FALL 2016 Topics Course Descriptions

ARCH 4961.01 DUCHAMP SEMINAR: ANARCHISM UMPED (architecture students)
ARCH 4961.02 (Non-Architecture Students = 6)
Explore the life, work and influence of Marcel Duchamp (1887-1968), inventor of the readymade and father of conceptual art. By examining his ideas and those of his peers we will critically map his influence on 20th century art and architecture. Speculated as "the world's first feminist artist" by curator Helen Molesworth, Duchamp continues to impact art discourse, 44 years after his death. Readings, response papers, field trips (to the Philadelphia Museum of Art) and discussions with two of the world's leading Duchamp authorities, Francis Naumann and Michael Taylor.

MICHAEL OATMAN. Cr 2.

ARCH 4962.01 PORCELAIN FABRICS
This seminar will continue a research on the invention of different techniques to work with porcelain, exploring structures of light and shadow, opacity and translucency, motion and fixity, interiority and exteriority. It is a search for intensity in the experience of space in which light determines the formal explorations becoming sculpted material; a desire to carefully consider and stage the conditions for the phenomenological experience.

Cr. 2

ELENA PEREZ-GUEMBE

ARCH 4964.01
BRIAN DELUNA. Cr. 2.

ARCH 4965.01 DIGITAL MASONRY
Stereotomy is a set of seventeenth century stone cutting techniques that deployed descriptive geometry to advance architectural representation and fabrication. This course proposes that revisiting stereotomy through the lens of contemporary design software might enable us to tease out new ways to craft and visualize stone, one of the oldest construction materials. We will begin by scanning real world geological objects at various scales and gathering them into a "digital quarry." We will then proceed to devise computational design methods from these samples in order to produce artifacts in two and three dimensions.

Cr. 2

STEFANO PASSERI

ARCH 4968.01 INFORMATION IN US AND AROUND US
"Transformation of information is the fundamental building block of the universe"*.
The seminar will compare the dynamic process flows and the rivalry of different forms of information: biological, cultural and technological. Architecture plays important roles in this game and as a discipline of a wide spectrum, contains elements of all streams.

Based on the theory of Universal Darwinism, which describe that natural evolution also explain principles of culture and technology, we will consider the various scenarios concerning of our future on this planet and beyond. This approach allows us a deeper analysis of our activity and understanding of consequences of our creative ambitions.

Cr. 2.

* Norbert Wiener, "Cybernetics", 1948

ZBIGNIEW OKSIUTA

ARTS 2961.01 INTERMEDIATE DRAWING
Through close observation of a limited number of subjects, the student will explore the possibilities of visual translation using a variety of media and techniques. Over the term, each successive project will provide the student the opportunity to develop and control a particular set of media, technique, and perspective, which reveals a unique and personal approach to image making.

RAGSDALE
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 2963.01 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 a musical gaming experience.

ARTS 4962/6962.01 CREATIVE COLLABORATIONS
Students from multiple disciplines create interdisciplinary collaborative arts projects for implementation in appropriate musical or new media form for presentation. A variety of processes of improvisation, composition and performance are explored. Selected collaborative works of established artists will be researched and analyzed. Deep Listening practices will be incorporated during improvisations. Students will create portfolios by documenting their collaborations to include audio/video files, scores and written notes. Possible applications and venues for collaborations will be developed.

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.

COGS 2960.01/.02 INTRODUCTION TO GAME STORYTELLING
SKOLNICK

COGS 2961.01/.02 INTRODUCTION TO GAME PROGRAMMING
This hands-on class introduces many fundamental concepts in game development. Students will individually program multiple video games. Topics include render loops, rigid body dynamics, interfaces, event and messaging systems, and coroutines.

COGS 2962.01 INTRODUCTION TO LINGUISTICS
This course offers a survey of scientific and applied approaches to the study of human language, highlighting the endlessly surprising nature of this sophisticated mode of communication. Topics include phonology, morphology, syntax, semantics, pragmatics, language acquisition, psycholinguistics and sociolinguistics. Emphasis will be placed on developing the skill sets needed to carry out innovative linguistic investigation. No prerequisite

MCSEHANE

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 4964.01 SENSIBILITIES: WRITING ACROSS DISCIPLINES
“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.

