

## Duke Summer College Course List

### (Biology/BIOLOGY) Love and Hate Between Humans and Micro-Organisms

How much do you know about microbiology? This course will provide a broad introduction to what micro-organisms are, where they usually live, and how to work with them in science. You will learn to identify general features of micro-organisms from the three branches of life (bacteria, archaea, and eukarya) and explore how micro-organisms can sometimes have negative consequences and other times be beneficial. In the course's first part you will explore how micro-organisms affect human health by means of mutualism, commensalism, parasitism, and pathogenesis. In the second part, we will examine how micro-organisms function within industry – for example, with the commercial production of bread, wine, and beer fermentations. Our third section will focus upon micro-organisms in biotechnology by examining model organisms such as *E. coli* and CRISPER from Archaea. We will conclude our survey of micro-organisms by examining bioremediation for insights regarding the ethics of applying science to address the needs of the world.

### (Biology/BIOLOGY) The 3-D Genome and Human Disease

Genomes are highly organized inside the nuclei. Linear DNAs are folded into chromosome territories. Within the territories, individual genes occupy their special localization for proper expression. Misorganization of genomes will result in misregulation of genes and genome instability, which are linked to human diseases, such as cancer, several degenerative diseases including Huntington's disease, Alzheimer's disease, diabetes, and aging. This course will introduce concepts and models of genome organization, current technologies to study 3-D genomes, and case studies of misorganization of genomes and their related diseases – all with the goal of introducing students to the exciting inner life of genome.

### (Biology/BIOLOGY) Sensory Biology: Sight, Smell, Taste, Touch, Sound and Beyond

Every aspect of our lives is influenced by our senses. Senses provide the basis for everything we perceive in the world and influence how we interact with our environment. Most animals live in an entirely different sensory world than we do, so how do they perceive their world? How do their sensory worlds influence their behavior, ecology, and evolution? This course offers an introduction to the foundations of sensory ecology. It covers sight, smell, taste, touch, and sound, as well as senses that humans don't even possess, like the ability to sense magnetic fields, feel electricity, see polarized light, or smell pheromones. Topics include the mechanisms underlying sensation and sensory processing; functions of sensory systems including animal communication and signaling; the interaction between sensory biology and ecology; evolution, diversification, and divergence of sensory systems; and current methods in sensory ecology. We will read and discuss primary

literature, make observations in nature to develop hypotheses about sensory perception, and use case studies to illustrate and explore the scientific process.

## (Biology/BIOLOGY) The Ecology of Urban Environments

Over the past century, there has been a rapid expansion of urban areas and currently more than half of the world's human population lives in cities across the globe. As urban landscapes continue to grow, they alter the structure and function of the ecosystems they overtake presenting sustainability and conservation challenges to the people who reside within them. This course will address urban ecology - the study of ecology and socio-ecological systems within urban areas. The course will be a mixture of lecture and discussion with written assignments. We will cover such topics as the unique physical and chemical conditions in urban areas (urban soils, hydrology, climates, and biogeochemistry), biological communities within cities (wildlife, plants, and food webs), cities as drivers of global change (patterns of urban growth, pollution, disturbance), and we will frame each of those within the context of socio-ecological systems (conservation, sustainability, ecosystem services, resilience, and urban planning and design). At the end of this course, students will have the skills and knowledge to evaluate critically scientific research in the field of urban ecology.

## (Biology/BIOLOGY) The Hard Truth of Evolution

Through selected readings, short lectures, and class discussions, we will investigate some of the fundamental truths of biological evolution, the consequences of evolutionary biology for society, and the potential conflicts that emerge when evolutionary biology and (American) religion seek to co-exist. Building on Theodosius Dobzhansky's famous statement that "Nothing in biology makes sense except in the light of evolution," we will explore why some areas of evolution are easy to accept as factually true and why some areas are much harder to grasp. The course also seeks to broaden the discussion of evolutionary biology to include how societies have historically used and abused evolutionary theory (ancient crop breeding, eugenics, GMOs, etc.). Finally, we will discuss the modes of interaction between modern Western science and traditional Western (Abrahamic) religions, focusing on the rise of Creationism and Intelligent Design in contemporary American culture. This course will present various aspects of evolutionary biology, including phylogenetics, adaptations, natural selection, and genetics, while also drawing on diverse elements of cultural anthropology and theology to address the complexity of societal issues relating to evolution. Students from a variety of backgrounds, scientific and not, religious and not, are invited to engage in a collaborative discourse of one of the thorniest scientific topics in modern society.

## (Biology/BIOLOGY) Microbes and Our World

The course will be a survey of microbiology, including bacteriology, virology, and immunology. The goal is to introduce a wide variety of topics to spark your interest in the microbial sciences. Topics will include human disease, ecology, and biotechnology. In addition, we will discuss current events, including antibiotic resistance, Ebola virus, and gene therapy. We will engage in hands-on "dry lab"

demonstrations to explore laboratory practices and current research. Finally, you will research scientific journal articles to develop a final project/paper to be presented in class.

