Fall 2018 Topics Courses

ENVE 4961 Photobiology
This senior level course explores the fundamentals of light and its effects on living systems. Students will explore how light contains and distributes information as well as energy. Perception, photodamage, acclimation, the dynamics of plant physiological systems and the use of photobiological responses to produce nutrient rich foods through the engineering of lighting systems are discussed.

3 credit hours
Instructor: Tessa Pocock

ITWS-6962 – Big Data Policies
Learn about: what data policies really are, and how buzz words muddy the waters; the ‘hot topics’ in data policy right now (hint – they include privacy, security, and sharing); how to critically analyze and evaluate the effectiveness of data policies; what other countries are thinking about with respect to data policies; who makes these policies anyway, and why; what technologies have to do with all of this; what roles politics, culture, economics, and other seemingly unrelated disciplines have to do with data policies; and how specific implementation of some data policies may help address current societal issues. Who should enroll: Students who are interested in how data policies are made and evaluated; anyone who will be working in the data analytics, informatics, business analytics, or other data-related field; anyone who likes to critique an argument, or who wants to learn how; anyone who has wondered what happens to all of that collected data; anyone who wants to understand the broader connections inherent in policy formulation. You will work in teams to analyze and evaluate specific aspects of current data policies, and present your analysis to the class.

3 credits
Instr. – Fontaine

ITWS-4960/6960 – Database Systems
Discussion of the state of practice in modern database systems, with an emphasis on relational systems. Topics include database design, database system architecture, SQL, normalization techniques, storage structures, query processing, concurrency control, recovery, security, and new directions such as object-oriented and distributed database systems. Students gain hands-on experience with commercial database systems and interface building tools. Programming projects are required.

Prerequisites/Corequisites: Prerequisite: CSCI 2300 or permission of instructor.

3 credits
Restricted to ITWS/ITEC majors
CIVL 4961 Bedford Digital Tools Development

Digital application instruction and related explorations are integral to the studio, designed to provide a critical forum and to facilitate both the development of the design and its systematic documentation. While the end results will be representational including diagrams, renderings, and graphic instructions for construction, explorations will target how digital tools can become procedurally integral with design and how they can open up greater opportunity for creative design study. Digital techniques will be investigated as developmental tools rather than an assistant representational technology. Parametric modeling will also be utilized to help manage and clarify complex relationships between systems and environments. We will be working with a master model / Building Information Modeling (BIM) logic, in which a single application software will be the predominant digital resource, and workflow becomes essential to the successful development of the project. The computer, like any other design tool, has its place. There are more and less appropriate applications for any method, and the various computational techniques will be used together with analog modes of working.

1 Credit hour
Instructor: TBA

ARCH4960 Seminar in Sensory Culture

The Seminar builds an understanding of the role of senses in a broad range of cultural productions through readings, writing, discussion, and projects. Source material will be drawn from neuro- and cognitive science, philosophy, art, medicine, psychiatry, perceptual psychology, performance and epistemology. First person experiences by means of field trips to art, music, performances and/or installations will be required in lieu of textbooks.

2 credits
Instructor: Ted Krueger

ARCH4961 Veil and Beam: Architectures of Espionage in Cinema

Emerging from the literature of James Fenimore Cooper's "The Spy" (1821) and Robert Erskine Childers' "The Riddle of the Sands" (1903) came a lively and secretive cinema - of espionage. From "Spies" (Lang, 1928) to much of Hitchcock's oeuvre, the genre has made for an inexhaustible set of spaces, plot devices and syntactic layers that restrict viewers, thrill them and construct the visual forms of our greatest personal phobias, social anxieties and conspiracy theories. "Veil and Beam" will examine the architectural and technical aspects of spy cinema, the (often) political agendas of the filmmakers, and provide a close-viewing of the observer 'observing' (and being observed). The films studied have a specific relationship to architecture and include The Man Who Knew Too Much (1934 and 1956, Hitchcock); The Third Man (1949, Reed); 5 Fingers (1952, Mankiewicz); North by Northwest (1959, Hitchcock); Dr. No (1962, Young); The Conversation (1974, Coppola); Tinker, Tailor, Soldier, Spy (1980, BBC; and 2011, Alfredson); and a recent masterpiece, The Lives of Others (2006, von Donnersmarck).

2 credits
Instructor: Michael Oatman
ARCH4963  Contemporary Ceramic Assemblies

This course provides a platform, in the form of ceramics, to execute and deploy digital design, material and engineering principles at full scale using the SOA clay printer, and kiln. Instruction will be conducted as a seminar and workshop and will introduce design methodologies that are unique to ceramic processes through the process of designing a ceramic assembly.

2 credits

Instructor: Rhett Russo

ARCH4964  Projecting Light

"The relationship between light, projective geometry and drawing existed since antiquity. Different aspects of light are examined in mini-labs through their literary origins parallel to physical and optical explorations with light. The concluding project is a light construction that explores a thesis about projection in physical form."

Yael Erel.

Credits 2.

ARCH4965  Sculpting the Intangible: The Phenomenological experience in Arch

Light and materiality, intrinsically attached to the spatial experience, is able to affect, transform and stimulate not only our visual, but our mental and even bodily perception of things. This seminar intends to refine our ways of seeing by examining different artifacts, buildings, and expressions that engage with the phenomenological.

Elena Perez-Guembe.

Credits 2.

ARCH4966  Portfolio Development

The portfolio is a critical document standing on its own as both a representation of an architect’s (or graduating architect’s) body of work as well as a projection of the depth and breath of it’s authors imagination. More often than not you will depend on the impact and clarity of your portfolio as the primary vehicle for gaining future opportunities, whether in a top tier design office, an academic institution or when applying for commissions. Many of these opportunities are evaluated on the portfolio alone with no space for leveraging the public presentation skills of a seasoned graduating architecture student. More than a mere collection of projects, the portfolio demands a finely crafted set of editorial strategies that encompasses an array of visual representation skills, editorial skills, graphic design, book design and the subtle art of persuasion through non-verbal communication.
This seminar requires you to reassess your work and develop a global editorial strategy where you position your entire body of work in the framework of an architectural thesis. Drawings will be remade, renderings will be reworked and regenerated, layouts scrutinized and the conceptual underpinnings of any given project will be interrogated for its value and contribution to the larger narrative you will create around your work. The course will not seek to develop a complete portfolio, rather to identify a top level editorial approach and layout in connection with an in-depth reassessment and re-presentation of a number of projects. This process will allow you to develop the editorial approach of your portfolio and to clarify the expectations of each page, each project, through the in-depth reassessment of individual projects.

Lonn Combs.

Credits 2.

ARCH4968 Nature and Arch in the times of Digital Reality Consequences and Hopes

"Transformation of information, not energy, is the fundamental building block of the universe." (Norbert Wiener, Cybernetics 1949) "Life is just bytes and bytes and bytes of digital information" (Richard Dawkins, River out of Eden 1995) We are walking already "in the digital age of biology in which the once distinct domains of computer codes and those that program life are beginning to merge, where new synergies are emerging that will drive evolution in radical directions." (Craig Venter, Life with Speed of Light 2013)

In the seminar we will study the new frontiers of architecture of the future.

Zbigniew Oksiuta.

Credits 2

MATH-6790 Wave Motion

Waves underlie a multitude of phenomena in nature and technology. This course is concerned with the mathematical analysis of systems of equations with wavelike solutions. Analytical and asymptotic methods are emphasized. Both linear and nonlinear waves are examined with examples chosen from a variety of application areas including acoustics, solids and fluids, compressible gas dynamics and reactive media.

