

Fall 2017: Biology 4EE3: Human Diversity and Human Nature

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Office	Life Science Building, Room- LSB-531
Office hours	By appointment
Lecture slots	Tuesday: 11:30 - 12:20 KTH B132 Thursday: 11:30 - 12:20 KTH B132 Friday: 11:30 - 12:20 KTH B132
Teaching Assistant	Xue Song

Course format: Lectures, student research and presentations

Lectures

Lecture sessions will include seminars of relevant topics and theories related to understanding Human condition from a philosophical and evolutionary perspective to confront common misconceptions related to human biology. These seminars are important in understanding fundamental concepts and theories as well as to motivate and guide your critical evaluation of key topics related to human condition. During this time, students will select a major topic provided in the course outline for their research. Apart from the subtopics provided, students are also encouraged to develop their own specific topics *within* the broad course topics given above. One of the primary objectives is to review progress in the topic that you have chosen, in the last two decades. Following the seminars (lectures), **students will have two rounds of presentations**. The first will be a brief informal presentation of their topic – introduction of concepts and theories. The second will be the presentation of student research proposal – an outline of their research paper. Students shall introduce their topic; summarize research and current status of understanding of the topic. Finally students will hand in a research paper on their topic at the end of the course.

1. Students will work in groups of 2-3 (maximum). Each group will select a major topic. They can make subgroups to cover specific topics if they wish and then put

- together a comprehensive paper. One group – one topic. First come, first serve basis. Topics must be chosen before the end of week 2.
2. Presentation 1: Each group will choose one or two most recent scientific articles (review or original work) relevant to their topic. They will provide a synthesis of their topic – introduction, concepts and theories related to the topic. You will essentially teach the class about your chosen topic. Max 20 mins followed by discussions (time may change depending on necessity). Presentations will be informal, inviting ample discussions. All members can present as a group, or one or two chosen members can do the presentation. Marks will be awarded by group.
 3. Presentation 2: Students will have gained a better and deeper understanding of their topic after substantial research. They may have also chosen a specific topic to focus in detail. Each group will present a comprehensive synthesis of their topic and illustrate the progress made in the last two decades, comment on the current status of research and knowledge the topic. Max 20 mins (may change).
 4. At the end of the course each student (or groups) will submit their final research paper of about 4000 words not including references. The format may be updated in lectures.

Tutor/Tutorials: Tutorials are meant to generate discussions and critical evaluation of key concepts discussed in this course. Discussions are usually quite lively because many of the topics apply to real life issues. The idea will be to apply ‘scientific thinking’ and explore and evaluate evidence that exists pertaining to topics in this course.

During lecture weeks, you will be discussing key topics relevant to each lecture and exploring literature pertaining to key topics. Research articles will be assigned to facilitate discussions and to see what kind of evidence exists for key topics. The TA will lead discussions with some questions, but students are encouraged to formulate their own questions and lead discussions as well.

During the presentations weeks, discussions will pertain to what has been presented, importance papers used by presenters will be required reading to facilitate discussion regarding the science and social constructs behind the topic being discussed.

Course Schedule: *Note: these dates may be adjusted based on necessity.*

Important Dates:

Sept 4 – Oct 11:	Lectures
Oct 12	Mid Term Exam
Oct 16	Student Presentations starts
Dec 4	Research paper due: Hand in final research papers electronically (word or PDF) to TA and Instructor

Presentation Schedules will be provided by week 2 within which time students will have chosen their topics and their working groups.

Evaluation:

There will be no final exam.

Participation	10%
Presentation 1	10%
Presentation 2	10%
Midterm test	20%
Research paper	50%

Some important books

Steven Rose, Richard Lewontin, Leo Kamin: Not In Our Genes

Steven J Gould: The Mismeasure of Man.

Richard Lewontin: Biology as Ideology: The Doctrine of DNA

Leo Kamin: The Science and Politics of IQ

David S. Moore: The Dependant Gene

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Course outline/Research Topics

1. The Science and Politics of Race

It may not be an exaggeration to say that abuse of the biological concept of race has done more damage to the human condition than any other socio-biological doctrine. The race card continues to play a significant role and is being revived by the misuse of findings from molecular biology research.

Question: Are races real, if so what does it mean to the human condition?

2. The Science and Politics of IQ

The problem of racism is more than skin deep. No other trait has been more synonymous with race and racism than the idea that races differ in levels of intelligence, as measured by IQ, that these differences are controlled mostly by genes, and that differences in IQ account for the disparity in the socio-economic conditions between races.

Questions: What are the relative contributions of genes vs. environment in the determination of IQ?

How much of the differences in the social ladders (Inequality) are explained by genes?

Do successful civilizations owe it to their biology or to their historical contingency?

3. Science and Women

Even if current low numbers of women in science can be explained by historical reasons, what cannot be explained is that while the sex ratio is 1:1 in university students doing graduate work, women graduates continue to disappear from science after graduation. The pipeline from graduation to the echelon of academia is very leaky.