WALF

COGS 4965.01 GROUP INDEPENDENT STUDY: COGNITIVE AGENTS
This course will cover selected topics in theory behind language-endowed intelligent agents and design of such agents in specific domains and for specific purposes. The course will be a lab course that will involve both learning theoretical background though reading and discussion and team-oriented design and implementation of components of intelligent agents.

NIRENBURG

COGS 6960.01 GAME AI
This course introduces students to basic concepts and methods of artificial intelligence and their application in computer games. The topics include decision making, movement, path finding, and AI for humanlike characters. This course will take the form of combination of lectures, presentations by students, class discussions, and independent study.

Prerequisite CSI 2300. (meets with COGS 4420-01)

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. Secondly, we will also wander into discussions of how statistical issues are presented to the public and interpreted by the media.
GRAY

COGS 6962.01 PROFESSIONAL SEMINAR
PRO SEMINAR IN COGNITIVE SCIENCE. This course is an intensive hands-on introduction to the formal methods used by faculty on the cognitive science department. It features advanced readings and projects.
SUN

COGS 6968.01 RESEARCH PROBLEMS IN COGNITIVE SCIENCE
This is a seminar-based course primarily for graduate students in Cognitive Science. Students learn about a wide variety of topics related to cognitive science through reading articles, attending lectures by guest speakers, and participating in group discussions. The specific topics that are covered vary widely from semester to semester. Students also participate in a roundtable discussion at the end of the semester in which they synthesize the material to identify new research opportunities.
BRINGSJORD

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-CÁZA

COMM 2961.01 GAME STUDIES, THEORY, PRACTICE
ROUSE

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
CSCI 2960.01 WEB SYSTEMS DEVELOPMENT
See ITWS 2110
**Prerequisite:** ITWS 1100

PLOTKA

CSCI 2961.01 INTRODUCTION TO OPEN SOURCE
An introduction to open source software, open source communities and group dynamics, and open source tools. Students learn about the structure of groups, how communities form, and how group behavior impacts project success in communities, all in the context of open source software. Students also learn hands-on open source tools, including git and svn, and contribute to existing open source projects by modifying source code. Topics also include: challenges of global communication via blogs, wikis, IRCs, bug trackers; debugging and fixing code; communicating code changes and documentation; group formation; and the value of sharing and building one's software portfolio. This course is highly recommended as a prerequisite to working with RCOS.
**Prerequisite:** CSCI 1100
**Corequisites:** CSCI 1200

KRISHNAMOORTHY

CSCI 4690.01/6960.01 SEMANTIC WEB TOPICS COURSES
**Prerequisite:** CSCI 2300

MCGUINNESS

CSCI 4962.01/6962.01 NATURAL LANGUAGE PROCESSING
This course introduces state-of-the-art Natural Language Processing (NLP) methods from the last decade, covering 15 popular research topics via the most-cited and up-to-date papers for each topic. This course also covers machine learning methods for NLP. Students implement some of these methods and apply machine learning toolkits to solve a variety of problems. Assignments incorporate linguistics, mathematics, and careful thinking. Note that this will soon be a catalog course (CSCI 4130/6130).
**Prerequisite:** CSCI 2300 and MATH 2010

JI

CSCI 4963.01/6963.01 DISTRIBUTED SYSTEMS AND ALGORITHMS
This course explores the principles of distributed systems, emphasizing fundamental issues underlying the design of such systems: communication, coordination, synchronization, and fault-tolerance. We will study key algorithms and theoretical results and explore how these foundations play out in modern systems and applications. Note that this will soon be a catalog course (CSCI 4510/6510).
**Prerequisite:** CSCI 4210

PATTERSON

CSCI 4964.01/6964.01 COGNITIVE COMPUTING
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).