Prerequisites: MATH 4600 and MATH 4500 respectively. Acquaintance with elementary mechanics of solids and fluids, and with asymptotic and perturbation methods, will be helpful but is not essential.

Credit Hours: 4

Instructor: Ashwani Kapila (660000644)
MATP-6960 Geometric Methods for Data Processing

Processing and analyzing data in 3D and higher are crucial topics in many fields such as computer vision, 3D modeling, medical image analysis etc. Topics of this course includes fundamental concepts of differential manifolds, computation of basic geometric quantities, numerical methods for solving PDEs on Riemannian manifolds and applications to data analysis.

Prerequisites: Multivariable calculus, Numerical linear algebra, Numerical differential equations.

Credit Hours: 4

Instructor: Rongjie Lai (661411085)

ISYE-6961 Stochastic Models-Optimization

Prerequisites: Courses that demonstrate a solid mathematical background and knowledge about optimization. Please talk to the instructor should you be concerned about your background.

Description: This graduate level course will focus on prescriptive analytics for decision-making environments characterized by high degrees of uncertainty. A variety of modeling approaches will be discussed including Markov Decision Processes (MDPs), partially observable MDPs, stochastic programming, and robust optimization. The course will not only present these modeling approaches but also on examining effective algorithms to solve the problems at scale. These algorithms include large-scale linear programming methods, approximate dynamic programming/reinforcement learning, and sample average approximation. Students will be expected to complete a course project relevant to their research area in the hopes that it could lead to results for inclusion in their thesis.

ISYE 4960/6960: Introduction to Cyberphysical Systems

Cyber-Physical Systems (CPS) are a mechanism that is controlled or monitored by computer-based algorithms, tightly integrated with the physical environment or a biological system. In CPS, physical and software components are deeply intertwined, each operating on different spatial and temporal scales, and exhibiting multiple and distinct behavioral modalities, and interacting with each other in a myriad of ways that change with context. Examples of CPS include smart grid, autonomous automobile systems, medical monitoring, process control systems, robotics systems, and automatic pilot avionics.

Introduction to CPS provides students with the opportunity to learn the different principles entailed in the analysis and design of CPS. In the context of this year’s class, the application technology chosen was brain interfaces, motivated by the multitude of initiatives released by Silicon Valley companies that will likely shape the job market landscape. Examples include, for instance, the NeuraLink by Elon Musk, and typing-by-brain from Facebook. Consequently, the interplay between brain (i.e., the physical system) and its interface (i.e., the hardware and software components) will be explored from a practical and formal perspective. Due to the high interdisciplinarity of the topic, the course is structured in four parts: (i) the organization of the brain, and dynamics at different time-scales; (ii) determine the main features and their neurophysiological translation; (iii) classification of the features using statistical analysis and machine learning; and (iv) executing a task in open and closed-loop fashion.
In summary, the students will generally gain an understanding of the fundamental aspects required for the design and analysis of computational systems that are integrated with physical processes. In particular, the students will be equipped with skills and understanding regarding brain interfaces that will uniquely position them in the new market landscape and get a transversional (i.e., interdisciplinary) educational experience.


**ECSE 4962 Introduction to Machine Learning**

Course Description (Catalog Course Description)


**ECSE 4961/6961 - Modeling & Simulation for Cyber-Physical Systems**

Course description:

This course develops a solid basis for students to model and simulate cyber-physical systems using computer-based object-oriented equation-based modeling languages and tools with the goal of building models with high reusability. The course covers both theoretical and practical issues related to numerical simulation methods for CPS, including continuous time, discontinuous/discrete and timed clocked systems. Aspects of code-generation and real-time simulation for embedded systems are introduced. These foundations allow for the modeling and simulation of embedded systems which will be carried out “virtually” (by simulation) and physically using the Arduino and Raspberry Pi.

**BIOL 6960 Current Topics in Cytoskeletal Research**

This course approaches the function of the nervous system from a cell biological perspective. Neurons have a unique organization that facilitates their role in signal transmission and information processing. This course will explore the mechanisms that develop and maintain neurons and the unusual cell-biological problems these cells solve. Students will learn about modern experimental tools and how they are applied in neuroscience research. Students engage with current scientific literature, learn to evaluate it critically, and develop a research project.

Pre-Requisites: BIOL 4260 or BIOL 6260 and BIOL 4100 or permission of the instructor
PHYS-4963 Condensed Matter Theory Seminar

Course description

The weekly condensed matter theory seminar will bring together graduate students, postdocs, researchers, and faculty to discuss current topics in the physics of condensed matter theory. The students will earn one credit for their participation. Advanced topics such as many-body quantum physics, use of modern computational techniques to solve new solid state physics problems, and other contemporary subjects will be treated.

Prerequisites: none

Notes: students need to manually register to get into this course. It is limited to students actively involved in CMT research.

Credit Hours:  1

Instructor:  Vincent Meunier (660985977)

CSCI 4964/6964 01 Cognitive Computing

Credits: 4

Prerequisite: CSCI 2300 or permission of instructor

Cognitive Computing is a term being used for a new generation of artificially intelligence computers that interact with humans in new and important ways. Rather than human-machine interaction, cognitive computing is said to be leading to a new generation of human-machine collaboration, where computers help humans gain new insights into problems via a suite of technologies ranging from natural language to machine learning. The "coming of age" of cognitive computing was demonstrated when IBM's Watson program beat the world's experts at the TV gameshow Jeopardy! The 2015 announcement of the Cognitive and Immersive Systems Lab (CISL), a collaboration between the IBM Research and RPI, explores new research in human-scale situations rooms for human-machine partnership. In this course, we will explore several types of cognitive computing architectures, including Watson, neuromorphic computing, and agent-based modeling, and try to discover, via team projects motivated by the students in the class, what, if anything, is truly new and exciting in this technology space. Students should be willing to work in small teams on research-related projects requiring the teams to define, plan and implement their approaches. (Note that some of the classes will be held in CISL research spaces).

CSCI 4965 01 RCOS

Credits: 0

Prerequisite: CSCI 1200 and a 2000-level course in CSCI, ECSE, or ITWS

This 0-credit non-graded course offering is an administrative means to obtaining a full roster of students participating in RCOS. RCOS (Rensselaer Center for Open Source) is an eclectic group of undergraduate students that embark on individual and team-based open source projects, primarily software, but also open hardware projects. Many new projects are introduced each semester, though many ongoing and higher-profile projects are undertaken, as well. Students are required to work on and contribute to open
source projects, maintain a blog, and present to the group during the semester. Students may earn independent study credit hours, a limited stipend, or do RCOS for the experience only.

**CSCI 4963/6963 Large-Scale Programming and Testing**

This course focuses on software development techniques in support of large-scale software projects and maintenance. Specific topics include various programming paradigms and techniques, approaches to testing and automation, debugging, refactoring, and inheriting code. Individual and team assignments are required, including programming assignments. Project topics include text processing, building a search engine, and the like.

Prerequisites/Corequisites: Prerequisites: CSCI 2300

(4) **CSCI 4969/6966: prereq is CSCI 2300; description:**

"A project-oriented coding course in which we will examine Linux kernel code and make modifications to the operating system. Part of the course will be a survey of the kernel and organization of subsystems, but the primary focus will be in the networking code. Students should have a good grasp of operating systems concepts and C programming before taking this course, and be willing to run a virtual machine on their computer. Projects may be open-ended and will likely involve group work."

