DEPARTMENT OF AFRICAN AMERICAN STUDIES

AAS 245 Introduction to 20th-Century African American Art
Professor: Chika O. Okeke-Agulu

Description: This surveys history of African American art during the long 20th-century, from the individual striving of late 19th century to the unprecedented efflorescence of art and culture in 1920s Harlem; from the retrenchment in black artistic production during the era of Great Depression, to the rise of racially conscious art inspired by the Civil Rights Movement; from the black feminist art in the 1970s, to the age of American multiculturalism in the 1980s and 1990s; and finally to the turn of the present century when ambitious "postblack" artists challenge received notions of black art and racial subjectivity.

Schedule: 08:30 am - 09:50 am T Th

AMS 399 In the Groove: Technology and Music in American History, From Edison to the iPod
Professor: Emily Thompson

Description: When Thomas Edison invented the phonograph in 1877, no one, including Edison, knew what to do with the device. Over the next century Americans would engage in an ongoing dialogue with this talking machine, defining and redefining its purpose. This course will track that trajectory, from business tool to scientific instrument to music recorder to musical instrument. By listening to the history of the phonograph, and by examining the desires and experiences of phonograph users, students will perceive more generally the complex relationships that exist between a technology and the people who produce, consume, and transform it.

Schedule: 10:00 am - 10:50 am M W

PROGRAM IN AMERICAN STUDIES

AMS 101 America Then and Now
Professors: Aisha M. Beliso-De Jesus, William A. Gleason, Stacy E. Wolf

Description: An introduction to the interdisciplinary field of American Studies that takes "America" as a challenging analytical category rather than a given. Employing literature, theatre and performance, history, visual culture, and politics, this course examines the idea of America in its global, national, community contexts and its material and imaginary manifestations. We will explore a series of central concepts such as "citizenship," "family," and "imperialism," teasing out the tensions and paradoxes that historically structure these terms, while focusing on signature ideas, concerns, and debates that have made the nation what it is today.

Schedule: 01:30 pm - 02:50 pm M

ANTHROPOLOGY

ANT 309B Forensic Anthropology and Urban Bodies
Professors: Janet M. Monge, Page Selinsky

Description: Forensic anthropology involves medico-legal cases where human remains have lost "personhood" (an individual cannot be identified due to decomposition or destruction of unique personal features). We will learn techniques that biological anthropologists apply to these cases to identify certain social attributes. We will also blend both biological and social anthropology to analyze human variation and well-being in urban settings. Working with real-world data, students will identify and trace the intertwined physiological, social and environmental factors that have shaped the growth and development of Philadelphia-area children over decades.

Schedule: 11:00 am - 12:20 pm M W
SCHOOL OF ARCHITECTURE

ARC 203 Introduction to Architectural Thinking
Professor: Stanley T. Allen

Description: The objective of this course is to provide a broad overview of the discipline of architecture: its history, theories, methodologies; its manners of thinking and working. Rather than a chronological survey, the course will be organized thematically, with examples drawn from a range of historical periods as well as contemporary practice. Through lectures, readings, and discussions every student will acquire a working knowledge of key texts, buildings and architectural concepts.

Other information: Architectural thinking will be explored thematically by focusing upon a series of significant debates (historical and contemporary) about tectonics, program, representation, and urbanism. Debates will include history versus utopia, handcrafted versus machine made, generic versus iconic, form versus program, drawing versus scripting, and image versus surface, among others.

Schedule: 11:00 am - 11:50 am T Th

ART AND ARCHAEOLOGY

ART 100 An Introduction to the History of Art: Meanings in the Visual Arts
Professor: Deborah A. Vischak

Description: Introduction to the history of art and to the discipline of art history. Not a comprehensive survey but a sampling of arts -- painting, sculpture, architecture, photography and prints -- and artistic practices from diverse historical periods, regions, and cultures. The course balances consideration of historical developments with attention to individual works of art.

Schedule: 10:00 am - 10:50 am M W

ART 201 Roman Architecture
Professor: Michael Koortbojian

ART 218 Ten Essential Topics in Chinese Art and Culture
Professor: Cheng-hua Wang

Description: What was the role of women in Chinese art? How did Chinese people think about this life and the afterlife? Why and how is calligraphy considered an art form in China? These are but three of the questions this course asks and endeavors to explore. Focusing on ten important and provocative topics, this course aims to provide a comprehensive but spotlighted picture of Chinese art and culture. Together the ten point to the interrelated nature of the visual and Chinese philosophical thought, aesthetic values, religious beliefs, social life, political expression and commercial practices.

Schedule: 10:00 am - 10:50 am T Th

ART 248 Photography and the Making of the Modern World
Professor: Anne McCauley

Description: Photography exploded on the world stage in 1839 and transformed how we think about truth, reality, and the past. This course traces the multiple changes in photographic processes, styles, and functions from the invention to the present, in which photography is more a behavior than a way of generating permanent records. Topics will include photographs as scientific evidence; the portrait and family imagery; ethnographic and travel photography; photojournalism; the market for fine arts photographs; and the construction of celebrity.

Schedule: 10:00 am - 10:50 am T Th
**ASIAN AMERICAN STUDIES**

**ASA 225 'Too Cute!': Race, Style, and Asiamania**  
**Professor:** Anne Cheng

**Description:** What does a minor and shallow category like "cuteness" have to do with the abject histories of race and gender? This course offers an introduction to key terms in Asian American Studies through the lens of the seemingly insatiable American appetite for "Asian cuteness." How do we reconcile this desire with the long history of anti-Asian sentiments in this country? Why aren't other races "cute"? We will explore cuteness as racial and gendered embodiment, commodity, globalization, aesthetics, affect, and politics. Above all, we explore the implications of understanding race as a style.

**Schedule:** 10:00 am - 10:50 am T Th

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**ASTROPHYSICAL SCIENCES**

**AST 205 Planets in the Universe**  
**Professor:** Gaspar A. Bakos

**Description:** This is an introductory course in astronomy focusing on planets in our Solar System, and around other stars (exoplanets). First we review the formation, evolution and properties of the Solar system. Following an introduction to stars, we then discuss the exciting new field of exoplanets; discovery methods, earth-like planets, and extraterrestrial life. Core values of the course are quantitative analysis and hands-on experience, including telescopic observations. This STN course is designed for the non-science major and has no prerequisites past high school algebra and geometry. See www.astro.princeton.edu/planets for important changes

**Schedule:** 01:30 pm - 02:50 pm T Th

**AST 301 General Relativity**  
**Professor:** Jeremy J. Goodman

**Description:** An introduction to general relativity and its astrophysical applications, including black holes, cosmological expansion, and gravitational waves.

**Schedule:** 03:00 pm - 04:20 pm M W

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**CHEMICAL AND BIOLOGICAL ENGINEERING**

**CBE 245 Introduction to Chemical and Biochemical Engineering Principles**  
**Professor:** Mark P. Brynildsen

**Description:** Introduction to the principles underlying chemical and biochemical engineering. This course begins with the basics of engineering calculations, and continues on to the core subjects of material and energy balances in single and multi-phase systems; both with and without reactions. The topics in this course lay the bedrock for the remaining CBE curriculum, and students will see the subjects that they learn here time and again in their future CBE courses.

**Schedule:** 09:00 am - 09:50 am M W F

**CBE 341 Mass, Momentum, and Energy Transport**  
**Professor:** Celeste M. Nelson

**Description:** How do you design a drug delivery system that will kill a tumor but not the patient? What are the major constraints in building a new artificial heart? Why are some cooling systems more efficient than others? A strong understanding of transport phenomena is essential for solving these and other grand challenges facing society. This course combines applied mathematics with fundamental physics to promote an intuitive understanding of steady and unsteady heat and mass transfer and fluid dynamics. We will focus on key applications in processes related to biology, energy, materials, and chemical synthesis.

**Schedule:** 01:30 pm - 02:50 pm M W
CIVIL AND ENVIRONMENTAL ENGINEERING

CEE 102A Engineering in the Modern World
Professor: Michael G. Littman

Description: Lectures and readings focus on bridges, railroads, power plants, steamboats, telegraph, highways, automobiles, aircraft, computers, and the microchip. Historical analysis provides a basis for studying societal impact by focusing on scientific, political, ethical, and aesthetic aspects in the evolution of engineering over the past two and a half centuries. The precepts and the papers will focus historically on engineering ideas including the social and political issues raised by these innovations and how they were shaped by society as well as how they helped shape culture.

Schedule: 11:00 am - 11:50 am M W

CEE 205 Mechanics of Solids
Professor: Sigrid M. Adriaenssens

Description: This course teaches fundamental principles of solid mechanics. Equilibrium equations, reactions, internal forces, stress, strain, Mohr's circle, and Hooke's law. Analysis of the stress and deformation in simple structural members for safe and stable engineering design. Axial force in bars, torsion in shafts, bending and shearing in beams, stability of elastic columns, strain transformation, stress transformation, combined loadings, design project.