**Prerequisite:** CSCI 2300 or permission of instructor

**HENDLER**

**CSCI 4965.01 RCOS**

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 twice per semester. Students may earn 3 or 4 independent study credit hours, a limited stipend, or do RCOS for the experience only.

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

**KRISHNAMOORTHY**

**CSCI 4966.01 PROGRAMMING FOR COGNITIVE SCIENCE AND AI**

See COGS 4410

**Prerequisite:** CSCI 2300 or permission of instructor

**SCHOELLES**

**CSCI 4967.01 GAME AI**

See COGS 4420

**Prerequisite:** CSCI 2300

**SI**

**CSCI 4969.01/6966.01 SECURITY TOPICS COURSE**

**Prerequisite:** CSCI 2300

**ZIKAS**

**CSCI 4972.01/6961.01 INTRODUCTION TO COMPUTATIONAL BIOLOGY**

Modern high-throughput experimental techniques produce large collections of data about the fundamental molecules of life: DNA, RNA, and proteins. The size and complexity of these data require efficient computational techniques. This course introduces deterministic and probabilistic algorithms for the analysis of RNA, DNA, and protein sequences. Topics include: sequence alignment, genome assembly, structure prediction, regulatory signal detection, and analysis of phylogeny. Techniques to be introduced include: hidden Markov Models, Expectation Maximization and Gibbs sampling for regulatory signal detection, algorithms for genome assembly, probabilistic models of evolution and phylogeny. For each topic, the biology of each topic will be introduced, mathematical models constructed, and algorithms for evaluating the model developed.

**Prerequisite:** CSCI 2300 and BIOL 1010 (or permission of instructor)

**THOMPSON**

**CSCI 4973.01/6973.01 AFFECTIVE COMPUTING**

See COGS 4963/6963

**Prerequisite:** CSCI 2300

**SI**

**ECON 4960.01 INTERNATIONAL FINANCE**

"This course will introduce students to core models of international finance and open-economy macroeconomics. Topics will include: international risk sharing and capital flows; the intertemporal approach to the current account; determination of exchange rates; home equity and consumption bias; sovereign debt crises; capital flows and growth; and global imbalances. The
readings for the course will be split between theoretical and empirical papers to present the stylized facts and applications of the theory."

**Prerequisite:** ECON 2020

YATSYNOVIC

**ECON 4961.01 ECONOMICS OF FINANCIAL INSTITUTE & MARKET**

"This course will introduce students to core models of international finance and open-economy macroeconomics. Topics will include: international risk sharing and capital flows; the intertemporal approach to the current account; determination of exchange rates; home equity and consumption bias; sovereign debt crises; capital flows and growth; and global imbalances. The readings for the course will be split between theoretical and empirical papers to present the stylized facts and applications of the theory."

**Prerequisite:** ECON 2020

JONES

**ECON 4962.01 FINANCIAL ECONOMICS**

Financial economics explores financial markets, instruments, and strategies from the perspective of economic theory. The course examines consumption and investment decisions with and without uncertainty and the roles that equity, fixed income, and derivative instruments may play in making optimal decisions. In addition to optimal decisions from an individual perspective, the course examines asset pricing in general equilibrium.

**Prerequisites:** MATH 2010 and ECON 4130 or permission of the instructor

ESTRELLA

**IHSS 1960.01 BACK TO THE 60's**

This course invites students to take a journey back to the activism of the 60’s through the lens of history, sociology, political science, media, and the arts. Utilizing selected readings, videos, site visits, and guest lecturers, students will take a deep dive into the “movement” and explore the philosophy, programs, and activism of several major organizations. Through this exploration of a significant period in time, students will have the opportunity to unearth the work and significance of visual artists (e.g. Andy Warhol), poets (e.g. The Last Poets, Amiri Baraka, Gil Scott-Heron), and musicians (e.g. The Grateful Dead, Bob Dylan, Joan Baez) who chronicled the issues of the 60’s through their respective mediums of communication. Students will learn about university, community, cultural, militant, religious and political organizations committed to one of three dominant themes (integration, separation, and revolution), and the tensions generated within the “movement.” Students will be divided into one of 3 teams, each focused on one of the 3 themes. Through guided research, they will develop a working knowledge of the selected theme, including the history, philosophy, programs, leaders, activities, successes, failures, issues, etc. Each team will make a presentation to the class followed by discussion and debate. 4 credits.