(5) **CSCI 4977/6962: prereq is CSCI 2300; description:**

"This course is an interdisciplinary introduction to network resilience and its applications in both science and engineering. Classes will interchangeably present the chapters from these textbooks with emphasis on the current active research related to network resilience, robustness, stability, and control. Topics to be covered include the network theory, dynamical systems, data analysis, and applications to biology, ecology, sociology, technology, and other fields. Students will learn about the ongoing research in the field, and ultimately apply their knowledge to conduct their own analysis of a real network data set of their choosing as part of the final project."

(6) **CSCI 6969: description:**

"This course provides graduate students with invaluable information and guidance for succeeding as a graduate student in computer science. Specific topics covered by faculty and guest speakers each week include writing papers and proposals, giving talks, finding and reading research papers, fellowship applications, career paths after graduate school, and so on."

**MGMT 4960: Student Managed Investment Fund**

The Student Managed Fund course actively invests real capital using financial market principles. The goal of the fund is to produce excess returns consistent with the performance of long/short hedge funds through the use of fundamental, technical, and quantitative strategies driven by economic fundamentals. The goal of the course is to directly apply, in a real world environment, the analytical financial skills developed within other Lally courses and to provide students with both instructor and peer real-time feedback for their work. Students will be actively engaged in discussion of economic events, market developments, investment strategies, and portfolio risk in every class session."
**MTLE 4960/6960  Material Informatics and Data Science**  Credit Hours: 3  
Introduction to machine learning and data science, with case studies in discovery of structure-property relationships and new materials from experimental and computational data. Brief review of required background in linear algebra and statistics with hands-on exercises in Python. Data science topics: model fitting, clustering, dimensionality reduction, ontologies, Bayesian inference and design of experiments.

Prerequisites: CSCI 1100 and MATH 2010, or permission of instructor.

**MANE-2960-Thermodynamics**

Introduction to the First and Second Laws of Thermodynamics for open and closed systems. Thermodynamic properties of solids, liquids, and gases. Elementary power and refrigeration cycles.

NOTE: this course is only for Class of 2021 Mechanical Engineering and Nuclear Engineering students who opt in to the Class of 2022 curriculum.

**MANE-4946-Control Systems Engineering**

Cross-listing of ECSE-4440 Control Systems Engineering. Prerequisite: ECSE-2410 Signals and Systems, or MANE-4050 Modeling and Control of Dynamic Systems and ENGR-2300 Electronic Instrumentation. Students may not get credit for both ECSE-4440 and this course.

**MANE-6960-Experimental Methods in Macro/Micro Fluid Dynamics**

Theory and practice of experimental fluid mechanics at macro and micro length scales will be studied primarily through lectures and augmented with a few laboratory demonstrations.

Topics will include:

1. Necessary tools (fundamentals of optics, including geometric optics and Gaussian optics, microscopy, lasers; also signal processing);
2. Flow visualization (topics ranging from Schlieren imaging to laser-induced fluorescence);
3. Velocity measurements (including the theory and practice of laser-Doppler velocimetry; particle image velocimetry, including cross-correlation and auto-correlation techniques; hot-wire anemometry, etc.); and
4. Interfacial measurements (including nonlinear optics and Brewster angle microscopy).

Prerequisite: At least one course dedicated to the fundamentals of fluid mechanics, such as MANE-4070 Aerodynamics 1, MANE-4800 Boundary Layers & Heat Transfer, or MANE-6520 Fluid Mechanics
MANE-6961-Advanced Heat Transfer
Graduate level cross-listing of MANE-4710 Heat Transfer. Students may not get credit for both courses.

MANE-6962-Experimental Mechanics
We will study the design and analysis of experiments in solid mechanics, including some applications in biomechanics. Methods for experimental stress analysis and the mechanical testing of materials will be discussed. Measurement techniques, instrumentation, and data acquisition for key mechanical parameters such as displacements and forces (point and full-field measurements). Mechanical behaviors include creep and relaxation, high strain rate, fracture, fatigue, and aspects of biological soft tissues.

MANE-6963-Advanced Design Optimization
Graduate level cross-listing of MANE-4280 Design Optimization. Students may not get credit for both courses.

MANE-6967-Rotorcraft Dynamics and Aeroelasticity
The course will cover rotor flap dynamics and related mathematical concepts in detail, coupled flap-lag-torsion dynamics, aeroelastic stability in hover and forward flight, aeromechanical instability (ground and air resonance), rotorcraft vibration, and vibration reduction concepts.

Prerequisites: MANE-4900 Aeroelasticity & Structural Vibrations and MANE-4200/-6060 Rotorcraft Performance, Stability, and Control, or equivalent.

IHSS-69XX Postmodernism, Poststructuralism, Technoscience
Atsushi Akera
The course will operate like a guided reading seminar where students (as well as visiting faculty) are expected to contribute deeply to the conversation. Interdisciplinary perspectives, and cross-disciplinary conversations about the diverse use of social theory in different fields will be encouraged.

COMM 496X: Social Media & Popular Culture in Contemporary China
Helen Zhou
This course explores the ways in which Chinese culture shapes social media and popular culture in contemporary China. Through readings, guided explorations, and original research, students will learn about the different uses of Chinese social media for socializing, gaming, publicizing, and commerce. Students will gain knowledge and develop critical perspectives of Chinese social media and popular culture vs. their western equivalents. This course will be taught in English. No proficiency of Chinese is required for coursework. Course can be used to meet Chinese Minor requirement.
COMM 296X: Board Games as Storytelling Systems
Maurice Suckling

Recent developments in board game design have given us numerous examples of games where the focus is on narrative engagement for players. We now see a number of games where the essence of the experience is not so much about winning or losing, but on the design of game systems that both facilitate and encourage storytelling, sometimes cooperatively, other times not. For game writers and game designers alike, understanding the often-sophisticated interplay between narrative and design is imperative. Whether a game is ultimately destined for a digital incarnation or not, paper prototyping is a highly effective way to quickly and efficiently move through design iterations, so taking time to ‘look under the hood’ of game systems to understand how they work can prove extremely useful for analog and digital game designers alike.

This course will mix analysis with practical engagement. Most games on the syllabus will be played, at least once. Students will generate short written summaries of their thoughts in response.

ARTS 296X: Sound Recording & Production
Justin Yang

This course covers historical, theoretical, practical and creative aspects of sound recording and production. Topics include microphone theory and placement, acoustics, recording studio use, mixing desk use, digital audio workstation, mixing, editing, and mastering.
Term: Summer I
Day/Time: M/R 10:30-12:35
Space: DCC
Size: 18

WRIT 196X: Introduction to Creative Writing: New Ways into Mystery
Shira Dentz

In this class we will read and write poetry, fiction, and creative non-fiction. Emphasis will be on students generating their own creativity and in-class and out-of-class exercises will foster discovery.

Language will be approached like a musical instrument, and students will practice flow on its keys through a writer’s notebook and guided prompts, tuning their senses, with the eventual goal of composing artful pieces. Students will learn literary terms and how to read creatively, looking to published literary pieces as models—we will discuss both our reactions to the texts we read and the authors’ techniques for achieving those effects. You will receive feedback from me and from your classmates on drafts of your writing, and will use these suggestions to revise your work. The willingness to imagine and a good grasp of basic English grammar are prerequisites for this course. Requirements include keeping a writer’s notebook, active class participation, and regular attendance, as well as a final portfolio.