## (Cultural Anthropology/CULANTH) Advertising and Society: A Global Perspective

In this course we will examine the history and development of commercial advertising. Specific topics to be addressed include the following: advertising as a reflector and/or creator of social and cultural values; advertisements as cultural myths; effects on children, women, and ethnic minorities; advertising and language; relation to political and economic structure; and advertising and world culture. Although the primary emphasis will be upon American society, this emphasis will be complemented by case studies of advertising in Canada, Japan, Mexico, Russia, Western Europe, and selected other countries.

## (Economics/ECON) Game Theory

The interactions of human beings with other individuals, within groups, and with the earth lead us to ponder many questions concerning the ways in which people coordinate and structure their actions. It is to these questions that we turn, in trying to understand the strategic decisions that people make on a daily basis. Will it make a difference if I throw my candy wrapper in the street instead of waiting to find a trash can? How much should I pay for a used car? How will our family decide who cooks dinner? Is it feasible for a firm to enter the market for a new product? Under what conditions would a union go on strike during labor contract negotiations? In this course students learn the basic tools of game theory in order to analyze these various economic and social situations. We start by providing a background and introduction to both game theory and economics. We then proceed to define the terminology used in both fields. Our section on games begins with an analysis of normal form (strategic form) games in which we have a static setting and players move simultaneously. Concepts such as a player's best response, dominant strategies, and the Nash equilibrium are presented, along with various examples of applications. The three classic games of chicken (hawk-dove), coordination (battle of preferences), and the prisoners' dilemma are introduced, with an extension to the mixed strategy Nash equilibrium. Next we turn to extensive form games in order to analyze dynamic games in which players move sequentially. The notion of a sub-game perfect Nash equilibrium is discussed, and the technique of backward induction is taught. Repeated interactions between players are then considered as we discuss both infinitely repeated games and finitely repeated games. Topics in public and environmental economics are introduced in order to apply these game theory concepts to situations pervaded by free-riding and collective action problems. Evolutionarily stable strategies are also discussed, allowing us to understand how repeated games can lead to the stability of social inequalities by class, gender, race, and ethnicity. The role of institutions (such as norms, customs, traditions, beliefs, and property rights) in maintaining these inequalities is discussed from a game theoretic standpoint. Lastly, we study situations of asymmetric information between players. We give specific references to issues of principal-agent problems, moral hazard, and adverse selection as applied to monitoring, signaling, and "lemons" markets. We will also discuss bargaining models. The course concludes with a critical

analysis of the theories and assumptions used in game theory. In particular, students debate the usefulness of concepts of “rationality.”

## (Education/EDUC) Race, Power and Identity: From (Muhammad) Ali to (Colin) Kaepernick

This course explores historic and contemporary psycho-social and socio-cultural aspects of the African American sport experience. Over the course of the term, we will examine research that addresses the effect of physical differences, racial stereotyping, identity development, gender issues, and social influences on African American sport participation patterns. This course offers an analysis of sport as a microcosm of society through its examination of associated educational and societal issues.

## (English/ENGLISH) Classics of American Literature, 1915-1960

This course in modern American literature will begin with the major figures of the 1920s and then move through the decades up to 1960. Most of the course will be devoted to novels, but we shall also look carefully at T.S. Eliot, the most influential poet of his time, while giving such attention as time permits to his contemporaries: Robert Frost, Wallace Stevens, William Carlos Williams, and Hart Crane. Although our primary interest will be to understand and appreciate the specific works we study, we shall also consider the larger cultural and intellectual context relevant to each writer. In addition to the poets already mentioned, this course will study works by F. Scott Fitzgerald, William Faulkner, Ernest Hemingway, Carson McCullers, Saul Bellow, Richard Wright or Toni Morrison, and John Updike.

## (English/ENGLISH) Language and Social Identity

Whenever we hear someone speak, we inevitably make guesses about his or her gender, age, occupation, place or origin, ethnicity, sexual orientation, and religion. We also often refer explicitly to the language and identity connection. For example, we talk of expressing our identity through our choice of vocabulary, or ‘losing’ our identity along with our regional accent when we enter a new environment such as college. In this course, we will draw on examples from the media, literature, the internet, pop culture, and politics to explore how speakers portray themselves to others through the use of language. We will also consider how language is talked about, and what assumptions people make about others based on how they speak. Students will be encouraged to bring their own examples to class for discussion.