KNOWLES

**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; “accidently” 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 1965.01-04 ART, MUSIC & CULTURE
This tri-taught class will address Open Source Software from the perspectives of Art, Music, and Social Science. Students will explore the impacts of OSS beyond STEM and across cultural settings, including the ways OSS is used and accessed by artists, musicians, and social groups that have been traditionally marginalized by tech communities. Students must register for the lecture session as well as for one of the creative studio sections.

MALAZITA, LAWSON, RUZANKA

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

IHSS 1970.01 MUSIC & SOUND I

MATH-6890 Numerical Solution of Wave Equations
Wave phenomenon play a critical role in the physical sciences, and numerical methods for computing solutions to these problems face a unique set of challenges. Applications of interest include fluids, solids, electromagnetics, and plasmas. In this course we will discuss construction of numerical methods for linear and nonlinear equations with traveling wave solutions. Topics
may include discretization of classical non-dispersive equations (acoustics, elasticity), dispersive equations (Schrodinger), and hyperbolic conservation laws (Euler equations).

Prerequisites: MATH-6840 or permission of instructor

PHIL 2961.01/02 DEMOCRACY, INSIGHT & PRACTICE
The defining features of democracy characterize a social way of life and outlook, not a form of government. If so, most practices associated with democracy are undemocratic or anti-democratic including the (US) federal Republic and Constitution, voting by majority rule, presidential leadership (an independent chief executive), patriotism and good citizenship, major political parties and ideologies (liberal-Democrat, conservative-Republican), war policy (just or otherwise) a military pledged to government or constitution not society, and public school curricula in history, citizenship, and civic engagement that teach otherwise. Resolved further: early Americans adhered to these propositions. We will debate and evaluate such notions pro and con, considering ways to further democratize social institutions, distinguishing America from the US. 4 Cr.

PSYC 2960.01 POSITIVE PSYCHOLOGY
In every day terms, resilience is being able to deal with whatever life brings our way, to overcome crises or obstacles we face. All areas of our lives can benefit from being resilient, such as at work, with our health, in intimate and family relationships, as well as our approach to how we choose to spend the time at a stop light. My approach to this course will focus on how our perspective can influence how we approach situations/crises/obstacles. For example, a resilient person may see a failure as an opportunity for learning and growth. The main goal will be to help students establish more positivity in life, so that they become more resilient. We will discuss how environmental factors, such as parental upbringing, can influence our resilience. We will also focus on learning about character strengths, so that we can develop those to be more resilient.

STSS 2961.01 SCI FICT CINEMA & SOCIAL CRIT
This class studies relationships between science fiction films and serious works of modern social criticism. Through a careful reading of texts, analytical viewing of films and comparison of the two experiences we will explore some of the most significant issues in modern society. Films include "Metropolis," "1984," "Dr. Strangelove," "Avatar" and "Ex Machina."

STSS 4962.01 CRITICAL DATA MAPPING
This course examines the politics of big open data initiatives in cities across the globe. Students will participate in a group project, each focusing on a particular city and building GIS maps from data available in the city’s open data portals. Students will study the history of open data movements in their cities, how data is collected and made available, and how citizens and officials are leveraging and visualizing the data to address social issues.

STSS 4963.01 GENDER IN CULTURE
This course revolves around documentary films that examine diverse gender issues in settings around the world. Following film screenings, facilitated discussion will encourage critical perspective and personal reflection.