This class will be structured according to aspects of craft, rather than by strict divisions between genres. Our focus will be mostly on the short piece, so that we may pay close attention to the many juggling balls a writer needs to balance in the making of a creative writing piece, and, as William Blake said, “To see a World in a Grain of Sand And a Heaven in a Wild Flower, Hold Infinity in the palm of your hand And Eternity in an hour.”
IHSS 196X: War & Society
Patrick Royer
This course examines how culture and society shape war, and inversely how war shapes culture and society. It views war through the lens of social sciences, particularly of cultural anthropology, political science, and philosophy. Some of the issues we will discuss include the study of different types of war (for example, civil war, asymmetric war), the notions of pacification and nation-building, the role of rituals and of discipline in the military institution, the relations between weapons/technology and culture, between war and religion, and even between war and sports. Students will be introduced to a few major thinkers and to key concepts and themes in social science related to war, culture, and society. We will also examine war from an ethnographic perspective (the description of different cultures) with case studies ranging from the role of war in non-western societies to the ways in which war has affected American culture.

While the course includes some history of warfare, it is not primarily concerned with military history, and it will not cover debates not directly associated with the institution of war such as the relation between violence and human nature.

COMM 296X: Language in Real Time
Sarah Seeley
This course offers an introduction to theories and methods used to study language in its real time contexts. We will begin by exploring the structure of sounds, words, and phrases. We will move on to investigate how language variation at those structural levels bleeds into social life—including the cultural and socio-historical production of identities, ideologies, and inequalities. A series of writing assignments will allow students to participate in both public and academic debates about language. Students will learn to conceptualize critical thinking and composing as processes—including the creation, development, organization, and revision of ideas and arguments.

ARTS/GSAS 496x/696x: AR Design for Cultural Heritage
Rebecca Rouse
Students work in interdisciplinary teams to design and develop functioning prototype mobile augmented reality (AR) applications for cultural heritage. This semester, students will collaborate with the City of Cohoes to develop a series of interactive murals to accompany new parks in the historic downtown district. Students with backgrounds in computer science, games, visual media, sound design, HCI, architecture and storytelling are welcome.

IHSS-196X: History of Jazz and Improvised Music
Matthew Goodheart
In the century since the first commercial jazz recording, the energy, vitality, and challenging nature of jazz has had a major impact on music throughout the world. This course explores the emergence, evolution, and influence of jazz in America, Europe and beyond, and examines the many controversial musical, social, and philosophical questions it continues to provoke.
IHSS 196X: Music and Nature
Justin Yang
Music and Nature is a course exploring the intersections between music and nature from a variety of disciplinary perspectives – artistic, scientific, spiritual/religious. Music will be approached as artistic expression, drawing on diverse world cultures, as well as a form of knowledge that can heighten our sensitivity and awareness of the environment and natural processes.

ARTS 196X: Fundamentals of Music and Sound
Matthew Goodheart
This course is a hands-on introduction to the primary building blocks of music and musicianship in a 21st Century context. The course will explore acoustics and psychoacoustics, rhythm, pitch, harmony, melody, timbre, improvisation, composition, and music notation through engaged listening practices and creative projects. No formal musical background is expected. This course may be taken by those who wish go on to Music and Sound I and II.

ARTS 296X: Contemporary Improvisation Ensemble
Matthew Goodheart
This ensemble explores a variety of contemporary group improvisational practices that draw upon the creativity of the performer to make spontaneous and original music. Among the techniques explored will be conduction, musical games, graphic and text scores, and cell- structure improvisation. No prior experience with improvisation is required, and participants from any musical background, including electronic and computer music, are encouraged to join.

ARTS 296X: Sound Recording & Production
Justin Yang
This studio based course covers the theory, practice and creative use of sound recording and production techniques. Topics include sound basics, acoustics, microphone theory and placement, mixing, mastering, recording console use, and digital audio workstations. Emphasis will be placed on hands on experience with a professional recording studio and equipment.

ARTS 496X/696X: Interdisciplinary Research Seminar: Experimental Music & Sound Art
Justin Yang
This is a history and analysis course that surveys 20th and 21st century experimental music and sound art. The last hundred years of music has been marked by continuous change, a proliferation of different styles and approaches, and challenges to what music is and can be. This course investigates experimentalism in a broad sense from the breakdown of tonality and early experiments in Expressionism and Serialism, to the rise of Modernism and Experimental Music, through post war developments of Minimalism, improvised music, computer music, and Postmodernism.

IHSS 196X: The Future of AI and HCI
Ralph Noble & Mei Si
In this course, we'll jointly explore the central ideas and anticipated societal impacts of Artificial Intelligence. What is Artificial Intelligence (AI) and how will it shape the world in the decades to come? What ideas enable machines to see, use language, and reason, and how will these machines affect the world? This course intends to introduce students to the state of art development in AI, and open the discussion of how the growth of AI impacts individuals and
society, and ultimately how we can make AI better serve people’s needs. With the rapid development of technologies, AI is playing an increasingly important role in our society. They can not only facilitate people in their everyday lives (e.g. smart home, Siri and other chatbots that provide directions and other useful information, Amazon’s drones for making deliveries), but also have the power of monitoring and manipulating people’s interaction. The study of AI therefore should come not only from the technological perspective, but also social and psychological perspectives. This course could provide an excellent gateway course for an HCI concentration where human computer interactions are construed in the broadest possible terms. This course could provide an excellent foundation for the informed and responsible use of computer-based technology.

IHSS 196X: Contemporary Africa
Cynthia Cook
This course will introduce students to the sociology of Africa via film, literature, and ethnography. Through the print and visual media, students will be exposed to the culture, health, demography, and the politics of the continent. We will study pre-colonial, colonial, and post-colonial Africa as well as contemporary economic, social, and political issues for a select group of African countries. By the end of the course you should have a better understanding of the people and culture of Africa.

ECON 496X/696X: Econometric Methods for Big Data
Chad Stetcher
Examine advanced econometric and statistical methods for the analysis of high-dimensional data, otherwise known as “Big Data.” In this setting, detailed information for each unit of observation informs machine learning techniques such as decision trees; neural nets; deep learning; classification and regression trees; penalized regressions; boosting; and bagging. Application of these techniques will include study of healthcare demand and supply modeling, and behavior of consumers and businesses. Prerequisites: ECON 1200 & MATH 2010

ECON 496X/696X: Health Economics
Jason Huh
Also cross-listed as 6000 level course Examine various facets of the healthcare industry. Application of microeconomic theory and tools will be used to: analyze healthcare demand and supply; examine the impact of public policies; study market segments such as health insurance and pharmaceuticals; explore economic choices of healthcare professionals; identify potential socioeconomic and demographic determinants of health status and healthcare; and gain insights into issues related to the ongoing healthcare policy reform. Prerequisites: ECON 1200 & MATH 1010

ECON 496X/696X: Behavioral Economics
Chad Stecher
Also cross-listed as 6000 level course Integrate theory from psychology, neuroscience, and other social sciences into traditional economic models of human behavior. By relaxing the standard assumptions of perfect rationality and selfishness, more realistic modelling features such as loss aversion, myopia, framing, mental accounting, information salience, and social norms can improve the accuracy of economic analyses. These techniques are used to analyze decision-
making across a wide range of settings with an emphasis on health behaviors, health insurance markets, and healthcare policy. Prerequisites: ECON 1200 & MATH 1010

ECON 4150/6150: Economics of Government Regulation
Vivek Ghosal
Also cross-listed as 6000 level course [This course is already in the catalog, but will undergo description changes.] Examine regulations related to the environment, intellectual property rights, healthcare, and antitrust. Examine the interaction between regulatory policies and how businesses respond to them with respect to innovation, production, and pricing. Some of the industries and markets examined to highlight the regulatory policy issues include automobiles, information technology, telecommunications and media, healthcare services, pharmaceuticals, medical devices, retail sector, high-speed rail, and taxi and ridesharing.
Prerequisites: ECON 1200 & MATH 1010.

