecture on the scientific principles covered in the movie/book/art pieces presented to the entire class. The remainder of the week's meetings will be held with each of two sections separately to reduce the class size and encourage open dialog. In these "break-out" sessions, discussions will be held on the topic as it relates to society. These discussions will include invited guest lecturers who can facilitate a charged dialog and who can provide a framework for the science in ethics, policy and law, medicine, etc.

INTDs: ***Genetic legacies: a Connecticut slave's story***

Venture Smith remains the most well documented survivor of the North Atlantic slave trade; his published narrative speaks to us across the centuries to tell his remarkable story first hand. The son of an African king, he was captured and sold as a slave through several prominent families in New England. After purchasing his own freedom, and that of his family, Venture Smith lived on his farm in Haddam Neck and became an entrepreneur eventually leaving a remarkable economic and genetic legacy. In this seminar class, the story of Venture Smith will form the framework for a truly interdisciplinary examination of the man and his times. A new book documenting the life of Venture Smith will be available for use as a text. Moreover, we propose to tape all presentations by guests and develop, in collaboration with the Beecher House Society, a fully supported curriculum for use in future years here and across the world.

Course design: This course will include a series of guest lectures from the President of the Beecher House Society, forensic DNA experts, archaeologists and anthropologists, historians, cultural experts, as well as film clips, poetry readings, and a site visit to the home of Venture Smith (see table 2).

Table 2. The-one hour guest units are outlined below, not necessarily in the order they will occur (speakers in italics have already agreed to participate; we await word from the others).

Guest speaker	**Department/Field**	**Topic**
Chandler Saint President, Beecher House Society	History Human Rights and Equality	Overview: The Atlantic Slave Trade and UNESCO World Heritage Sites
Dr. Robert Forbes Associate Research Scholar, Yale Univ., former Assoc. Dir. Gilder Lehrman Center	Religious Studies; State and Local History / Museums; U.S. History and Culture; African-American Studies	The life and times of Venture Smith: a glimpse of colonial New England
Dr Robert Hall Chair, African- American Studies, Northeastern Univ.	History African-American Studies Drama	In his own words: readings from the narrative of Venture Smith
Dr. Anna Mae Duane Professor Torrington Campus	English and American Studies	Venture Smith and Frederick Douglass-- Money, Manhood and Mythology
Dr. Marilyn Nelson Professor Emeritus, Poet Laureate, CT.	English	In her own words: poetry inspired by the life of Venture Smith
Dr. Nicholas Bellantoni Professor, UConn and State Archaeologist, CT	Forensic Anthropology Archaeology	Archaeological investigations of the Venture Smith sites
Dr. Sally McBrearty Professor, UConn	Anthropology	Early human evolution and migrations
Dr. Rachel O'Neill Professor, UConn	Genetics and Genomics	Genetics and Race

Josh Suhl & Craig O'Connor, UConn CAGT	Population and Forensic Genetics	Maternal and Paternal Ancestry by DNA
Dr. Linda Strausbaugh Professor & Director CAGT	Genetics and Genomics	The Genetic Landscape arising from Venture Smith and his contemporaries
Dr. Linda Strausbaugh	Forensic Genetics	Analysis of DNA from remains
Dr. Jeffrey Ogbar Professor & Director, Institute for African American Studies, UConn	History African American Studies	The Venture Smith story: Why it matters today.

V. Interdisciplinary Nature: Both the Core and INTD courses are interdisciplinary in that I propose to use a non-traditional medium for teaching a scientific curriculum. The Core course is designed to teach a general audience of students who traditionally would not be exposed to a science curriculum the basics of genetics and genetic engineering by using film, books and contemporary art topics to introduce the subject material. The INTD course is designed to do the opposite – teach humanities, liberal and fine arts to those interested in genetics and DNA typing. Both courses represent a blend of science curricula with psychology, sociology, bioethics, family studies, law and health care policy.

VI. Gen Ed component: The core course will fall into Group Three of the general education guidelines and will meet all of the criteria outlined for the Science and Technology component of the Gen Ed curriculum. Students will be exposed to a broad range of topics in genetics, genomics and genetic engineering and will learn the scientific principles of genetic inheritance, cloning, transgenics, forensics, stem cell technology and directed evolution. The use of several forms of media in popular culture (books, film and art) will introduce students to the basic principles of the science covered as well as how these advances have been incorporated into the psyche of our popular culture.

VII. Potential "W": I will consider inclusion of a "W" component in the course as I develop the curriculum. At this point, it is difficult to determine the extent a "W" component could be handled without additional support, although the final project would certainly meet the "W" criteria.

VIII. Pedagogical Methods for Honors Students:

The goal of this course is to use the case-method in a somewhat novel context by introducing genetic technologies and theory through various forms of popular culture. This form of science course introduces students to a variety of media prevalent in popular culture: film, fiction and non-fiction literature and contemporary art. The inclusion of either a second instructor or several guest instructors from different departments at UCONN will facilitate discussion on the impact genetics discovery has had on postmodern culture.

Assessment will be at three levels: student learning, guest lecture assessment on the design and implementation of the course, and assessment of the course curriculum as the field of genetics changes and new literature, films and art are released. Student learning will be assessed by quizzes and exams (utilizing the honors system of grading and examination) and a final research project. Guest lecturers will be asked to assess their involvement, the course design and student responses to the topics covered. In addition, students will be

asked to assess the effectiveness of the media chosen to introduce the scientific and conceptual topics.

IX. Innovation: The students will be charged with a service component as part of their final research project. Small groups of students must each develop, through a medium of their choice (DVD/film, art, lecture, website) a short educational piece to teach one topic touched upon in class to a lay audience (a jr high or high school, senior center, public workshop). The success of these projects (these will be implemented locally) will reflect the educational experience they have had in this course in the proposed format.

X. Timeline of Course Offerings: I expect to develop the curriculum over the first year of the proposed award period. This includes selection of a supplemental text that covers genetics, genomics and genetic engineering as well as two to three books for reading topics. In addition, a series of film, art and documentaries will be selected based on their scientific content. In years 2 and 3 (each) the INTD will be offered in the fall semester and two sections of the Honors GenEd Core will be offered in the spring semester.

XI. Departmental Commitment:
See attached letter of support from Prof. Linda Strausbaugh, Director CAGT and Prof. Larry Hightower, MCB Associate Chair.