STSS 4965.01 FUTURISM: UTOPIAS & DYSTOPIAS
Fiction-based, including sci fi, but also social and scientific scenarios on future work/leisure, radical abundance via nanotechnology, virtual realities, sexualities, real democracy,
transhumanism, space colonization. Classroom: Discussion, videos, oral presentations – not lecture. Major research project of student’s choice. Considerable reading.

**Prerequisites:** Any STS or LIT course, or permission of instructor.

WOODHOUSE

**STSS 4966.01 HEALTH & EMERGENCIES**
This course examines the history, organization and challenges of emergency medical response. We will study emergency response in particular cases (the deadly European heat wave of 1993, Hurricane Katrina, the recent Ebola outbreak in Africa, etc.), and involved organizations (FEMA, Red Cross, Doctors Without Borders, etc.). We will also examine and reflect on the complex ethical dimensions that often arise in emergency medical response. Students in this course will complete a 90-hour New York State Emergency Medical Technician curriculum offered through Rensselaer County held on the RPI campus. Students affiliated with RPI Ambulance will have the cost of the course covered. Upon completion, students will receive EMT-B certification allowing them to work on Basic Life Support units.

(ADDITIONAL FIELD WORK REQUIRED)

FORTUN

**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

**ECSE 4964 FUNDAMENTALS OF SOLID STATE LIGHTING SYSTEMS**
The course covers the basics of LEDs and drivers (including dimming challenges), LED fixture design and engineering challenges (optics, thermal management), control topics (sensors for lighting control, how sensors are integrated into lighting control systems), current lighting control platforms, and some future of lighting topics (lasers for lighting, semantic lighting).

**Prerequisite:** ECSE 2050

3 credit hours

**ECSE 6961 COMPRESSED SENSING APPLICATIONS**
Compressed sensing takes advantage of the sparseness of many natural signals and can significantly reduce the sampling rate, as well as the sensing cost. It has wide applications in signal (image, speech, video) processing, communication networks, computer vision, etc. This
The course provides background for study and research in compressed sensing, as well as high-dimensional signal processing based on low-dimensional models. The course will cover 1) recent developments of the mathematical theory of sparse representation and low-dimensional structures, 2) measurement design schemes and efficient recovery algorithms for compressed sensing, and 3) the applications of sparse representation in various areas. The course will make the connections to probability theory, high-dimensional geometry, optimization, and information theory.

**Prerequisites:** Familiarity with basic concepts probability, linear algebra, and optimization will be helpful.

*3 credit hours*

**ECSE 6962 ULTRA-WIDE-AREA RESILIENT ELECTRICAL ENERGY TRANSMISSION NETWORKS**

This is a course team-taught by thrust/subthrust leaders and other key faculty of the NSF Engineering Research Center, CURENT (Center for Ultra-wide-area Resilient Electrical Energy Transmission Networks). The goal is to present the latest developments in CURENT and related areas to the graduate students and to have them well prepared for research tasks in CURENT. The course is open to all graduate students. A student who completes the course will be able to understand the characteristics and design methods for large power systems and wide-area monitoring and control systems. The course will give a general introduction to a large variety power system research topics, such that a student after taking the course, will be able to select and start a research topic.

**Prerequisites:** ECSE 6110 Power Engineering Analysis and ECSE 6400 System Analysis Techniques, or equivalent; or permission of instructor.

*3 credit hours*

**ITWS 6960 DATA POLICIES AND THE ERA OF ‘BIG DATA’ DATA AND SOCIETY**

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, 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

**MATH 6890 NUMERICAL SOLUTION OF WAVE EQUATIONS**

Wave phenomenon play a critical role in the physical sciences, and numerical methods for computing solutions to these problems face a unique set of challenges. Applications of interest include fluids, solids, electromagnetics, and plasmas. In this course we will discuss construction of numerical methods for linear and nonlinear equations with traveling wave solutions. Topics may include discretization of classical non-dispersive equations (acoustics, elasticity), dispersive equations (Schroedinger), and hyperbolic conservation laws (Euler equations).