## (Evolutionary Anthropology/EVANTH) Introduction to Evolutionary Anthropology

Have you ever wondered about human origins, anatomy, and behavior from an evolutionary perspective? This course traces the historical development of pre-Darwinian evolutionary thinking

and Darwin's contribution to evolutionary theory and then moves to consider genetics, microevolution and macroevolution, and the modern synthesis framing the study of human origins and behavior in the context of modern evolutionary biology. Along the way we will consider primate behavioral ecology and evolution, primate and human paleontology, adaptation and variation, the origins of human social organization and culture, and the impact of modern humans on biodiversity.

## (Linguistics/LINGUIST) Language and the Media: The New York Times to Twitter

The focus of this course is upon the linguistic analysis of texts – from the past and the present, including social media – with a view to understanding how they create, sustain, or challenge "common-sense" understandings of society and politics. English first-language speakers will be equipped with the tools to understand how \*their own\* language works in the media; second-language (L2) speakers will learn invaluable skills in identifying and understanding idiom, nuance, and rhetoric in both academic and media texts, thus offering preparation for undergraduate classes in a range of disciplines. If possible, writers from the Duke News and Communication Office will visit class to engage students in a few intensive writing and analysis workshops. The instructor of this course has written for news outlets such as *The Huffington Post*, *The London Guardian*, *The Seattle Times*, *The Taipei Times*, and *The News and Observer* (of Raleigh, North Carolina).

## (Literature/LIT) Contagion in Culture and Society

Blood. Infection. Danger. Death. These are ideas that come to mind when we hear the words "disease" and "contagion." The fear of being infected has become an irreducible norm for living in society with and among others. In our increasingly connected world, infectious diseases destabilize the boundaries of nation-states in ways rivaled only by the viral collapse of financial markets. From SARS to Swine Flu and most recently to the Zika Virus, the looming threat of locally controlled epidemics turning into worldwide pandemics is a constant source of public anxiety in the twenty-first century. This course explores the historical, political, and conceptual legacies embedded within our collectively inherited ideas of "disease" and "contagion." Through films, documentaries, medical textbooks, newspaper and magazine articles, and scholarly texts, we will track the development of narratives that constitute contagion. In doing so, we will also investigate how biomedical discourses of contagion connect to larger cultural anxieties of our time. Some questions we will track in this course are the following: what are the common tropes in contagion narratives that are reproduced everywhere –from The World Health Organization (WHO) and The Centers for Disease Control and Prevention (CDC) to the mass media and popular culture objects such as blockbuster films and novels? How does the idea of "nation" influence how we theorize contagion? How do "disease" and "contagion" inform our conceptions of "race," "sexuality," and "otherness?"

## (Literature/LIT) Drugs, Theory & Culture

What is the relationship between the chemical composition of drugs, the intricate neurochemistry of the brain, and the thinking mind? This course will explore some deep-seated and even controversial questions around both recreational and medicinal uses of drugs and the ways these shape individual identities and even cultures. We will examine texts that push the boundaries of our common conceptions of drugs as simply “good” or “bad” and instead think through the complicated relationship drugs create between the body, the brain, and the mind. The role of experience will be central to this course because it will draw our attention to how drugs enhance or suppress our sensations, perceptions, and cognition. In particular, we will look to specific textual examples of writers that discuss psychotropic drugs including major twentieth century thinkers William James, Karl Jaspers, R.D. Laing, and Timothy Leary. Alternatively, we will analyze the role of “Big Pharma” in advertising medicinal drugs to patients and their doctors and look to how pharmaceutical companies match available medications to specific diagnostic categories.

## (Literature/LIT) Finance Fictions

On the surface, 'finance' and 'fiction' might seem worlds apart—the one pertaining to the realm of cold calculation and material interest, the other to the ethereal spheres of the imagination. Look more closely, however, and this distinction begins to crumble. On the one hand, financial documents reveal themselves to be full of literary flourishes and figurations; on the other, fictional works reveal a deep concern with questions of economics, interest and value. This course will explore the fictions of finance and the finance of fictions. Beginning with Mandeville's Fable of the Bees, we will examine a number of works which trouble the distinction between literary and economic genres. We will consider the literal and figurative economies at work in various fictions as well as the fictions, figures and tropes at work within economic texts. Questions we may ask include: is literary value distinct from economic value? Do notions like "investor confidence" depend on forms of rhetoric and modes of persuasion typically considered literary? Can money itself be considered a sort of fiction?

## (Mathematics/MATH) Mathematics of the Universe

This course will survey, in precise mathematical terms, what is known and not known about the universe, from special relativity, the big bang, and black holes to dark matter and theoretical astrophysics. Einstein's idea that "matter curves spacetime," which is the fundamental principle behind general relativity, requires a field of mathematics called differential geometry, for example. Since this is a seminar, the pace and emphasis of the class will be highly influenced by the questions asked by the students. Nevertheless, mastery of single variable calculus is highly recommended.