Schedule: 11:00 am - 12:20 pm M W

CEE 207 Introduction to Environmental Engineering
Professor: Ian C. Bourg

Description: The course introduces the basic chemical and physical processes of relevance in environmental engineering. Mass and energy balance and transport concepts are introduced and the chemical principles governing reaction kinetics and phase partitioning are presented. We then turn our focus to the applications in environmental engineering problems related to water and air pollution.

Schedule: 01:30 pm - 02:50 pm M W

CEE 305 Environmental Fluid Mechanics
Professor: Elie R. Bou-Zeid

Description: The course starts by introducing the conservation principles and related concepts used to describe fluids and their behavior. Mass conservation is addressed first, with a focus on its application to pollutant transport problems in environmental media. Momentum conservation, including the effects of buoyancy and earth's rotation, is then presented. Fundamentals of heat transfer are then combined with the first law of thermodynamics to understand the coupling between heat and momentum transport. We then proceed to apply these laws to study air and water flows in various environmental systems, with a focus on the atmospheric boundary layer.

Schedule: 01:30 pm - 02:50 pm T Th

CEE 467 Design and Behavior of Steel Structures
Professor: Maria E. Garlock

Description: Topics in the design and analysis of steel structures are covered such as geometric properties and stresses of built-up shapes, columns (including plate buckling), beams, tension members, beam-columns.

Schedule: 09:00 am - 09:50 am M W

CEE 471 Introduction to Water Pollution Technology
Professor: Peter R. Jaffe

Description: An introduction to the science of water quality management and pollution control in natural systems; fundamentals of biological and chemical transformations in natural waters; identification of sources of pollution; water and wastewater treatment methods; fundamentals of water quality modeling.

Schedule: 08:30 am - 09:50 am T Th
UNIVERSITY CENTER FOR HUMAN VALUES

CHV 310 Practical Ethics
Professor: Peter A. Singer

Description: This course will challenge you to examine your life from an ethical perspective. What should your goals and values be? To live ethically, is it enough to obey conventional moral rules, or should we seek to do the most good we can? For citizens of wealthy nation like the U.S., living in a world in which there is also extreme poverty, what might that involve? Other questions to be discussed include: what we should do about climate change, the ethics of what we eat, the moral status of animals, abortion, euthanasia and the claim that all human life has equal value. One or two other topics of current interest may be added during the semester.

Schedule: 11:00 am - 11:50 am M W

CLASSICS

CLA 212 Classical Mythology
Professor: Joshua H. Billings

Description: An introduction to the classical myths in their cultural context and in their wider application to human concerns (such as creation, sex and gender, identity, transformation, and death). The course will offer a who's who of the ancient imaginative world, study the main ancient sources of well-known stories, and introduce modern approaches to analyzing myths.

Schedule: 01:30 pm - 02:20 pm T Th

CLA 217 The Greek World in the Hellenistic Age
Professor: Marc Domingo Gygax

Description: The Greek experience from Alexander the Great through Cleopatra. An exploration of the dramatic expansion of the Greek world into Egypt and the Near East brought about by the conquests and achievements of Alexander. Study of the profound political, social, and intellectual changes that stemmed from the interaction of new cultures, and the entrance of Rome into the Greek world. Readings include history, biography, and inscriptions.

Schedule: 03:30 pm - 04:20 pm M W

COMPARATIVE LITERATURE

COM 205 The Classical Roots of Western Literature
Professor: Eileen A. Reeves

Description: This course focuses on the classics of the Western literary tradition from Antiquity through the medieval period. We will examine the ways in which poets, playwrights, biographers, and other fabulists addressed questions of public duty and private emotion, domestic and exotic customs, and natural, unnatural, and supernatural events. All works are taught in English.

Schedule: 12:30 pm - 01:20 pm M W

COM 306 The Modern European Novel
Professor: Maria A. DiBattista

Description: Description; This course is designed for those 1) wanting to read landmark fictions in the modern European literary tradition; 2) intrigued by the question of "world literature" as it is posed in and by the European novel.

Schedule: 10:00 am - 10:50 am T Th

COMPUTER SCIENCE

COS 109 Computers in Our World
Professor: Brian W. Kernighan

Description: Computers are all around us. How does this affect the world we live in? This course is a broad introduction to computing technology for humanities and social sciences students. Topics will be drawn from current issues and events, and will include discussion of how computers work; what programming is and why it is hard; how the Internet and the Web work; security and privacy.

Schedule: 1:30 pm - 02:50 pm M W
COS 217 Introduction to Programming Systems
Professor: Jennifer L. Rexford

Description: Introduction to programming systems, including modular programming, advanced program design, programming style, test, debugging and performance tuning; machine languages and assembly language; and use of system call services.

Schedule: 10:00 am - 10:50 am T Th

COS 226 Algorithms and Data Structures
Professor: Kevin Wayne

Description: This course surveys the most important algorithms and data structures in use on computers today. Particular emphasis is given to algorithms for sorting, searching, and string processing. Fundamental algorithms in a number of other areas are covered as well, including geometric algorithms, graph algorithms, and some numerical algorithms. The course will concentrate on developing implementations, understanding their performance characteristics, and estimating their potential effectiveness in applications.

Schedule: 11:00 am - 12:20 pm T Th

COS 318 Operating Systems
Professor: Jaswinder P. Singh

Description: An introduction to operating systems. Emphasis is on the fundamentals of how to design and implement an operating system. Topics include operating system structure, processes, threads, synchronizations, concurrent programming, interprocess communications, virtual memory, I/O device management, and file systems.

Schedule: 11:00 am - 12:20 pm M W

COS 326 Functional Programming
Professor: Andrew W. Appel


Schedule: 11:00 am - 12:20 pm M W

COS 340 Reasoning about Computation
Professor: Mark Braverman

Description: An introduction to mathematical topics relevant to computer science. Combinatorics, probability and graph theory will be covered in the context of computer science applications. The course will present a computer science approach to thinking and modeling. Students will be introduced to fundamental concepts such as NP-completeness and cryptography that arise from the world view of efficient computation.

Schedule: 03:00 pm - 04:20 pm M W

COS 429 Computer Vision
Professor: Olga Russakovsky

Description: This course is an introduction to the concepts of 2D and 3D computer vision. It surveys a wide range of topics from level-level vision to high-level recognition. We will discuss concepts such as filtering and edge detection; cameras and shape reconstruction; segmentation and clustering; optical flow and tracking; object recognition; motion recognition; statistical modeling of visual data, etc. Throughout the course, there will also be examination of aspects of human vision and perception that guide and inspire computer vision techniques.

Schedule: 03:00 pm - 04:20 pm T Th

COS 432 Information Security
Professor: Edward W. Felten

Description: How to secure computing systems, communications, and users. Basic cryptography; private and authenticated communication; software security; malware; operating system protection; network security; web security; physical security;
cryptocurrencies and blockchains; privacy and anonymity; usable security; economics of security; ethics of security; legal and policy issues.

**Schedule:** 11:00 am - 12:20 pm T Th

**COS 451 Computational Geometry**  
**Professor:** Bernard Chazelle

**Description:** This course introduces the basic concepts of geometric computing, illustrating the importance of this field for a variety of applications areas, such as computer graphics, solid modeling, robotics, database, pattern recognition, and statistical analysis. Algorithms are presented and analyzed for a large number of geometric problems, and an array of fundamental techniques are discussed (e.g., convex hulls, Voronoi diagrams, intersection problems, multidimensional searching).

**Schedule:** 01:30 pm - 02:50 pm M W

**COS 487 Theory of Computation**  
**Professor:** Gillat Kol

**Description:** Introduction to computability and complexity theory. Topics will include models of computation such as automata, and Turing machines; decidability and decidability; computational complexity; P, NP, and NP completeness; others.

**Schedule:** 03:00 pm - 04:20 pm T Th

**EAST ASIAN STUDIES**

**EAS 216 Writing and Culture of Premodern Korea**  
**Professor:** Ksenia Chizhova

**Description:** This course is an introductory survey of the cultural history of premodern Korea—from early times until the turn of the twentieth century—focused on the primary sources. We will read various original materials (in English translation): myths, state histories, diaries, travelogues, and works of fiction, among others. Topics covered in this course include the imagination of the origins in myth, the idea of Confucian governance, everyday life and entertainment in Choson (1392-1910), and Korea's opening to the west in the late nineteenth century.

