

GEC Objectives for Biology 350: Courses in natural sciences foster an understanding of the principles, theories and methods of modern science, the relationship between science and technology, and the effects of science and technology on the environment.

Learning Objectives and How They Will Be Met:

- 1. Students will understand the basic facts, principles, theories and methods of modern science as they relate to the biology of hope and belief.**

This course is structured around two themes that are pivotal to modern biology. The first of these themes is that the force of natural selection has played a key role in producing the capacity for hope in humans as well as the human desire to believe in a supernatural deity. Each lecture explicates the adaptive significance of these phenomena and the evidence we have to support the claim that these behaviors developed as a consequence of natural selection. The second theme is that, if these qualities are the result of evolutionary forces, then it should be possible to identify the underlying physiological and biochemical mechanisms for them. In the course of making these arguments, students will be exposed to the facts, principles and theories of modern evolutionary theory as well as modern cell theory, physiology and neurochemistry.

- 2. Students will learn key events in the history of science;**

We will trace evolutionary theory from the time of Darwin to the present in an effort to understand how natural selection can be adduced to explain hope and belief. In so doing, students will understand how the theory of natural selection unifies key ideas in biology. In addition, students will learn about the nature of science, how evidence is evaluated and how critical experiments are designed. For instance, students will learn that indirect observation and experimentation valid ways of doing science as are making and testing predictions from evolutionary theory.

- 3. Students will provide examples of the inter-dependence of scientific and technological developments;**

Students will learn about how neurological activity can be assessed and interpreted. Students will learn about current brain scan technologies (eg. fMRI, PET, EEG etc.) and how the development of these technologies have facilitated our ability to measure subjective characteristics such as hope and belief. We will also discuss the limitations of these technologies and future directions in technology.

- 4. Students will discuss social and philosophical implications of scientific discoveries and understand the potential of science and technology to address the problems of the contemporary world.**

Over the 10 week quarter, we will have many opportunities to explore the social and philosophical implications raised in the course. For instance, how should our capacity for

hope be incorporated into end-of-life treatment decisions? If nonhuman animals have a capacity for hope, should that affect how we treat them? Can we ethically use brain-damaged people as guinea pigs for understanding how the brain works? If we can understand belief in God neurologically, does this diminish the spirituality of the religious experience? These issues will be covered both in the lecture and recitation sections.