## (Philosophy/PHIL) Introduction to Philosophy (emphasis on ethics and value theory)

What exactly do philosophers do? This remains a mystery to most people who envision philosophers sitting around pondering the meaning of life. So we will begin this course by clarifying what philosophy is. Next, we will study the tools that philosophers use to assess arguments. After we practice distinguishing good reasoning from bad, we will use these skills to evaluate arguments in epistemology (theory of knowledge), metaphysics, and ethics. Discussion topics will be tailored to student interest, but potential topics to be addressed include the possibility and nature of scientific progress; the nature of mind; space and time; the ethics of environmentalism, genetic engineering, immigration, and the 2008 financial crisis; and, yes, the meaning of life.

## (Philosophy/PHIL) Logic

Are you ever puzzled by reading a paragraph that seems to make no sense or a debate that seems to go in a circle? Would you like to improve your test-taking skills for standardized admission tests? Why do pre-law advisors recommend taking a course in Logic as the best preparation for admission to law school? This course will examine the conditions of effective thinking and clear communication. To this purpose, we will look at the most fundamental principles of deductive reasoning and cover the basics of sentence and predicate logic. Some of the topics we will investigate include truth-functional connectives, quantifiers, translation, derivations, and truth trees.

## (Philosophy/PHIL) Existentialism

This course places literature and philosophy in conversation with one another, pointing to their close connections. Existentialism asks about the foundations of mind, morals, and the meaning of life. It asks about ways of living, ways of reading, and ways of writing. Key themes will be existence, ethics, meaning of life, freedom, death, and writing. Texts may include writings by Kierkegaard, Nietzsche, Dostoevsky, Tolstoy, Heidegger, Sartre, Camus, Beauvoir, Fanon, Murdoch, and others.

## (Physics/PHYSICS) Introductory Seminar on Big Questions in Physics

This course will provide an introduction to six major questions representing frontiers of twenty-first century physics, such as what are the ultimate laws of nature, how does complex structure arise, and how can physics benefit society. Individual class sessions will involve presentations by researchers and by students, discussions of journal articles, and tours of physics labs involved with related research.

## (Psychology/PSY) Introductory Psychology

This course will provide a broad overview of the field of psychological science, covering the biological, evolutionary, cognitive, social, personality, and clinical perspectives of behavior, as well as the conceptual issues unifying these sub-disciplines. Not only will the course provide a solid grounding in the knowledge of the field, but it will address the historical roots of psychological inquiry and the methods and techniques through which our understanding is advanced. Students will come away with greater insight into human behavior and an enhanced appreciation of the psychological factors that influence their lives and the functioning of society as a whole.

## (Psychology/PSY) Social Psychology

Social psychology is the scientific study of how people's thoughts, feelings, and behaviors are influenced by others. The primary purpose of this course is to provide a general introduction to the theories, research methods, and major findings of social psychology. We will examine a wide variety of topics involving how we perceive and interact with other people, including person perception, the self, stereotypes and prejudice, group influences, and pro-social behavior. Some of the questions we may examine include the following: why does someone who is 'good' act in an evil fashion? Why would people act in ways that are alien to their nature? Why would someone who is considered intelligent do something that is irrational? Where possible, we will apply the knowledge and skills learned to examine events and situations in the real world and everyday life.

## (Psychology/PSY) Adolescence

This course will explore adolescent development across domains of physical, cognitive, and social development. Topics will include those related to normal/typical development as well as abnormal development, particularly with regard to issues of health and mental health in this age group. Additionally, students will learn about the broader world in which adolescents live and the contexts within which development occurs – families, peer groups, schools, neighborhoods, and cultures. This course features a service learning component that allows class members to interact with adolescents in our community by means of a variety of activities on the Duke campus. This class is particularly appropriate for students interested in counseling or clinical psychology, teaching, educational policy, or medicine.

## (Public Policy Studies/PUBPOL) Public Speaking

This course will explore theoretical and practical elements of effective advocacy, not only as applied to public policy issues, but also as related to personal image presentation. While the focus is on efficient oral communication and effective presentation skills (both in large public speaking environments, and in smaller interactive exchanges), stress is also given to the development of compelling arguments, debate, and written expositions for presentation. Emphasis is also placed on the human dimensions of the communication process: vocal intonation, body behavior, audience evaluation, focus, control, distraction, and self-awareness. Individuals who will benefit from this

course range from students entering the public arena, scholars entering the political arena, and athletes wanting to develop confidence in the presentation of their public image.

## (Sociology/SOCIOL) Gender, Work and Organization

This course will examine research and theories on gender issues in the work organization. Attention will be given to the socio-historical causes of gender segregation in the workplace and the contemporary consequences for wages and occupational status. Finally, the course will examine organizational and governmental work and family policies. Case studies of specific work organizations with gender-related problems will be utilized in group projects and presentations.