**Schedule:** 11:00 am - 12:20 pm M W

**EAS 225 Japanese Society and Culture**  
**Professor:** Amy B. Borovoy

**Description:** During the latter part of the 20th century, Japan became the world's second largest economy and a highly technologized, wealthy, and ordered society. While Americans once regarded Japan as a land of "corporate warriors," in the 21st century, scholars are looking to Japan to understand global issues such as labor instability, environmentalism, longevity, and the demographic crisis related to rapid aging. We explore key social issues in Japan today including gender equality, labor, school-to-work transition, public health, and popular cultural critiques of modernity and technology.

**Schedule:** 01:30 pm - 02:50 pm T Th

**ECONOMICS**

**ECO 100 Introduction to Microeconomics**  
**Professor:** Henry S. Farber

**Description:** Economics is the study of the allocation of scarce resources. The subject of this course is microeconomics, which examines the decision making of individuals and firms with regard to consumption, production, and allocation of good and services in a market system. We examine the benchmark "perfectly competitive" market setting as well as market settings that are not perfectly competitive. We discuss the appropriate role of government in addressing these "market failures".

**Schedule:** 10:00 am - 10:50 am M W

**ECO 101 Introduction to Macroeconomics**  
**Professor:** Alan S. Blinder

**Description:** Analysis of the operation of the national economy, with emphasis on the
causes and consequences of recessions and booms, inflation and unemployment -- and possible policy responses to each. Attention is also paid to the banking and financial systems, the financial crisis, and international influences on the U.S. economy.

**Schedule:** 10:00 am - 10:50 am T Th

**ECO 300 Microeconomic Theory**  
**Professor:** Kelly Noonan

**Description:** This course builds on your knowledge of microeconomics from ECO 100. As with ECO 100, this course will focus on the decisions made by individual consumers and producers. It will consider a variety of different market structures ranging from perfect competition to monopoly. It will also discuss the rationale for government involvement when there are market failures. While the topics will be very similar to those covered in ECO 100, the analysis will be more in depth.

**Schedule:** 11:00 am - 12:20 pm T Th

**ECO 302 Econometrics**  
**Professor:** Bo E. Honore

**Description:** Develop facility with basic econometric methods and the ability to apply them to actual problems and understand their application in other substantive course work in economics.

**Schedule:** 11:00 am - 12:20 pm M W

**ECO 312 Econometrics: A Mathematical Approach**  
**Professor:** Michal Kolesar

**Description:** This course is an introduction to econometrics. Econometrics is a sub-discipline of statistics that provides methods for inferring economic structure from data. This course has two goals. The first goal is to give you means to evaluate an econometric analysis critically and logically. Second, you should be able to analyze a data set methodically and comprehensively using the tools of econometrics.

**Schedule:** 01:30 pm - 02:50 pm M W

**ECO 324 Law and Economics**  
**Professor:** Thomas C. Leonard

**Description:** An introduction to the economics of law. Application of price theory and welfare analysis to problems and actual cases in the common law - property, contracts, torts - and to criminal and constitutional law. Topics include the Coase Theorem, intellectual property, inalienable goods, product liability, crime and punishment, and social choice theory.

**Schedule:** 11:00 am - 12:20 pm T Th

**ECO 331 Economics of the Labor Market**  
**Professor:** Orley C. Ashenfelter

**Description:** To provide a general overview of labor markets. Covering labor force participation, the allocation of time to market work, migration, labor demand, investment in human capital (education, on-the-job training, man-power training), discrimination, unions and unemployment. The course will also examine the impact of government programs (such as unemployment insurance, minimum wages, or a negative income tax) on the labor market.

**Schedule:** 11:00 am - 12:20 pm M W

**ECO 342 Money and Banking**  
**Professor:** Markus K. Brunnermeier

**Description:** This course explores the interaction between money, financial markets and institutions. We examine (1) the three roles of money, using cryptocurrencies as leading example, (2) the core principles of asset pricing, (3) how financial institutions help to overcome financial frictions, but may lead to financial crisis and bank runs, (4) how monetary and macroprudential policy manage inflation and can help to mitigate financial crises, (5) the international financial architecture, especially the role of the International Monetary Fund, and the impact of FinTech on the financial sector.

**Schedule:** 01:30 pm - 02:50 pm M W
ECO 372 Economics of Europe  
Professor: Silvia Weyerbrock

Description: Europe is at a crossroads. Political and economic integration in the European Union (EU) exceeds levels reached in the rest of the world. Economic integration not only affects trade but also migration, agriculture, competition, regions, energy, and money. Most euro area economies have been struggling with interlocking crises involving debt, banking and growth. Moreover, the EU is facing Brexit and a migration crisis. This course studies economic integration, the ongoing crises, and policy responses. It uses economic analysis to study policy issues.

Schedule: 08:30 am - 09:50 am T Th

ECO 418 Strategy and Information  
Professor: Faruk R. Gul

Description: Explores basic themes in modern game theory and information economics. Non-cooperative solution concepts for games will be developed and applied in a variety of contexts including auctions, bargaining, repeated games, dynamic interaction in oligopolistic industries, and reputation formation.

Schedule: 11:00 am - 12:20 pm M W

ECO 464 Corporate Restructuring  
Professor: O. Griffith Sexton

Description: This course applies topics from microeconomics (ECO 310) and corporate finance (ECO 363) to study corporate restructuring. Topics include mergers, acquisitions, joint ventures, divestiture and share repurchases. Each of these is discussed in the context of the relevant economic theory, institutional and regulatory environment, and with a focus on shareholder value.

Schedule: 01:30 pm - 04:20 pm T

ECOLOGY AND EVOLUTIONARY BIOLOGY

EEB 211 Life on Earth: Chaos and Clockwork of Biological Design  
Professor: Sarah D. Kocher, Jonathan M. Levine

Description: An examination of how life evolved and how organisms function. Design--‘intelligent’ and otherwise--will provide a unifying theme. Why do some microbes produce slime and others do not? Why are males brightly colored in some species, but in others females are the showy sex? Why do humans have knees that fail whereas horses and zebras do not? These and other ‘why is it so’ questions related to the origin and history of life, genetic code, biochemistry, physiology, morphology and body plans, sex and reproduction, cooperation, and ecosystems will be explored. This course is required of all EEB majors and fulfills a requirement for medical school.

Schedule: 11:00 am - 12:20 pm M W

EEB 309 Evolutionary Biology  
Professor: Bridgett M. vonHoldt

Description: All life on Earth has, and continues to, evolve. This course will explore evolution within two frameworks: conservation genetics and species interactions. In the first half of the course, we will explore fundamental processes that work together to shape biodiversity and viability, both at the organismal and molecular levels. We then will examine how species interactions can be the driver of change, from sexual selection to predation and pathogens. Overall, this course will provide you with the basic tools to understand how evolution continues to shape contemporary ecological and the phenotypic traits we observe on our planet.

Schedule: 08:30 am - 09:50 am M W

EEB 327 Immune Systems: From Molecules to Populations  
Professor: Andrea L. Graham

Description: How do immune systems
work, and why do they work as they do? Why is there so much immunological polymorphism in animal populations? To address these questions, students will examine immunology across multiple biological scales. At the molecular and cellular scales, students will learn mechanisms by which animals recognize and kill parasites. At the population scale, students will investigate causes of the tremendous immunological heterogeneity exhibited by animals. Both the clinical relevance and the evolutionary basis of polymorphisms will be emphasized.

Schedule: 08:30 am - 09:50 am T Th

ENGINEERING

EGR 156 Foundations of Engineering: Multivariable Calculus
Professor: N. Jeremy Kasdin

Description: This course will present the fundamentals of multivariable calculus from an engineering perspective, using examples from all 6 engineering departments. As a first introduction to functions of many variables, it will cover key topics important to the various engineering fields, including vectors and vector valued functions in 2 and 3 dimensions, partial derivatives, multiple integrals, optimization, and the calculus of vector fields.

Schedule: 11:00 am - 12:20 pm M W

EGR 395 Venture Capital and Finance of Innovation
Professor: Shahram Hejazi

Description: Venture capital is a driving force behind innovation and entrepreneurship, although the unique working details of venture capital firms and their processes are well-kept secrets. Early stage investors not only fund startups but also enable innovation through mentorship and partnership with the entrepreneurs. Understanding how these investors think and operate is critical to students who are interested in entrepreneurship, as well as to those who would like to pursue venture capital. This class is by application only.

Applicants: Auditors interested in this class should send an email to pucap@princeton.edu. Please include a 150 word paragraph stating background experience and the reason for taking this class. Registration will be per instructor approval. RSVP by Friday, August 16, 2019.

Schedule: 12:30 pm - 01:20 pm M

EGR 488 Designing Ventures To Change the World
Professor: John D. Danner

Description/Objectives: This course looks at global challenges reflected in the UN's Sustainable Development Goals (SDGs), e.g., widespread poverty, disease, gender inequality, poor water, inadequate housing and illiteracy, through the lens of entrepreneurial ventures, exploring whether and how entrepreneurs can meaningfully address those issues in ways that complement governmental and charitable initiatives. First, we will consider the SDGs themselves, second, we will focus on one issue in particular: coffee business. This class is by application only.