**Prerequisites:** MATH-6840 or permission of instructor

*Credit Hours: 4*

**Instructor:** Jeffrey Banks
STSS-4???, or PSYC-4??? NON-TECHNICAL ISSUE RELEVANCE TO TECHNICAL SOLUTIONS
This course focuses on helping the students understand the impact of non-technical issues including economic, environmental, cultural and societal on the viability of technical solutions. The course will involve the study & discussion of case studies where the technical solution pursued did not have the desired effect because the people involved looked too much at the technology without paying appropriate attention to the environmental, economic, culture, social, and political issues associated with the technology's ultimate usage.

MANE 2961 INVENTOR’S STUDIO I: IDEATION INNOVATION
Students will learn: A) how to select “tools” for innovation, and how to choose the appropriate tool for an idea or problem; B) a systematic “process” for innovation to develop an innovative idea from concept to a minimum workable prototype using 3-D printing equipment; C) how to iterate on fine tuning an innovative idea, learning from each iteration using a ideate-build-learn cycle; and D) a quick overview of “Additive Manufacturing” or 3-D printing methods. At the end of the course, students will be ready to enroll in the 2nd course of the MANE.Innovation Spine, which is to develop their prototype into a full-fledged product or offering to have discussions with industry or investors. Students/mentors/RPI would own the Intellectual Property of the ideas.
Prerequisites: Introduction to Engineering Design (ENGR-2050)

MANE 4960 ROTORDYNAMICS
As the name implies, rotordynamics is an application of engineering dynamics concerned with rotating machinery. Such machinery includes jet engines, turbochargers in trucks or cars, pumps and compressors, or even computer disk drives. In the most basic case, the machine consists of a rotating member (rotor) supported by bearings on a stationary structure (stator). Usually the goal is to develop machines with a high power density, which means higher speeds and lighter weights. Lightweight, in turn, implies flexible structures. These factors conspire to make such machinery susceptible to unwanted vibrations, and the goal of rotordynamics is to minimize these tendencies. I will try to make the course as practical as possible, but due to the nature of the subject matter there will inevitably be a fair amount of theory. Topics will include: general vibration behavior, bearings and seals, and the rotordynamic phenomena of critical speeds, response to unbalance, and instabilities.
Prerequisites: Eng. Dynamics (ENGR-2090) and Thermal & Fluids Eng. I (ENGR-2250)

MANE-4961 NUCLEAR FUEL DESIGN
This course covers the design of nuclear fuel from mechanical, thermal, material, and nuclear considerations. In reactor behavior of nuclear fuel materials such as swelling, fission gas release, and pellet clad mechanical and chemical interactions will be studied. Design considerations of LWR, HTGR and fast reactor fuels will be covered. Current design methods used in computer code FRAPCON and FRAPTRAN will be discussed.
Prerequisite: MANE-2400 Fundamentals of Nuclear Engineering

MANE 6962 STRUCTURAL DYNAMICS
The goal of this course is to study vibrations and dynamics of flexible structures including rods, beams, and strings. Topics include the following. Single and multiple degree of freedom systems. Modeling mass, stiffness and damping of structural elements. Damping treatments including viscous, structural, and coulomb damping. Free and forced response of flexible structures. Influence coefficient methods. Bending, axial and torsional vibrations of flexible structures, natural frequencies and mode shapes, vibration testing and methods to quantify damping. Introduction to numerical methods in structural dynamics including finite element (FEM), Rayleigh-Ritz, and Galerkin methods. Energy methods in structural dynamics – Hamilton's principle and Lagrange equations.
Prerequisites: basic matrix algebra, methods to solve ordinary differential equations, and MATLAB programming.
MANE 696x EXPERIMENTAL MECHANICS
Contact Professor Kristen Mills.

MANE 696x ADVANCES DESIGN OPTIMIZATION
Graduate level cross-listing of MANE-4280 Design Optimization: Theory and Practice.

MANE 696x ADVANCED HEAT TRANSFER
Graduate level cross-listing of MANE-4710 Heat Transfer.