ECON 496X: Law & Economics
Bob Jones
Market-based economies depend upon legal systems that establish and protect property rights. In this and many other instances the law is designed to encourage and support economic activity; in others it is designed to restrain certain types of otherwise rational economic behavior. This course will apply fundamental economic concepts, such as supply and demand, competition, monopoly, externalities, and Pareto efficiency to a range of legal topics, including contracts, torts, criminal, and intellectual property law to explain the economic motivation and consequences of the legal framework. For those students considering law school, this course offers an exposure to many of the legal concepts found in the first-year law school curriculum.

IHSS 196X: Principles of Economics
Sarah Parrales
Every society faces the question of choosing how to use its natural and human resources to produce goods and services and how to distribute these resources among its people. This course studies how these choices are made in markets. It also explains the determinants of total output, employment, and inflation. Attention may also be given to special topics such as the environment, trade, and population.

ARTS 696X: Composition Seminar
Composition Seminar focuses on music composition designed to prepare students for the more extensive creative work involved in the Senior Thesis. The course asks students to model a variety of compositional types of as a means to exposing them to different systems of musical organization and to help them discover a musical linguistic practice that resonates with their own creative aims.

ECON 496X The Economics of Business Cycles [4 credits]
Arturo Estrella
Examines economic models that can help explain the existence of business cycles (expansions and recessions), looking in particular at the effects of monetary and fiscal policy. The course will be communication intensive and the grade will be based in part on a paper and an in-class presentation. Prerequisite: ECON 2020 or ECON 4130
IHSS-196X: Philosophy, Technology and the Human Future
This course explores the philosophical and ethical implications of cutting edge technological developments that promise to shape – and perhaps to jeopardize – human life and society in the 21st Century: Prospects of a coming technological "Singularity," in which hyper-intelligent machines may leave humanity in the dust. Killer robots. The cloning of human beings. Genetic modification for superhuman abilities. Students will improve their insight as well as their critical reasoning skills as we examine, analyze, and evaluate each of these controversial topics through the lens of philosophical reasoning. This is a communication intensive course.

IHSS-196X: Great Ideas in Philosophy
This course invites you into the world of philosophical ideas and reasoning -- to join a great conversation that has unfolded over the past 2,500 years. We will explore such issues as whether some ways of acting and living are morally better than others, as well as philosophical issues concerning the relationship between mind and body. This course will include both frequent discussion and written assignments, and will aim to help you develop your skills in each of these modes of communication. This is a communication intensive course.

IHSS 6960: Research Methods
Michael Century
This course provides a forum for interdisciplinary graduate discourse and community at Rensselaer. Students will curate a series of presentations by guest speakers, faculty, and graduate students. Related readings and writing assignments will be based on colloquium presentations.

ECON 496X/696X: Applied Game Theory for Economics
Provide set of tools to analyze strategic interactions among rational decision-makers. Introduce basic concepts in game theory: Nash Equilibrium, pure/mixed strategies, sequential games, subgame perfect equilibrium, backward induction, and games with incomplete information. The concepts will be illustrated by numerous business applications with an emphasis on the healthcare industry and markets, including quantity and price competition, entry and exit, bargaining, and issues of adverse selection. Prerequisites: ECON 1200 and MATH 2010. ECON 2010 is highly recommended

ECON 496X/696X: Econometric Methods for Big Data
Examine advanced econometric and statistical methods for the analysis of high-dimensional data, otherwise known as “Big Data.” In this setting, detailed information for each unit of observation informs machine learning techniques such as decision trees; neural nets; deep learning; classification and regression trees; penalized regressions; boosting; and bagging. Application of these techniques will include study of healthcare demand and supply modeling, and behavior of consumers and businesses. Prerequisites: ECON 1200, MATH 2010, and one of: ENGR 2600 or MGMT 2100 or MATP 4600 or PSYC 2310. ECON 2010 is highly recommended

ECON 496X/696X: Health Economics
Examine various facets of the healthcare industry. Application of microeconomic theory and tools will be used to: analyze healthcare demand and supply; examine the impact of public policies; study market segments such as health insurance and pharmaceuticals; explore economic choices of healthcare professionals; identify potential socioeconomic and
demographic determinants of health status and healthcare; and gain insights into issues related to the ongoing healthcare policy reform. Prerequisites: ECON 1200, MATH 1010. ECON 2010 is highly recommended.

ECON 496X/696X: Behavioral Economics
Integrate theory from psychology, neuroscience, and other social sciences into traditional economic models of human behavior. By relaxing the standard assumptions of perfect rationality and selfishness, more realistic modelling features such as loss aversion, myopia, framing, mental accounting, information salience, and social norms can improve the accuracy of economic analyses. These techniques are used to analyze decision-making across a wide range of settings with an emphasis on health behaviors, health insurance markets, and healthcare policy.
Prerequisites: ECON 1200, MATH 1010. ECON 2010 is highly recommended.

COGS/PSYC 4961: Hormones, Brain, & Behavior
This course will examine hormone and brain/behavior relationships across the lifespan. Hormones are molecules that are secreted by glands (the majority of which are located outside the brain) and have distal effects on their targets, such as the brain, throughout development. A focus will be on hormones’ effects, mechanisms, and brain regions of interest for cognitive processes, such as perception, learning/memory, social cognition, motivation, and emotion.
Prerequisites: PSYC1200 or permission of instructor

COGS 4964 Sensibilities: Writing X Discipline
“Sensibilities”—a special ART_X@Rensselaer (Art Across the Curriculum) seminar—draws from the tremendous resource of EMPAC to inspire students to cultivate writing skills through the cross-disciplinary theme of the senses/perception. During the semester students will have opportunities to observe unique art/science presentations and performances in an intimate setting at EMPAC, providing rich experiences for discussions and writing. Classes include reading science and art texts, as well as writing workshops to develop authorial voice and experimentation. Prerequisites: PSYC1200, or PHIL/PSYC 2120, or permission of instructor This course is Communication Intensive.

PHIL 4960: Introduction to Inductive Logic
Selmer Bringsjord & Naveen Sundar G.
A new paradigm for (formal) logic, an intrinsically computational one, has been invented: LAMA. Hitherto, the bulk of effort in setting out the LAMA paradigm has been invested in the part of logic that is deductive in nature. The hallmark of deductive logic is that the proofs and arguments featured in it follow established inference schemata that, if applied correctly, cannot possibly lead to a reduction in semantic value. For example, if it’s certain that a given triangle in Euclidean 2-space has an angle of 45 degrees, it’s equally certain that the sum of the remaining two angles is 135 degrees, because there are inference schemata (going back to Euclid) that allow us to reason deductively, and correctly, from the first proposition to the second. In contrast, inductive logic revolves around arguments that allow reductions in semantic value. For instance, even though it may be certain that (1) most beans in the jar are blue, and that (2) bean-22 is in the jar, it’s not certain that (3) bean-22 is blue — despite the fact that (as we shall see) one can reason inductively, and correctly, from (1) and (2) to (3). This class is overall an
introduction to the side of the LAMA paradigm that is currently nascent: the inductive-reasoning side. Prerequisites: Introduction to Logic at Rensselaer (in either the "Stanford" or LAMA form), traditional high-school mathematics.