Applicants: Auditors interested in this class should send an email to pucap@princeton.edu. Please include a 150 word paragraph stating background experience and the reason for taking this class. Registration will be per instructor approval. RSVP by Friday, August 16, 2019.

Schedule: 01:30 pm - 04:20 pm F

EGR 497 Entrepreneurial Leadership
Professor: Derek B. Lidow

Description: The mission of the class is to enable students to successfully create and lead enterprises by teaching the basic skills required to be a successful entrepreneurial leader. This class compliments EGR 491 "High Tech Entrepreneurship" which focuses on 'giving birth to a company', by focusing instead on enterprise 'early child rearing'. The basic skills taught fall into three major categories: how to create and manage powerful relationships, how to
know and manage yourself, in addition to understanding how organizations work as they evolve from the idea stage to become value producing, self-sustaining enterprises.

**Schedule:** 11:00 am - 12:20 pm T Th

**ELECTRICAL ENGINEERING**

**ELE 206 Contemporary Logic Design**  
**Professor:** Sharad Malik

**Description:** Introduction to the basic concepts in logic design that form the basis of computation and communication circuits. Logic gates and memory elements. Timing methodologies. Finite state systems. Programmable logic. Basic computer organization.

**Schedule:** 01:30 pm - 02:50 pm T Th

**ELE 341 Solid-State Devices**  
**Professor:** Antoine Kahn

**Description:** The physics and technology of solid state devices. Review of electronic structure of semiconductors, energy bands and doping, followed by discussion of carrier transport by drift and diffusion and recombination/generation. Detailed analysis of p-n junctions, bipolar transistors and field effect transistors. Survey of a wide range of devices, including photodetectors, solar cells, light-emitting diodes and semiconductor lasers, highlighting contemporary concepts such as thin film electronics and 2D semiconductors.

**Schedule:** 03:00 pm - 04:20 pm T Th

**ELE 396 Introduction to Quantum Computing**  
**Professor:** Andrew A. Houck

**Description:** This course will introduce the matrix form of quantum mechanics and discuss the concepts underlying the theory of quantum information. Some of the important algorithms will be discussed, as well as physical systems which have been suggested for quantum computing.

**Schedule:** 11:00 am - 12:20 pm M W

**ELE 441 Solid-State Physics I**  
**Professor:** Mansour Shayegan


**Schedule:** 11:00 am - 12:20 pm T Th

**ELE 453 Optical Electronics**  
**Professor:** Hakan E. Tareci

**Description:** Fundamentals of light-matter interactions, waveguides and resonators, nonlinear optics and lasers.

**Schedule:** 11:00 am - 12:20 pm T Th

**ENERGY STUDIES**

**ENE 431 Solar Energy Conversion**  
**Professor:** Barry P. Rand


**Schedule:** 01:30 pm - 02:50 pm T Th
ENGLISH

ENG 203 The Essay
Professor: Jeff Nunokawa

Description: This course introduces students to the range of the essay form as it has developed from the early modern period to our own. The class will be organized, for the most part, chronologically, beginning with the likes of Bacon and Hobbes, and ending with some contemporary examples of and reflections on the form. It will consider how writers as various as Sidney, Hume, Johnson, Emerson, Woolf, C.L.R. James, and Stephen Jay Gould have defined and revised The Essay.

Schedule: 02:30 pm - 03:20 pm M W

ENG 284 Sex, Politics, and Religion on the Comic Stage
Professor: Michael W. Cadden

Description: This course offers an overview of comic drama, from the Greeks to the present. We'll focus on comedy's relation to festival culture, its interest in the fluidity of human identity (often telegraphed by its deployment of disguise), and its obsession with the relationship between love and money.

Schedule: 10:00 am - 10:50 am M W

ENG 320 Shakespeare I
Professor: Leonard Barkan

Description: The first half of Shakespeare's career, with a focus on the great comedies and histories of the 1590's, culminating in a study of Hamlet.

Schedule: 09:00 am - 09:50 am T Th

ENG 369 Contemporary Science Fiction/Speculative Fiction
Professor: Alfred Bendixen

Description: An exploration of contemporary speculative fiction, with particular attention to the ways specific texts of the past fifty years have transformed science fiction into a richly imaginative literary form that challenges basic assumptions about the possibilities and limitations of human life. Our analysis of texts will focus on both the literary achievement and philosophical underpinnings of recent depictions of imagined futures, racial and gender identity, travels in time and space, and contacts with aliens, robots, and androids.

Schedule: 11:00 am - 11:50 am T Th

GEOSCIENCES

GEO 102A Climate: Past, Present, and Future
Professors: Danielle M. Schmitt, Daniel M. Sigman

Description: Which human activities are changing our climate, and does climate change constitute a significant problem? We will investigate these questions through an introduction to climate processes and an exploration of climate from the distant past to today. We will also consider the implications of climate change for the global environment and humans. Intended to be accessible to students not concentrating in science or engineering.

Schedule: 11:00 am - 12:20 pm T Th
GEO 255A Life in the Universe  
**Professors:** Christopher F. Chyba, Michael H. Hecht, Tullis C. Onstott, Edwin L. Turner  
**Description:** This course introduces students to a new field, Astrobiology, where scientists trained in biology, chemistry, astronomy and geology combine their skills to discover life's origins and to seek extraterrestrial life. Topics include: the origin of life on Earth; the prospects of life on Mars, Europa, Enceladus and extra-solar planets. Students will also compete in class to select landing sites and payloads for the next robotic missions to Mars and Europa. 255A is the core course for the Planets and Life certificate.  
**Schedule:** 01:30 pm - 02:50 pm M W

GEO 361 Earth's Atmosphere  
**Professor:** Stephan A. Fueglistaler  
**Description:** This course discusses the processes that control Earth's climate - and as such the habitability of Earth - with a focus on the atmosphere and the global hydrological cycle. The course balances overview lectures (also covering topics that have high media coverage like the 'Ozone hole' and 'Global warming', and the impact of volcanoes on climate) with selected in-depth analyses.  
**Other information:** The main goal of the course is to demonstrate how interplay between measurements and a hierarchy of models (that starts with the highly idealized and gradually becomes more elaborate) can lead to an understanding of very complex phenomena such as weather and climate.  
**Schedule:** 11:00 am - 12:20 pm T Th

HISTORY  

HIS 211 Europe from Antiquity to 1700  
**Professor:** Anthony T. Grafton  
**Description:** This course traces an epic story: How Greeks and Romans, Jews and Christians, nobles and merchants, princesses and servants, serfs and slaves built what is now called Western Civilization.  
**Schedule:** 11:00 am - 11:50 am M W

HIS 214 British Empire in World History, 1700-2000  
**Professor:** Linda J. Colley  
**Description:** Until the First World War, empire was the most common form of rule and political organization. This lecture course focuses on the story of the biggest empire in world history, the British Empire, and uses it as a lens through which to examine the phenomenon of empire more broadly. How was a small set of islands briefly able to establish global predominance? What roles did war, race, religion, migration - and luck - play in the process? What was the impact on literature, art, gender, and ways of seeing? And how far do the great powers of today, the USA, China and Russia, retain some of the characteristics of empires in the past?  
**Schedule:** 10:00 am - 10:50 am T Th

HIS 267 The Modern Middle East  
**Professor:** Max D. Weiss  
**Description:** An introduction to the history of the Middle East from the late eighteenth century through the turn of the twenty-first, with an emphasis on the Arab East, Iran, Israel, and Turkey.  
**Schedule:** 11:00 am - 11:50 am M W

HIS 270 Asian American History  
**Professor:** Beth Lew-Williams  
**Description:** This course introduces students to the multiple and varied experiences of people of Asian heritage in the United States from the 19th century to the present day. It focuses on three major questions: (1) What brought Asians to the United States? (2) How did Asian Americans come to be viewed as a race? (3) How does Asian American experience transform our understanding of U.S. history? Using newspapers, novels, government reports, and films, this course will cover major topics in Asian American history, including Chinese Exclusion,
Japanese internment, transnational adoption, and the model minority stereotype.

**Schedule:** 10:00 am - 10:50 am M W

**HIS 283 War in the Modern Western World**  
**Professor:** David A. Bell

**Description:** A survey of the history of war in the Western world since the late middle ages. Will cover both "operational" military history (strategy, tactics, logistics, mobilization, etc.), and also the relationship of war to broad changes in politics, society and culture.