Question: Why do women still not fair at par with men in the academia?

4. Sex and Gender

Nature has a variety of sexual systems: separate males and females, bisexuals, hermaphrodites, asexuals, and transsexuals who can change sex depending on environmental conditions. Human reproduction requires males and females. But starting first with gay and lesbian, genders have begun to multiply including bisexual, transsexual, and transgender.

Question: Is sexual preference controlled by genes? What's the relation between sex, preference, and gender? How does it affect our perception of human culture that is built on two gender human sexuality?

5. Female choice vs. male driven sexual selection

Sexual dimorphism is common in nature, including humans. It finds its most extreme expression in insects, birds and mammals. Darwin noticed that certain male traits, call them secondary sexual traits, appeared maladaptive and contrary to the dictates of natural selection. Darwin thought such traits could be explained if they were involved in mate choice and were used by female to choose mates. Theory of 'female choice' and 'male modification' became the hallmark of Darwin's sexual selection theory.

Question: Can female choice theory explain the peculiar features of human sexuality which shows signs of male driven sexual selection and 'female modification'?

6. Men & Women; Patriarchy & Feminism

Aggression, invasion, war, and decimation comprise a major portion of human history. While women find a central place in the mythology of wars, men have kept them away from real wars. One wonders if patriarchy is a socio- historical convention that found it profitable to keep women away from all public affairs outside the home, or has the women's role has been defined by female-choice subversion through male driven sexual selection and 'female modification'.

Question: Is patriarchy simply an outcome of historical/social convention, or is it an outcome of sexual selection?

Question: Why feminism failed and what can be done about it?

7. Genes, Aggression, Violence

Individuals and populations can differ in temperament. Temperament can be biologically or developmentally controlled and/or environmentally triggered. Genes are known to affect aggression in model organisms like mice. Individuals involved in drugs, prostitution, smuggling, robbery, gang-related activities and terrorism are generally found to be more aggressive and violence prone and their counterparts. Are they driven by genes or do they pick the trick of the trade including violence while on the job?

Question: How much of the aggressive behavior of an individual controlled by gene,s and what's the relationship between individual aggression and group violence?

8. Biological basis of complex diseases

It's the dream of medical research and drug companies to find simple, single Mendelian genes causing genetic diseases. Many such genes have been discovered. Indeed, much of the medical research is based on the assumption that simple Mendelian genes will be found. Genetic homogeneity is preferred over genetic heterogeneity and is ideologically imposed on the research methodology. It is a fact of genetics about disease causing genes - the more deleterious and harmful they are in their effects, the more rare they are. Such genes are hard to be selected out from the population as most of the culprit gene copies hide in the heterozygous condition.

Complex diseases such as cardiovascular conditions, Type II diabetes, obesity, schizophrenia and depressions are complex diseases as they often involve many genes and are affected by the environment. Complex diseases kill many times more than the simple genetic diseases in total but even here the medical research plugs along believing in the luck of the lottery, i.e., hitting upon a simple gene with significant affect on the condition. Even here search for cure predominates over prevention.

Developments in molecular biology are promoting/ forcing two new ideas on the population for staying healthy; one is to take pills to ward off a suspected disease, and the other is the promise of individually tailored, genomic medicine. Under the latter scenario, in theory, all individuals can be put on pills as all will be found to have some "disease genes"- of major or minor effects.

Question: What are the relative roles of gene vs. environment in the control of complex diseases such as cardiovascular diseases, diabetes, and schizophrenia?

Question: What kind of check and balance can be put on drug companies involved in developing cure vs. promoting health medicine?

9. Altruism/ kin selection/group selection

The central theme of Darwinian evolution is individual-based selection through survival and reproduction. Cooperation (among individuals) as a rule is expected to arise and be favored only if it benefits the participants. Individual-based selection is expected to be stronger and more common than group selection as there will be fewer groups than individuals.

Hamilton (1964) introduced the concept of kin selection in which an individual's fitness is made up of two components: individual's own fitness, and fitness accruing from relatives with whom the individual shares genes. The total fitness is called "inclusive fitness". Kin selection can be called a form of group selection but kin selection raises problem for the concept of "true" altruism. One can argue that we are always getting something in return directly or indirectly.

*Question: Is there is no such thing as true altruism? Are we all selfish?
What's the role of kin selection vs. group selection in human evolution?*

10. The Biological Basis of Human Freedom

Human consciousness and free will (freedom to choose) are the two most cherished human characteristics and while the former taken as a hallmark of humans; the latter has been the subject of intense debate among philosophers. We are biological entities and like all biological entities our choice must be more or less, directly or indirectly, context dependent. How can there be free choice? We must differentiate between freedom to think (and deliberate the available, appropriate choices) and freedom to act (the actual choice). We may have freedom to choose but the choices are never fully context free.

Question: Do we have free will? What's its implication to individual responsibility?