ARTS 2963: DESIGNING MUSICAL GAMES
Students will explore the artistic role of music and sound in gaming by building their own interactive sound and music-rich games and 2D/3D rendered environments. Within the context of their own creative game projects, students will learn the basics of designing sound and composing music for interactive game spaces. Using workflow programming languages and software tools, students will program basic gaming interactions, link them to interactive audio software, and create musical gaming experiences.

IHSS 496X: Generative STEM
This class trains students in STEM education techniques based on “bottom-up” value flow. Using ethnomathematics, heritage algorithms, ecological value circulation and other examples of generative justice, we will develop tools and test out learning materials in formal and informal learning environments.

IHSS 196X: DESIGN AS GLOBAL CHALLENGE
This course explores the roles of design, technology, and engineering in addressing complex global challenges spanning environmental, economic, and cultural domains. Using a project-based learning approach, the class allows students to work in interdisciplinary teams to design, propose, and advocate their own creative solutions to enduring global challenges. In addition to project work, students will be expected to do weekly reading, to discuss readings in class, and to write reflection pieces based on their readings. This course is designed to help students draw connections between modes of inquiry commonly found in the humanities, arts, and social sciences and those of engineering and the sciences. The class will meet in a once-weekly lecture and twice-weekly breakout sessions that include hands-on project work.

STSS 296X: Society by Numbers
Study of global and national population trends with an emphasis on how population growth and decline affects migration, urbanization, economic development, sustainable development, environmental degradation, food scarcity, and political conflict.

IHSS 196X: Human Rights in History
Sohasky
This course explores the historical development of modern international human rights through the lens of American foreign policy. Through lecture and discussion, this course will guide students in critical analysis of the narratives and national myths surrounding human rights in the history of the United States and the world. Major themes include the origins of human rights, human rights abuses, the human rights regime, human rights institutions, and problems of enforcement. Freshmen only.

IHSS 196X: Open Source Art, Music and Culture
Malazita
The concept of “Open Source,” once exclusively linked to a certain kind of politically and economically engaged set of software production, has experienced a period of growth and
transformation in the 21st Century. “Open Source” projects can now be found in disciplines and activities ranging as wide as computer science, hardware development, artistic practice, design, bio hacking, and social justice work, as well as in artistic and technological experimentations in LGBTQ and racially intersectional communities. Though “Open Source” practices across all these domains vary wildly, a common thread that runs through all these groups is the commitment to collaboration and to distributed “making” tools. Through a hybrid of readings, discussions, and collaborative papers and art projects, this class will explore the dynamics and politics of Open Source knowledge, collaboration, and distributed technical and artistic production. Freshmen only.

IHSS 196X: Religion in a Global World
Royer
This course explores the role of religion and ritual in the everyday lives of people around the world. It will introduce students to key concepts, themes, and debates in social science and their relevance to present-day issues. We will read classic texts and recent ethnographic reports relating to very different types of societies, from traditional non-western cultures to modern American culture. Freshmen only.

IHSS 196X: Global Health Challenges
Cook
This course explores current and emerging global health problems and possible solutions. We will compare problems in low, middle and high-income countries, examining different health challenges (associated with malaria and child birth, for example), ethno-medical practices, medical ethics, and ways environmental problems impact human health. Freshmen only.

STSS/H 296X: American History
Sohasky
This course surveys the history of the United States from the colonial era through the present. The course introduces major themes and tensions in United States politics, society, and culture. Topics will include encounters between American Indians and colonial peoples, independence, the formation of the American government, slavery, immigration, citizenship, rights, social movements, colonialism, war, and the changing identity of the United States in the world.

STSS/H: Medicine and Society
Cook
This course explores the social dimensions of health and medicine, examining factors shaping disease, access to health care, and therapeutic choices. It also explores the different stakeholders in health (doctors, nurses, patients, parents) and their interaction.

STSS 496X: STS Research Design
Kinchy
This is the first part of a two-semester senior project sequence for majors in STS Sustainability Studies and Science and Technology Studies. Students who successfully complete this course will be able to identify and investigate important research topics, construct theoretically-informed research questions, select research methods that are appropriate to their questions, review the relevant research literature, and compose compelling research proposals. Students will practice methods of locating, generating,
managing, and analyzing diverse forms of data, as relevant to their senior projects. The course also addresses research ethics and the practical challenges of carrying out a research project.

**STSS/H 496X: Gender in History**  
*Costelloe-Kuehn*  
This course is designed to complement Gender in Culture, a one credit film-based course (that students will be auto-enrolled in) exploring how gender and culture intersect in settings around the world. Gender in History will provide an opportunity to dive deeper into the topics covered by the films, discussing resonant readings and conducting original research. Researchers, activists and other members of the community will join the class as guest discussants.

**STSS 496X: Futurism: Utopias and Dystopias**  
*Woodhouse*  
Fiction-based, including sci fi, but also social and scientific scenarios on future work/leisure, radical abundance via nanotechnology, virtual realities, real democracy, transhumanism, space colonization. Classroom: Discussion, videos, oral presentations – not lecture. Major research project of student’s choice. Considerable reading.

**STSS 496X: Digital Design in History**  
*Malazita*  
This course will trace the history of digital media, design, and art from the 18th to the 21st century, focusing not only on the development of new technologies and design practices, but also on the philosophical and cultural shifts about knowledge, art, and design that occur through and with digital and electronic technology. Through a combination of readings and hands-on interactions with digital design tools, students will think through how the social and technical qualities of digital design tools influence the ways in which we construct and create art, technology, and knowledge.

**STSS 496X: Social Movements**  
*Mascarenhas*  
This interdisciplinary seminar links #blacklivesmatter movements with populist nationalism movements. We will examine these movement within four broad phenomena: 1) the rise of the U.S. prison industrial complex and its relationship to the increasing militarization of inner city communities 2) the role of the media industry in influencing national conversations about race and racism and 3) the state of racial justice activism in the context of a neoliberal Obama Presidency and 4) the increasingly populist nature of anti-Muslim and nationalism movements in the contemporary United States and Europe.

**STSS/H 496X: Archive Politics**  
*Sohasky*  
How do nations choose what information to preserve and protect, and what are the mechanisms by which nations conceal or forget? This discussion-based course will interrogate the politics of archives, museums, memorials, and other repositories of national memory. Topics include the history of collecting, the preservation and destruction of electronic data and materials, collective and national memory, barriers to access of information, the protection of information, and information in the digital age.