**Schedule:** 11:00 am - 11:50 am T Th

**HIS 301 Modern Eastern Europe, 19th to 20th Centuries**  
**Professor:** Iryna Vushko

**Description:** History of Eastern Europe from 1800 to the present. In this course, we analyze the concept of and historical trajectories of Eastern Europe during the modern era. The focus is upon political history, but we will also discuss how modern politics affected culture and the arts. Themes and topics include (but not limited to): empire, statehood and nationalism in East-European history; Marxism, radicalism, fascism, communism; the revolutions of 1848, 1917, 1989, and 2014. The class ends with discussion of the wars on the Balkans during the 1990s, the crisis in today's Ukraine, and the historical roots for both.

**Schedule:** 11:00 am - 11:50 am M W

**HIS 303 Colonial Latin America to 1810**  
**Professor:** Vera S. Candiani

**Description:** What is colonization? How does it work? What kind of societies does it create? Come find out through the lens of the Latin America. First we study how the Aztec and Inca empires subdued other peoples, and how Muslim Iberia fell to the Christians. Then, we learn about Spanish and Portuguese conquests and how indigenous resistance, adaptation, and racial mixing shaped the continent. You will see gods clash and meld, cities rise and decline, and insurrections fail or win. Silver mines will boom and bust, slaves will toil and rebel; peasants will fight capitalist encroachments. This is a comprehensive view of how Latin America became what it is.

**Schedule:** 10:00 am - 10:50 am M W

**HIS 322 20th-Century Japan**  
**Professor:** Sheldon M. Garon

**Description:** The course provides a general introduction to Japanese history from 1890 to the present, with emphasis on Japan's rise as the modern world's first non-Western power, imperialism, industrialization, social change, gender relations, democracy, World War II, the U. S. Occupation, state management of society, the postwar "economic miracle" and recent stagnation, and the preoccupation with national identity in a Western-dominated world. In the final weeks, we will think about post-1945 developments in terms of continuities with (and divergences from) the prewar and wartime history of Japan.

**Schedule:** 10:00 am - 10:50 am T Th

**HIS 324 Early Modern China**  
**Professor:** He Bian

**Description:** This course surveys the history of China between 1400 and 1800, tracing the foundation and decline of the Ming dynasty, the consolidation of Manchu rule till the end of the High Qing era. The main aims are 1) to understand the tremendous changes in Chinese society during this period 2) to see the continued relevance of China's recent imperial past in its contemporary existence. Topics discussed include governance, morality, family life, religion, and ethnicity.

**Schedule:** 10:00 am - 10:50 am T Th

**HIS 332 India before Europe: Politics, Religion, and Culture in South Asia, 1000-1857 A.D.**  
**Professor:** Divya Cherian

**Description:** What was social, cultural, economic, and political life in South Asia
like before colonial modernity? This class will explore the medieval and early modern periods in the history of the Indian subcontinent, spanning the years 750 to 1750 CE and traversing through such chapters as the establishment of the first Muslim polities in India, the growing integration of South Asia into global networks of circulation and exchange, and the birth and death of cultural practices in this dynamic environment. It will examine the changing relationship between India and the rest of the world, concluding with the British conquest of the region.

**Schedule:** 03:00 pm - 04:20 pm M W

**HIS 343 The Formation of Europe in the First Millennium**  
**Professor:** Helmut Reimitz

**Description:** A broad survey of the formation of medieval Europe in the first millennium CE, from the British Isles in the fifth century to the new Slavic states towards the end of the first millennium. We will talk about Romans and barbarians, Christians and pagans, Charlemagne, the Vikings and the emergence of new nations and states whose names are still on the map today (such as the English, French, Normans, Poles or Russians). We will observe how these societies came to be part of a Western Christendom defined by a Christianity that is much closer to ‘our’ Christianity today than to the Christianities of earlier times or those of the East.

**Schedule:** 02:30 pm - 03:20 pm M W

**HIS 368 England from the Wars of the Roses to the Glorious Revolution**  
**Professor:** Eleanor K. Hubbard

**Description:** The two centuries between the Wars of the Roses and the Glorious Revolution saw the end of the feudal order, astonishing revolutions in church and state, a literary renaissance, two ruling queens and one executed king in a deeply patriarchal and hierarchical society, civil wars, the beginnings of the British empire, and the emergence of a recognizably modern society of newspapers, scientific experiments, and political parties. These extraordinary developments were, however, far from being natural or predetermined. This course will explore how such dramatic transformations took place in a society seemingly resistant to change.

**Schedule:** 01:30 pm - 02:20 pm M W

**HIS 373 Democracy and Slavery in the New Nation**  
**Professor:** Robert S. Wilentz

**Description:** An interpretive history of the United States from the ratification of the Constitution to the coming of the Civil War. The course will cover politics and social development, while emphasizing focused reading of primary documents. Topics will include the debate over the Federal Constitution, the presidency of Thomas Jefferson, the rise of cotton slavery, Jacksonian democracy and the growth of political parties, antislavery and reform, westward expansion, and the growing social and political divisions between North and South.

**Schedule:** 01:30 pm - 02:20 pm M W

**HIS 376 The American Civil War and Reconstruction**  
**Professor:** Matthew J. Karp

**Description:** Why did the flourishing United States, by some measures the richest and most democratic nation of its era, fight the bloodiest civil war in the 19th century Western world? How did that war escalate into a revolutionary political struggle that transformed the nation--and then, almost as rapidly, give way to a reactionary backlash? This course will explore the causes, course, and consequences of the U.S. Civil War and Reconstruction, keeping in mind the ways that America's greatest conflict also represented a major event in the history of the global 19th century, and a landmark moment in the making of the modern world.

**Schedule:** 01:30 pm - 02:20 pm T Th

**HIS 380 U.S. Foreign Relations**  
**Professor:** Joseph M. Fronczak

**Description:** This course covers the history
of US foreign relations from the American revolution to the present day. Lectures take up questions of diplomacy, foreign policy, ideology and culture, empire and anti-imperialism, and revolution and counterrevolution. Precepts emphasize primary sources, from the writings of Tom Paine, George Washington, William Jennings Bryan, Ho Chi Minh, Phyllis Schlafly, Elaine Scarry, and more.

**Schedule:** 10:00 am - 10:50 am M W

**HIS 388 Unrest and Renewal in Urban America**  
**Professor:** Alison E. Isenberg

**Description:** This course surveys the history of cities in the United States from colonial settlement to the present. Over centuries, cities have symbolized democratic ideals of immigrant "melting pots" and cutting-edge innovation, as well as urban crises of disorder, decline, crime, and poverty. Urban life has concentrated extremes like rich and poor; racial and ethnic divides; philanthropy and greed; skyscrapers and parks; violence and hope; center and suburb. The course examines how cities in U.S. history have brokered revolution, transformation and renewal, focusing on class, race, gender, immigration, capitalism, and the built environment.

**Schedule:** 11:00 am - 11:50 am T Th

**HIS 395 History of Medicine and the Body**  
**Professor:** Katja Guenther

**Description:** This course covers key concepts and developments in the history of medicine from Ancient times to the present. We will explore ideas of health and disease in Antiquity, the rise of anatomy and dissection in the Renaissance, the fight against germs in the nineteenth century, and modern practices of health, life and death. Particular attention is paid to the ways in which changing medical views and practices were sustained by contemporary experience of the body. What did it mean to fall ill and get better? How did people understand their relationship to the environment? How could one prevent sickness by living a healthy life?

**Schedule:** 10:00 am - 10:50 am T Th

**ITALIAN**

**ITA 303 Dante's "Inferno"**  
**Professor:** Simone Marchesi

**Description:** Intensive study of the "Inferno", with major attention paid to poetic elements such as structure, allegory, narrative technique, and relation to earlier literature, principally the Latin classics. Course conducted in English.

**Schedule:** 01:30 pm - 03:20 pm Th

**ITA 309 Topics in Contemporary Italian Civilization - Africa in Modern Italian Literature**  
**Professor:** Pietro Frassica

**Description:** This course explores the colonial experience discussed by Italian writers who were in contact with Northern Africa between the 19th and the 20th centuries. This association between Italy and Africa has not been extensively developed neither within Italy or abroad, and it will be the primary focus of this course. The newly unified Italy (1861) looked at Africa as a colonial opportunity to expand its might and wealth. Writers soon embarked to places such as Alexandria and shared a unique perspective on Africa: they understood the continent not as a space to conquer and colonize, but rather as a surprisingly tolerant society in which to live.

**Schedule:** 07:30 pm - 08:20 pm W

**ITA 314 Risorgimento, Opera, Film**  
**Professor:** Gaetana Marrone-Puglia

**Description:** This course will explore the ways in which national identity was imagined and implemented within Italian literature, culture, and cinema before, during, and after the period of Italian unification in the mid-XIX century. Examples are drawn from a wide range of
literary, artistic and cultural media.

**Schedule:** 12:30 pm - 01:20 pm Th

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**PROGRAM IN LINGUISTICS**

**LIN 201 Introduction to Language and Linguistics**  
**Professor:** Christiane D. Fellbaum

**Description:** An introduction to the scientific analysis of the structure and uses of language. Core areas covered include phonetics and phonology, morphology, the lexicon, syntax, semantics and pragmatics, with data from a wide range of languages. Topics include the biological basis of language, language and cognition, the neurology of language and language disorders, and first and second language acquisition.

**Schedule:** 10:00 am - 10:50 am M W

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**MECHANICAL AND AEROSPACE ENGINEERING**

**MAE 221 Thermodynamics**  
**Professor:** Lamyaa El-Gabry

**Description:** Heat and work in physical systems. Concepts of energy conversion and entropy, primarily from a macroscopic viewpoint. Efficiency of different thermodynamic cycles, with applications to everyday life including both renewable and classical energy sources. In the laboratory, students will carry out experiments in the fields of analog electronics and thermodynamics.

**Schedule:** 10:00 am - 10:50 am M W F

**MAE 223 Modern Solid Mechanics**  
**Professor:** Andrej Kosmrlj

**Description:** Fundamental principles of solid mechanics: equilibrium equations, reactions, internal forces, stress, strain, Hooke's law, torsion, beam bending and deflection, and analysis of stress and deformation in simple structures. Integrates aspects of solid mechanics that have applications to mechanical and aerospace structures (engines and wings), as well as to microelectronic and biomedical devices. Topics include stress concentration, fracture, plasticity, and thermal expansion. The course synthesizes descriptive observations, mathematical theories, and engineering consequences.

**Schedule:** 11:00 am - 12:20 pm T Th

**MAE 323 Aerospace Structures**  
**Professor:** Luigi Martinelli

**Description:** The course presents contemporary methods of mechanical and structural analysis used in Aerospace. Foundational topics covered include: equations of linear elasticity, virtual work and energy formulations, basic concepts of structural stability and vibration. An introduction to Finite Element Analysis is also presented and the students will gain familiarity with commercial Finite Element application software in the context of aerospace structures.

**Other information:** This is a fundamental course for anybody interested in the analysis and design of structures subject to the tough constraints of aerospace applications, namely, high efficiency and low weight. The course will also allow the student to familiarize with typical structural arrangements and components and the principles behind their design and analysis. This technical elective course will satisfy the department's structures requirement in the Mechanical and Aerospace programs.

**Schedule:** 11:00 am - 12:20 pm T Th

**MAE 324 Structure and Properties of Materials**  
**Professor:** Craig B. Arnold

**Description:** Relates to the structures, properties, processing and performance of different materials including metals, alloys, polymers, composites, and ceramics. This course also discusses how to select materials for engineering applications.

**Schedule:** 1:30 pm - 2:50 pm M W
MAE 335 Fluid Dynamics
Professor: Daniel M. Nosenchuck
Description: The course is focused on compressible and incompressible inviscid fluid flow. Compressible subsonic and supersonic flows are studied in the first half of the course. The remaining portion of the semester addresses low-speed, incompressible fluid flows and aerodynamics of two and three-dimensional wings and bodies. Concepts of thrust, lift and drag are introduced and applied.

Schedule: 8:30 am - 9:50 am T Th

MATHEMATICS

MAT 321 Numerical Methods
Professor: Nicolas Boumal
Description: Introduction to numerical methods with emphasis on algorithms, applications and numerical analysis. Topics covered include solution of nonlinear equations; numerical differentiation, integration, and interpolation; direct and iterative methods for solving linear systems; computation of eigenvectors and eigenvalues; and approximation theory. Lectures include mathematical proofs where they provide insight and are supplemented with numerical demos using MATLAB.

Other information: This is an introductory course designed for upper class undergraduates and beginning grad students in fields related to applied math and engineering. Special attention is paid to numerical analysis and algorithm development. Students are expected to accumulate hands-on experience by programming and running numerical simulations assigned as homework problems. A substantial amount of time in class is dedicated to mathematical analysis of numerical methods, with proofs.

Schedule: 1:30 pm - 2:50 pm T Th, 1:30 pm - 2:20 pm F

MAT 340 Applied Algebra
Professor: Mark W. McConnell
Description: An applied algebra course that integrates the basics of theory and modern applications for students in MAT, APC, PHY, CBE, COS, ELE. This course is intended for students who have taken a semester of linear algebra and who have an interest in a course that treats the structures, properties and application of groups, rings, and fields. Applications and algorithmic aspects of algebra will be emphasized throughout.

Schedule: 3:00 pm - 4:20 pm T Th

MAT 477 Advanced Graph Theory
Professor: Maria Chudnovsky
Description: Advanced course in Graph Theory. Further study of graph coloring, graph minors, perfect graphs, graph matching theory. Topics covered include: stable matching theorem, list coloring, chi-boundedness, excluded minors and average degree, Hadwiger's conjecture, the weak perfect graph theorem, operations on perfect graphs, and other topics as time permits.

Schedule: 11:00:00 am - 12:20:00 pm T Th
MOLECULAR BIOLOGY

MOL 214 Introduction to Cellular and Molecular Biology
Professors: Daniel A. Notterman, Heather A. Thieringer

Description: Important concepts and elements of molecular biology, biochemistry, genetics, and cell biology are examined in an experimental context. This course fulfills the requirement for students majoring in the biological sciences and satisfies the biology requirement for entrance into medical school.

Schedule: 11:00 am - 12:20 pm M W

MOL 345 Biochemistry
Professor: Frederick M. Hughson

Description: Fundamental concepts of biomolecular structure and function will be discussed, with an emphasis on principles of thermodynamics, binding and catalysis. A major portion of the course will focus on metabolism and its logic and regulation.

Schedule: 10:00 am - 10:50 am M W F

MOL 380 Modern Microbiology
Professor: Martin C. Jonikas

Description: Microbes offer a rich world for exploration, a teeming universe invisible to the naked eye but thrilling in terms of diversity and scope. Human beings could not survive in their absence, yet we often think of them as the enemy. In fact, the majority are beneficial and can be harnessed for good in science and industry. This course will examine both sides: first an overview of microbial growth and function as well as specialized applications in areas such as photosynthesis, synthetic biology, quorum sensing, and CRISPR, with subsequent study of the threats to human health arising from dangerous pathogens that cause bacterial and viral disease.

Schedule: 01:30 pm - 02:50 pm T Th

MOL 459 Viruses: Strategy and Tactics
Professor: Lynn W. Enquist

Description: Viruses are unique parasites of living cells and may be the most abundant, highest evolved life forms on the planet. The general strategies encoded by all known viral genomes are discussed using selected viruses as examples. The first half of the course covers the molecular biology (the tactics) inherent in these strategies. The second half introduces the biology of engagement of viruses with host defenses, what happens when viral infection leads to disease, vaccines and antiviral drugs, and the evolution of infectious agents and emergence of new viruses.

Schedule: 11:00 am - 11:50 am M W F

MUSIC

MUS 240 Musical Modernism 1890-1945
Professor: Simon A. Morrison

Description: This course is an overview of modernism in European and Euro-American art music, including movements such as symbolism, expressionism, and neoclassicism. We will listen to music of among others-Bartok, Berg, Copland, Debussy, Ives, Mahler, Milhaud, Satie, Schoenberg, Scriabin, Stravinsky, and Varese. Topics will include introduction to a wide variety of musical languages and forms, as well as different cultural contexts for music making (music and ethnicity, music's relation to other art forms such as dance and visual art, music and politics).

Schedule: 12:30 pm - 01:20 pm M W

NEAR EASTERN STUDIES

NES 201 Introduction to the Middle East
Professor: Michael A. Cook

Description: A sweep through Middle Eastern history, globally contextualized. Weeks 1-6 treat the rise of Islam, the Caliphate, the Ottoman Empire, 19th-century reforms, European imperialism, and incipient globalization in the region. Weeks
7-12 focus on state-society relations, political ideologies, and foreign actors in the 20th and 21st centuries. You will come away with a basic grasp of the region's past and present and its mix of idiosyncrasies and global links.

**Schedule:** 11:00 am - 11:50 am T Th

**NES 240 Muslims and the Qur'an**  
**Professor:** Muhammad Q. Zaman  
**Description:** A broad-ranging introduction to pre-modern, modern, and contemporary Islam in light of how Muslims have approached their foundational religious text, the Qur'an. Topics include: Muhammad and the emergence of Islam; theology, law and ethics; war and peace; mysticism; women and gender; and modern debates on Islamic reform. We shall examine the varied contexts in which Muslims have interpreted their sacred text, their agreements and disagreements on what it means and, more broadly, their often competing understandings of Islam and of what it is to be a Muslim.