**ARTS 2962.01 3D BOOTCAMP**  
An introductory course in digital 3D tools and concepts, focusing on polygonal modeling, texturing, rendering, and animation; real-time 3D; sculptural and spatial design issues in digital environments; and uses of 3D for 2D print output and 3D printing.
ARTS 4965/6965.01 Hactivism
This course will explore the history, methods, ethos, and goals of hackers with special attention paid to their role in social movements. It broadly interprets the terms “hacktivism” to include computer hacking, media hacking, and “reality hacking” in the service of social change. Students will gain an understanding of why hackers have emerged as a major social force. VAMOS

COGS/PSYC 4961.01 HORMONES, BRAIN & BEHAVIOR
This course will examine hormone and brain/behavior relationships across the lifespan. Hormones are molecules that are secreted by glands (the majority of which are located outside the brain) and have distal effects on their targets, such as the brain, throughout development. A focus will be on hormones’ effects, mechanisms, and brain regions of interest for cognitive processes, such as perception, learning/memory, social cognition, motivation, and emotion. (cross-listed with PSYC4961)

WALF

COGS 4962.01 THE LINGUISTICS OF COMPUTATIONAL LINGUISTICS
This course will explore how linguistics, the scientific study of the properties of human language and languages, can be applied to the development of intelligent agents that can fluently and meaningfully communicate with people in natural language. We will focus on linguistic phenomena that have so far been particularly resistant to effective machine processing, such as lexical ambiguity resolution, reference resolution, ellipsis, indirect speech acts, implicature and non-literal language (e.g., metaphor and irony). We will pursue the hypothesis that a knowledge-oriented, linguistically-informed, meaning-centric approach to language processing is a core prerequisite for the configuration of truly sophisticated intelligent agents of the future. The course will include lectures, discussions of assigned readings, analysis of available knowledge resources and algorithms, and work on extending these resources and algorithms. No programming experience is required.

NIRENBURGH

COGS 4963/6963.01 AFFECTIVE COMPUTING
This course introduces the theories of human emotions (how it arises from and influences cognition, the body and the social environment), techniques for recognizing and synthesizing emotional behavior, and illustrates how these can be applied to application design. More specifically, we will go over the following four topics in sequence: emotion detection, emotion modeling, emotion expression, and how emotion affects cognition. The graduate and undergraduate Computer Science and Cognitive Science majors will gain a strong background in the theory and practice in human-centered computing as it relates to games, immersive environments and pedagogical applications.

SI

COGS 6961.01 METATOPIC IN STATISTICS
We will discuss issues confronting researchers who collect and analyze behavioral data. This is not a course on probability theory, this is not a course that will teach statistical methods or techniques. We will focus on current controversies in the use and misuse of statistics by well-intended members of various research communities. Secondarily, we will also wander into discussions of how statistical issues are presented to the public and interpreted by the media.

GRAY

COMM 2960.01 WRITING FOR THE SCREEN
Students in this course will explore how different “screens” require different approaches to writing. The course will examine how genre and format influence style, with a focus on solving challenging
communication problems or telling compelling stories. Students will learn how to both critically “read” and effectively write various forms of visual media, including educational, entertainment, corporate, and commercial content for film, television, Internet and mobile media. No prerequisites.

**SPINA-CZA**

**COMM 4960.01 INTRODUCTION TO GAME PRODUCTION**

Provides an experience in how real videogames get built at real game studios. Students build a semester-long non-trivial video game for an actual game industry "client," someone who works at one of the area's videogame studios. Topical materials concern the various aspects professional game development: including development phases, preparing technical documents, scheduling and budgeting, team dynamics, and handling the many production issues (asset management, voiceover, etc.) that inevitably arise during development. This course should NOT be open to first-year students.

**Prerequisite:** Students should have completed Game Design.

**LYNCH**

**COMM 4961/6961.01 MOBILE AR**

Students design and create mobile augmented reality (AR) experiences, using GPS or computer vision based tracking. Final projects will be implemented off campus, with potential for long term public installation. Students with backgrounds in design, architecture, and visual storytelling are welcome, as are students with significant programming or computer graphics experience.

**ROUSE**

**IHSS 1962.01 PUBLIC HEALTH & WAR ON DRUGS**

This course examines the history of social, political, and economic conditions of the War on Drugs. The television series “The Wire” serves as a major text for this course. By raising the question of what a public health approach to drugs might look like, this course challenges first-year students to play a policy-making role in the creation of evidence-based drug policy and public health policy.

**CAMPBELL**

**IHSS 1964.01 SCIENCE IN THE KEY OF LIFE**

Science seems to be tuned in the key of death: it invents ever more deadly weapons; “accidentally” causes environmental devastation; and allows the wealth inequalities at the root of race riots, terrorist movements and other poverty-driven crises. What would science be like when played in the key of life? Students will examine the concept of “tuning” in frameworks ranging from music to mathematics; learn how to utilize this analysis as a critique of current scientific and technological practices; and how to compose alternative practices that bring us closer to a just and sustainable future.

**EGLASH**

**IHSS 1966.01 PHIL, TECH, & THE HUMAN FACTOR**

"This course explores the philosophical and ethical implications of cutting edge technological developments that promise to shape – and perhaps to jeopardize – human life and society in the 21st Century: Prospects of a coming technological "Singularity," in which hyper-intelligent machines may leave humanity in the dust. Killer robots. The cloning of human beings. Genetic modification for superhuman abilities. Use of genetic technology to bring extinct species back to life. Students will improve their insight as well as their critical reasoning skills as we examine, analyze, and evaluate each of these controversial topics through the lens of philosophical reasoning. **This course is communication intensive and is open to incoming freshmen only.**"

**THERO**
IHSS 1967.01 RELIGION & GLOBAL ORDER  This course explores the role of religion in the everyday lives of people around the world, and ways religion becomes interlaced with media and politics.

ROYER

IHSS 1968.01 BLENDED REALITY & INTERNET
Increasingly we live in a blended reality where life and the internet are intertwined. This course provides the students with an opportunity to develop a multidisciplinary perspective on the impact of blended reality; enhancing their capacity to critically evaluate the impact of technology on contemporary life. This class is a joint venture; students provide the content knowledge of technology while the professor provides human perspective.

NOBLE

IHSS 1969.01 ARE HUMANS RATIONAL?
This course is an introduction to the philosophy of mind and cognitive science. Students meet in small sections to have class discussions and debates about questions like: What are minds? Are minds physical or non-physical? If minds are purely physical, do we have free-will? If we don't have free-will, do we have moral responsibilities or rights? How are we defined anyway? Does our reliance on technology turn us into cyborgs? How close are we to building an intelligent robot or machine? Do we want to? Students will learn how to make a philosophical argument, and how to express them in writing or thorough an oral presentation.

BRINGSJORD

STSS 6963 WRITING PRACTICUM
Set writing goals, complete a writing project, and exchange constructive feedback on works in progress. Students enrolled in this course are expected to make consistent progress toward their own writing goals and will receive peer review at various stages of their writing. Enrolled students are also expected to provide peer review for about two papers each month.
Restricted to STS graduate students.
(1 Credit)

NIEUSMA

STSS 6966 TEACHING PRACTICUM
In this course, students will explore a variety of approaches to teaching STS and will exchange constructive feedback on lesson plans, classroom management strategies, grading techniques, teaching statements, syllabus design, and other key issues related to effective pedagogy in traditional and non-traditional course settings.
Restricted to STS graduate students.
(1 Credit)

NIEUSMA

STSS 6967 PRESENTATION PRACTICUM
Students in this course will participate in the weekly STS Brown Bag seminar series. Students are expected to attend the seminar weekly, give one research presentation, and provide constructive feedback on other presentations over the semester.
Restricted to STS graduate students.
(1 Credit)

NIEUSMA
COGS 4960/6960 Natural Languages: A Cross-Linguistic Perspective

Course Description: This course explores the impressive variety of languages spoken throughout the world, which employ very different strategies to carry out one and the same basic inventory of human communication needs. Topics include: historical linguistics and diachronic language change; language universals; language typology; dialects, creoles and pidgins; translation by humans and machines; and the much-debated question of whether every shade of meaning can, in principle, be expressed in every natural language. Close analyses of select languages will also be undertaken. Class meetings will include lectures, discussions, and group projects.