**Schedule:** 10:00 am - 10:50 am M W

**NEUROSCIENCE**

**NEU 200 Functional Neuroanatomy**  
**Professor:** Michael S. Graziano  
**Description:** A crucial part of neuroscience is understanding how function has its foundation in anatomy. This course traces neuroanatomical pathways through the central nervous system. It emphasizes the primate brain, especially the human brain. The course covers how nuclei, ganglia, and layered structures such as cortex are arranged physically in the brain, the fiber pathways by which they connect to each other, and how this connectivity relates to their function. The material will encompass systems within the brain stem, sensory systems, motor systems, higher cognitive systems, and the interconnectivity and interaction of these systems.

**Schedule:** 11:00 am - 12:20 pm M W

**NEU 201 Fundamentals of Neuroscience**  
**Professor:** Lisa M. Boulanger  
**Description/Objectives:** An intensive introduction to fundamental topics in neuroscience, including neuronal excitability, synaptic physiology, neural networks, and circuits that mediate perception, action, emotion, and memory. We will examine neuroscience at scales ranging from single neurons, to the activity of small sets of neurons, to the organization of brain and behavior. The course will address broad questions including: How does information enter the brain? What neural pathways transmit these signals? How is information processed and used to construct an internal model of reality? How does the brain choose and execute the correct behavioral response?

**Schedule:** 01:30 pm - 02:50 pm T Th

**OPERATIONS RESEARCH AND FINANCIAL ENGINEERING**

**ORF 405 Regression and Applied Time Series**  
**Professor:** Ludovic Tangpi  
**Description:** Regression: linear, nonlinear, and nonparametric (kernel and projection pursuit). Neural networks, convolution networks, deep learning: Tensor Flow and Keras. Time series: classical linear models (AR, MA, ARMA) univariate and multivariate.

**Schedule:** 03:00 pm - 04:20 pm M W

**PHILOSOPHY**

**PHI 202 Introduction to Moral Philosophy**  
**Professor:** Johann D. Frick  
**Description:** An introduction to central topics of moral philosophy. Questions include: What makes an action morally right or wrong, and why? Is the right action the one with the best consequences? Do our intentions matter for the rightness of our actions? Is there a moral difference between
killing someone and letting someone die? Is there 'moral luck'? What makes someone's life go best for her? What is the moral status of future persons? Is abortion morally permissible? Is it permissible to kill animals to eat them? Is there a single true morality or is moral truth relative to cultures? Does anything really matter or did we just evolve to think so?

**Schedule:** 12:30 pm - 01:20 pm T Th

**PHI 203 Introduction to Metaphysics and Epistemology**
**Professor:** Harvey Lederman

**Description:** An introduction to central questions of philosophy. Topics include: The rationality of religious belief, our knowledge of the external world, freedom of the will and the identity of persons over time.

**Schedule:** 11:00 am - 11:50 am T Th

**PHI 303 Descartes, Spinoza, and Leibniz**
**Professor:** Daniel Garber

**Description:** Reason over Sense, Mind over Matter: Descartes, Spinoza, Leibniz and friends. In this course, we will be studying two main themes in the history of early modern philosophy: the relation between reason and the senses as sources of knowledge, and the relation between mind and matter. The central figures discussed will be Descartes, Spinoza, and Leibniz. Other figures treated my include Hobbes, Pascal, More, Malebranche and Berkeley.

**Schedule:** 11:00 am - 11:50 am M W

**PHI 312 Intermediate Logic**
**Professor:** Hans P. Halvorson

**Description:** Meta-theory of first-order logic. We will learn the principal concepts and results of meta-theory, such as compactness, completeness, the Lowenheim-Skolem theorem, Beth's theorem, and Lindstrom's theorem. We will also focus on theories in first-order logic, and relations between these theories (e.g. mutual interpretability, equivalence, and reducibility). These results will be brought to bear on major philosophical discussions of the past century, such as Putnam's model-theoretic argument for antirealism, Ramsey sentences, Quine's arguments against second order logic, etc.

**Schedule:** 12:30 pm - 01:20 pm M W

**PHYSICS**

**PHY 101 Introductory Physics I**
**Professor:** Kasey Wagoner

**Description/Objectives:** The course is concerned with an introduction to the fundamental laws underlying physics and having general application to other areas of science. The treatment is complete and detailed; however, less mathematical preparation is assumed than for PHY 103-104. Mechanics and thermodynamics are treated quantitatively with a special emphasis on problem solving. In the spring semester PHY 102 covers electricity and magnetism, optics and relativity using the topics treated in PHY 101.

**Schedule:** 12:30:00 pm - 01:20:00 pm Th
POLITICS

POL 301 Political Theory, Athens to Augustine
Professor: Melissa Lane

Description: A study of the fundamental questions of political theory framed by the institutions and writings of ancient Greek, Roman, and medieval thinkers. Highlights include the meaning of justice in Plato's "Republic" and the accounts of citizens and constitutions in Aristotle's "Politics"; Cicero's grappling with the purpose of the Roman republic; and Augustine's challenge to such accounts in light of divine purposes. We then turn to Thomist approaches to ethics and politics, and conclude with medieval controversies about the relation between church and state.

Schedule: 10:00 am - 10:50 am M W

POL 318 Law and Society
Professor: Sarah L. Staszak

Description: An examination of courts as unique legal and political institutions with distinctive approaches to resolving disputes and formulating law and public policy. Emphasis is on the American legal system.

Schedule: 10:00 am - 10:50 am T Th

POL 319 History of African American Political Thought
Professor: Desmond D. Jagmohan

Description: This course explores central themes and ideas in the history of African American political thought: slavery and freedom, solidarity and sovereignty, exclusion and citizenship, domination and democracy, inequality and equality, rights and respect. Readings will be drawn, primarily, from canonical authors, including Harriet Jacobs, Frederick Douglass, Martin Delany, Booker T. Washington, Anna Julia Cooper, Ida B. Wells, W. E. B. Du Bois, Marcus Garvey, Ralph Ellison, Kwame Ture and Charles Hamilton, and Martin Luther King, Jr. This is an introductory course, which emphasizes both thematic and historical approaches to political theory.

Schedule: 09:00 am - 09:50 am M W

POL 320 Judicial Politics
Professor: John Kastellec

Description: This course provides an introduction to the political science of law and courts. Topics typically include: bargaining and decision making on the U.S. Supreme Court; political struggles over doctrine within the judicial hierarchy; the politics of Supreme Court nominations; juries as political institutions; court packing, jurisdiction stripping and judicial intimidation.

Schedule: 11:00 am - 11:50 am M W

POL 325 The Presidency and Executive Power
Professor: Lauren Wright

Description: Topics to be covered include the origin, nature, uses and limits of presidential power; the presidential selection process; the relationship between the President and other significant political actors--Congress, the Press, executive branch agencies, and the public; presidential accountability and the importance of presidential personality.

Schedule: 09:00 am - 09:50 am M W

POL 326 Constitutional Difficulties in the Age of Trump
Professor: Keith E. Whittington

Description: The unexpected election of Donald Trump in the fall of 2016 has ushered in a host of debates about less familiar features of the U.S. Constitution. A political outsider and populist, President Trump has pushed on inherited constitutional practices and assumptions. In an era of highly polarized politics, his opponents have likewise made innovative use of constitutional institutions and powers. The Trump presidency has generated unusual concerns about the stability and robustness of the American constitutional system. This course will try to make sense of those concerns and the constitutional debates of the past two years.
**Schedule:** 10:00 am - 10:50 am M W

**POL 332 Topics in American Statesmanship - The Early American Republic: Judicial Career of John Marshall**

**Professor:** Matthew J. Franck

**Description:** Examines the political career and jurisprudence of the fourth Chief Justice of the United States, as Marshall interacted with his fellow judges and with political leaders from George Washington to Andrew Jackson, with attention to his judicial opinions in political context, and to his extracurial writings, chief among them his Life of George Washington, which will be assigned in the form of Marshall's own one-volume abridged edition. Interpretations of Marshall's career in secondary literature will also be considered.

**Schedule:** 02:30 pm - 03:20 pm M W

**POL 336 State Politics and American Federalism**

**Professor:** Patricia A. Kirkland

**Description:** This course provides an introduction to state politics and federalism in the United States. Broad themes include the role of states in American federalism, state political institutions, elections and political participation. We will focus on a variety of topics, including federal-state and state-local relations, interstate competition and cooperation, parties and elections, redistricting, and direct democracy. We also will examine subnational public policy in domains such as health and welfare, budgeting, the environment, and immigration.

**Schedule:** 02:30 pm - 03:20 pm T Th

**POL 349 Political Economy**

**Professor:** German S. Gieczewski

**Description:** Examine the role of political institutions in facilitating or hindering economic prosperity. We start with the basic tools of political economy – collective action, elections, and delegations. These tools are them applied to the problems of controlling rulers, and the persistence of inefficiency.

**Schedule:** 11:00 am – 11:50 am T TH

**POL 374 Russian and Post-Soviet Politics**

**Professor:** Mark R. Beissinger

**Description:** This course surveys the politics of Russia and the post-Soviet states, focusing on the four major political challenges that these states confront: state-building, nation-building, democratization, and economic development. Particular attention is given to the ways in which the Soviet experience continues to shape the politics of the Eurasian region, nation-building and identity politics, modes of authoritarian rule and democratization, the politics of energy, and the role of external actors and Russian policies in affecting the political evolution of the region.

**Schedule:** 02:30 pm - 03:20 pm M W

**PSYCHOLOGY**

**PSY 101 Introduction to Psychology**

**Professor:** Joel Cooper

**Description:** The study of human nature from the viewpoint of psychological science. Topics range from the biological bases of human perception, thought and action to the social-psychological determinants of individual and group behavior. This course can be used to satisfy the science and technology with laboratory general education requirement.

**Schedule:** 11:00 am – 11:50 am M W

**RELIGION**

**REL 244 Judaism, Christianity, and Islam: Their Emergence in Antiquity**

**Professor:** Moulie Vidas

**Description:** The period studied in this course saw wide-ranging transformations that inform religion and culture to this day, such as the emergence of the traditions now called Judaism, Christianity and Islam, a spread in allegiance to a single God, and a
decline in public animal sacrifice. The course will introduce students to a critical examination of these changes. We will learn to identify patterns across different traditions, uncover the ways these traditions shaped one another, trace the development of beliefs from their earliest forms, and analyze the social and political context of these changes.

**Schedule:** 1:30 pm - 2:20 pm T Th

**REL 246 Ancient Judaism from Alexander to the Rise of Islam**  
**Professor:** Martha Himmelfarb

**Description:** This course offers an introduction to the development of ancient Judaism during the eventful millennium from the establishment of the Torah as the constitution of the Jewish people in the fifth century BCE—an event that some have seen as marking the transition from biblical religion to Judaism—to the completion of the other great canonical Jewish document, the Babylonian Talmud, in perhaps the sixth century CE.

**Schedule:** 10:00 am - 10:50 am T Th

**REL 252 Jesus: How Christianity Began**  
**Professor:** Elaine H. Pagels

**Description:** Who was Jesus of Nazareth, and how do we know about him? Why did some interpretations of truth -- and his message -- win out over others? How have these particular ways of thinking influenced western culture, shaping our views of politics, race and ethnicity, sexuality and gender, civil and human rights even now? To answer questions like these, we'll investigate the earliest gospels, letters, Jewish and Roman sources, prison diaries and martyr accounts -- as well as how artists, filmmakers, musicians and theologians interpret them. Regardless of religious background, or none, you will learn a lot, and be able to contribute.

**Schedule:** 11:00 am - 11:50 am M W

**REL 261 Christian Ethics and Modern Society**  
**Professor:** Eric S. Gregory

**Description:** An introduction to ethical controversies in public life in light of modern disputes over the interpretation of Christian thought and practice. Is Christianity fundamentally at odds with the ethos of liberal democracy oriented toward rights, equality, and freedom? What do Christian beliefs and moral concepts imply about issues related to feminism, racism, and pluralism? What is the relationship between religious convictions, morality, and law? Special emphasis on selected political and economic problems, sexuality and marriage, bioethics, capital punishment, the environment, war, immigration, and the role of religion in American culture.

**Schedule:** 11:00 am - 11:50 am T Th

**REL 264 Religion and Reason**  
**Professor:** Andrew Chignell

**Description:** An examination of the most influential theoretical, pragmatic, and moral arguments regarding the existence and nature of God (or gods). Along the way, we consider debates about whether and how we can talk or think about such a being, and about whether mystical experience, miracles, and the afterlife are intelligible notions. Finally, we consider whether religious commitment might be rationally acceptable without any proof or evidence, and whether the real-world fact of religious diversity has philosophical implications. Course readings will be taken from both historical and contemporary sources.

**Schedule:** 10:00 am - 10:50 am M W

**SLAVIC LANGUAGES AND LITERATURES**

**SLA 219 Pushkin, Gogol, Dostoevsky:**  
**Introduction to the Great Russian Novel**  
**Professor:** Michael A. Wachtel

**Description:** A study in English of masterpieces of Russian literature from the late eighteenth to the mid-nineteenth
century. The focus of the course is on close readings of individual works. At the same time, we will pay close attention to the way a distinctively Russian national tradition is created, in which writers consciously respond to the works of their predecessors. No previous knowledge of Russian language, history, or culture is expected.

**Schedule:** 1:30 pm - 2:20 pm M W

**SOCIOMETRY**

**SOC 101 Introduction to Sociology**  
**Professor:** Timothy J. Nelson

**Description:** This course will introduce students to the discipline of sociology (the systematic study of human groups, institutions and societies). Students will learn the major theoretical approaches within the field as well as the diverse research methods used in sociological investigations. These tools will be applied to a wide variety of special topics studied by sociologists, including family, work, education, religion and social movements, as well as dynamics of class, gender, race and ethnic inequalities within and across countries.

**Schedule:** 11:00 am - 11:50 am M W

**SOC 207 Poverty in America**  
**Professor:** Matthew Desmond

**Description:** This course investigates poverty in America in historical and contemporary perspective. We will explore central aspects of poverty, including low-wage work and joblessness, housing and neighborhoods, crime and punishment, and survival and protest. Along the way, we will examine the cause and consequences of poverty; study the lived experience of severe deprivation and material hardship; evaluate large-scale anti-poverty programs with an eye toward what worked and what didn’t; and engage with normative debates about the right to housing, living wages, just punishment, and other matters pertaining to American life below the poverty line.

**Schedule:** 9:00 am - 9:50 am M W

**TRANSLATION AND INTERCULTURAL COMMUNICATION**

**TRA 200 Thinking Translation: Language Transfer and Cultural Communication**  
**Professor:** David M. Bellos

**Description:** What is translation? What is a language? So essential and widespread is translation today that it has become a central analytic term for the contact of cultures, and a paradigm for studying many different aspects of our multilingual world. This course will consider translation as it appeared in the past, but especially as it constructs everyday life in the contemporary world. It will look at issues of anthropology, artificial intelligence, diplomacy, film, law and literature that involve interlingual and intercultural communication. Students should acquire an understanding of the problems and practices of modern translation.

**Schedule:** 11:00 am - 12:20 pm T

**WOODROW WILSON SCHOOL**

**WWS 302 International Development**  
**Professor:** Alicia Adsera

**Description/Objectives:** This course focuses on less developed countries. Covered topics include economic growth; economic inequality, poverty and personal well-being; foreign aid; credit markets and microfinance; population change and gender inequality; health and education provision, and labor markets. The course tackles these issues both theoretically and empirically.

**Schedule:** 10:00 am - 10:50 am T Th

**WWS 307 Public Economics**  
**Professor:** Elizabeth C. Bogan

**Description:** The role of government in
promoting efficiency and equity in the U.S. economy. Conditions when markets fail to be efficient. Problems with government allocation of resources. Economic analysis and public policies regarding health care, education, poverty, the environment, financial regulations and other important issues.

**Schedule:** 3:30:00 pm - 4:20:00 pm T Th

**WWS 331 Race and Public Policy**  
**Professor:** Douglas S. Massey

**Description:** Analyzes the historical construction of race as a concept in American society, how and why this concept was institutionalized publicly and privately in various arenas of U.S. public life at different historical junctures, and the progress that has been made in dismantling racialized institutions since the civil rights era.

**Schedule:** 11:00 am - 11:50 am M W

**WWS 345 Prejudice: Its Causes, Consequences, and Cures**  
**Professor:** Stacey A. Sinclair

**Description:** Prejudice is one of the most contentious topics in modern American society. There is debate regarding its causes, pervasiveness, and impact. This goal of this course is to familiarize students with the psychological research relevant to these questions, particularly its cognitive aspects. We will review theoretical perspectives on prejudice to develop an understanding of its cognitive, affective, and motivational underpinnings. We will also discuss how these psychological biases relate to evaluations of, and behavior toward, members of targeted groups. Finally, research-based strategies for reducing prejudice will be discussed.

**Schedule:** 11:00 am - 11:50 am M W

**WWS 370 Ethics and Public Policy**  
**Professor:** Stephen J. Macedo

**Description:** The course examines major moral controversies in public life and differing conceptions of justice and the common good. It seeks to help students develop the skills required for thinking and writing about the ethical considerations that ought to shape public institutions, guide public authorities, and inform the public's judgments. The course will focus on issues that are particularly challenging for advanced, pluralist democracies such as the USA, including justice in war, terrorism and torture, paternalism, markets and distributive justice, immigration, and refugees and the place, if any, of religious arguments in politics.