Prerequisites: Undergraduates: Introduction to Linguistics or permission of the instructor. There are no prerequisites for graduate students but they will be required to do background reading if they are new to linguistics.

COGS 2960 Introduction to Linguistics

Course Description: This course offers a survey of scientific and applied approaches to the study of human language, highlighting the endlessly surprising, often confounding, nature of this sophisticated mode of communication. Topics include phonology, morphology, syntax, semantics, pragmatics, language acquisition, psycholinguistics, and computational linguistics. Emphasis will be placed on developing the skill sets needed to carry out innovative linguistic investigation. No prerequisites.

COGS 6960 Computational Psychology

Course Description: This course introduces students to computational psychological models of various kinds. It will present relevant conceptual, theoretical, and implementation aspects of computational modeling of psychological processes and mechanisms. Students in particular will learn about computational cognitive architectures. The course will cover model details, simulation examples, and advanced topics.

COGS 6968.01 Research Problems in Cognitive Sciences

Course Description: The research problems in cognitive sciences seminar is aimed to provide graduate students with in-depth information concerning a broad range of research problems and domains in cognitive sciences. It includes talks by invited speakers, as well as research progress reports by graduate students and faculty. Its goal is to establish some broad understanding of current, ongoing cognitive sciences research and to stimulate further research.

ARTS 296X: Private Music Lessons:

- Violin
- Viola
- Cello
- Bass
- Flute
- Oboe
- Clarinet
- Bassoon
- Saxophone
- Trumpet
- French Horn
- Trombone
- Tuba
- Piano
- Harp
- Percussion
- Voice

Individual instruction in 15 1 hour private meetings. Provided on violin, viola, cello, bass, flute, oboe, clarinet, bassoon, saxophones, trumpet, French horn, trombone, tuba, piano, harp, percussion, voice. On registration students should contact Professor Nicholas De Maison (demain@rpi.edu) indicating their instrument. A lab fee applies: $990

**ECON-4961: Law and Economics**

Jones

Market-based economies depend upon legal systems that establish and protect property rights. In this and many other instances the law is designed to encourage and support economic activity; in others it is designed to restrain certain types of otherwise rational, economic behavior. This course will apply fundamental economic concepts, such as supply and demand, competition, monopoly, externalities, and pareto efficiency to a range of legal topics, including contracts, torts, and criminal law to explain the economic motivation and consequences of the legal framework. For those students considering law school, this course offers an exposure to many of the legal concepts found in the first year law school curriculum.

**PSYC-4961: The Psych Of Reward**

Noble

The success if digital games has inspired an entire industry focused on using explicit rewards to motivate people. The trend towards accountability in education and elsewhere is built on the assumption that explicit rewards control behavior. This course provides a rigorous examination of the use of explicit external rewards and the consequences neglect of intrinsic rewards in real world situations.

**ARTS-2961-1 credits: Ensemble Nonlinear**

**ARTS-496X-4 credits: Ensemble Nonlinear**

**ARTS-696X-3 credits: Ensemble Nonlinear**

Hamilton

A technology-based performance ensemble, at the same time an electronic performance ensemble as well as a practice-based course focused on the composition, design and programming of new musical works and instruments. Students will create and perform electronic music using laptops, digital networks and a range of new interfaces for musical expression. The ensemble may be taken as a 1 credit performance ensemble in satisfying the Music minor requirement, or as a 3/4 credit seminar. Prerequisites/Co-requisites: Audition / permission of the instructor

**Comm 4960/6960**

**Game Studies Theory and Practice**

Students are introduced to major theorists in the field of game studies and topics including theories of play, space, narratology, ludology, identity, representation, culture and society. Students make integrative connections between theory and practice with a semester-long iterative design project, including critical writing, paper prototyping and peer feedback.

**Design in Culture – 1cr**

This course revolves around documentary films that explore diverse design challenges and solutions in settings around the world, focusing on sustainable and regenerative design. Following film screenings, facilitated discussion and writing exercises will encourage critical perspective and personal reflection. All
of the work for the course will be completed within the class time. Students wishing to dive deeper can sign up for the companion seminar *Sustainability by Design* [STSS/STSH4XXX]

**Race in Culture** – 1cr
This course revolves around documentary films that explore how race and culture intersect in settings around the world. Following film screenings, facilitated discussion and writing exercises will encourage critical perspective and personal reflection, including analysis of how race plays out at RPI and in daily lives. All of the work for the course will be completed within the class time. Students wishing to dive deeper can sign up for the companion seminar *Race as Global Challenge* [STSS/STSH4XXX]

**Sustainability by Design** – 4cr
This course is designed to complement *Design in Culture*, a one credit film-based course that students will be auto-enrolled in. *Sustainability by Design* will provide an opportunity to dive deeper into the topics covered by the films, discussing resonant readings and conducting project-based research. Students will present original research and design work to the campus community. Design researchers and practitioners will join the class in a series of guest lectures.

**Race as Global Challenge** – 4cr
This course is designed to complement *Race in Culture*, a one credit film-based course (that students will be auto-enrolled in) exploring how race and culture intersect in settings around the world. *Race as Global Challenge* will provide an opportunity to dive deeper into the topics covered by the films, discussing resonant readings and conducting original research. Researchers, activists and other members of the community will join the class as guest discussants.

28827 IHSS 1967-01 **RELIGION in a GLOBAL WORLD** M/R 4:00-5:50 ROYER
This course explores the role of religion in the everyday lives of people around the world, and ways religion becomes interlaced with media and politics.

**Global Health Challenges**
This course explores health challenges in settings around the world, considering many factors contributing to poor health and health inequality, and possible solutions. We will discuss different medicine traditions and medical ethics.

**ARTS 2961: BOARD GAME SCULPTURE**
Jefferson Wille Kielwagen
A hands-on sculpture class focused on design and fabrication of board games. Students generate original game ideas and employ woodworking, mold-making, casting and other sculptural crafts to fabricate game boards and pieces.

**GSAS 2961: Films Every Game Designer Should See**
Michael Lynch
This course explores a number of cinematic concepts (using excerpts and entire films) that can be of use to game designers. The concepts range from the purely technical (camera, lenses, lighting, composition) to narrative (storytelling conventions, handling of time and space, etc.). The objective of the course is to allow game designers to gain insights into techniques for telling a broader range of stories than have traditionally been found in video games.

**4xxx/6xxx Biopunk: Arts Lab Practices**
Kathy High
"Biopunk: Arts Lab Practices" is both a studio, lab and lecture class encouraging student participants to become science literate and to investigate the complex microbiomes of our environment. We will use amateur and biological laboratory techniques to create science,
design and art works in a wet lab. Students will be required to complete readings, experiment, and create their own visions of a speculative biofuture. “Scientific literacy empowers everyone who possesses it to be active contributors to their own health care, the quality of their food, water and air, their very interactions with their own bodies and the complex world around them... We are building on the work of the cyberpunks who came before us to ensure that a widely dispersed research community cannot be shut down... When we work it is with the betterment of the community in mind, and that includes our community, your community and the communities of people that we may never meet.” – Meredith Patterson, Biopunk Manifesto