FALL 2015 TOPICS COURSES

ARCH 4968.01 87232 MESTIZO ROBOTICS [3 credits option]

A design-and-build workshop dedicated to the development of an artistic robotic installation based on a fragment of the *Popol Vuh* (the Mayan book of creation) that narrates a failed attempt by the gods to create humankind from mud. This is an artistic/academic project comprised of a community of robotic agents “made of mud” dispersed and developed by different research academic units throughout the Americas. A cluster of 3 or 4 robotic units will be developed and installed at Rensselaer. These “*mestizo* robots” should have two levels of interactivity: local (among themselves and their environment) and remote (with other distant robots of the community and external data). The characteristics (technology, materials, mechanics, etc) and ‘personality’ (autonomy, behavior, etc.) of the RPI robotic cluster is to be defined during a dedicated studio / seminar course. This studio is developed under the framework of ART_X@Rensselaer, an “art across the curriculum initiative” aimed to promote art, science and design interchanges among the institute’s diverse academic units. This 4-credit option is open to non-architecture students only, who will work together with students at the School of Architecture in a larger dedicated design studio. Taught with ARCH 4260.01 Arch Design 6, and ARC 4969.01 (no room required taught in studio).

Faculty: Gustavo Crembil and others TBD. Days: MR 4-6. Prerequisites: 3rd and 4th year non-arch students only. Credits: 3

Enrollment: 6 students max.

ARCH 4969.01 88749 MESTIZO ROBOTICS [2 credits option]

A seminar dedicated to revising and expanding the notion of ‘mestizo technology’ and its larger theoretical implications. ‘Mestizaje’, a Spanish word normally used to describe the process that blends races or languages, is also understood in contemporary cultural discourse as a phenomena with a non-harmonic resolution, "an heterogeneous juxtaposition aiming toward hybridity" (G. Yudice), interactions, interchanges, and re-appropriations. Under this lens, could a ‘mestizo technology’ be possible? This seminar will provide the theoretical ground for the development of the robotic installation based on a fragment of the *Popol Vuh* (the Mayan book of creation) that narrates a failed attempt by the gods to create humankind from mud. This is an artistic/academic project comprised of a community of robotic agents “made of mud” dispersed and developed by different research academic units throughout the Americas. A cluster of 3 or 4 robotic units will be developed and installed at Rensselaer. This seminar is developed under the framework of ART_X@Rensselaer, an “art across the curriculum initiative” aimed to promote art, science and design interchanges among the institute’s diverse academic units. This 2-credit option is open to non-architecture students only, who will work together with students at the School of Architecture in a larger dedicated design studio. Taught with ARCH 4260.01 Arch Design 6 and Arch4968.01. (no room required taught in studio). Faculty: Gustavo Crembil and others TBD. Days: M 4-6. Prerequisites: 3rd and 4th year non-arch students only. Credits: 2
Enrollment Max: 6 students max.

CREATE: ARCH 4960.01 CRN 88351 PIP Planning Seminar
The Production Installation and Performance program has been a Rensselaer Tradition for many years. It is an opportunity to bring together students and faculty from architecture and the arts, and from other disciplines to collaborate with a guest artist in the making of a new work. This Seminar will engage the faculty and the invited artist in the initial discussions and planning stages of the PIP Studio that will happen in the Spring of 2016. The seminar will be both creative and organizational setting the groundwork for a productive studio and performance. The seminar and studio are not requirements for each other. Krueger. 660295097 R 10-12. Cr. 2. GR101. (ROOM GR101)

CREATE: ARCH 4961.01 CRN 86527 Latin American Architecture
This seminar will explore current developments in Latin American architecture and urbanism within a research matrix connecting issues such as domestic and public space, hybridity, nature, informality, politics, and history. Canonical and recent projects, and main tendencies will be identify, analyzed and discussed in relation to their own architectural tradition as well to current global trends. Pre-requisites: ARCH-2140 (required), ARCH-4140 (recommended). Crembil 660475023 T 2-4 pm. Cr. 2. ROOM request: 1WO1 Jonsson-Rowland

ARCH 4964.01 CRN 88710 Sensitive Skins: Phenomenon, Matter and Technology
Matter structures the physical and formal qualities of the art work playing a determinant role in the emotional perception of it, specially when these qualities are able to manifest signs of its internal essence. It is then, when the work is able to expres a connection with something primordial producing an emotional resonance that reaches cross cultural realms. The familiarity with matter involves a sensory experience that also activates our memory in our negotiation with the physical. Matter matters.

Matter stretches out to our body and, reciprocally, our body expands and occupies matter. Then what is the role our own skin plays within this context, as mediator between work and body, as an organism that filtrates emotions, conditions sensuality and links our body with the environment? What would be the architectural implications if we understand architecture as a projection of our own skin, an extension of our own body, or an organism that is able to reconnect us with the natural landscape?

As the 21st century enters a phase where Earth’s ecological balance is threatened by humanity’s short-term economic imperatives, there is an increased poignancy to the sustenance we once used to derive from the natural world. Reconnecting with the natural world implies reconnecting with our own nature as well. What is the role architecture can play in this sustenance? This seminar engages with the phenomenological and the role that matter and eventually technology plays in the way we experience the phenomenon in architecture. It is about looking at the past –and therefore learning from it- with present eyes, to project wisely into a future in which tecnology should be at our own service. Perez Guembe 661084961. R 10-12. Cr. 2. (room with projecton)

ARCH 4967 CRN 87867 Robotic Material Assemblies
This course is an advanced design seminar that explores the use of robotic gantry for direct material assembly. The primary objective is to understand all the different processes involved in the emerging 3D / 4D printing technologies, from modifying the material properties to writing motion control code that directs the assembly process.
The main goal of the course will be to teach students how to control material deposition through a 3-axis robotic gantry, as well as to modify and tune all necessary robotic motion control to accommodate different material behavior. This course will require students to have prior knowledge of Rhino 3D and preferably Rhino Grasshopper. The course will be conducted based on 6 workshop sessions on scripting and writing G-Code, students will spend the rest of the time in the shop getting hands on experience with the machine. Ngai. W 10-12. Cr 2. (will use our fabrication shop for room)

ARTS 4960 CRN 88638 / CRN 88639 6960-01 Writing (Art) Practice
R 4:00-6:50PM
Tomie Hahn (Arts)
Alicia Walf (Cognitive Science) R 4:00-7:50

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.

Location: EMPAC, Studio Beta
Pre-requisite, any 2000-level or higher Arts course, or permission of instructor

ARTS 4961-01 CRN 88640 Exploring Movement and Sound M/R 2:00-3:50PM
Tomie Hahn
The exploration of movement often reveals sensitivities concerning the body, identity, gesture, spirit, ritual, awareness, perception, space, orientation, kinesthesia, time, relationships to people and objects, as well as cultural notions of the senses. This course combines in-class active movement explorations with readings and viewing media pertaining to the moving body as well as objects that move. Practice and process-oriented work will serve as the primary method to illuminate the wide variety of issues listed above.

ARTS 4962-01 CRN 88642 Writing For Short Film T/F 2:00-3:50PM
Bustamante
This course introduces students to the art of writing short videos and script writing principles, with an emphasis on generating ideas, and realizing them in a well-developed script that can be produced as a class or independent project. Major themes and techniques are studied through a comparative analysis of scripts and films. Students learn plot development, character and dialog generation, and alternative structuring. A final script will integrate all of the elements covered in class and presented as a staged reading. This course may be taken in conjunction with "Producing and Directing the Short Film" to be offered in the spring semester.

ARTS 4963 CRN 88643/ CRN 88644 6963-01 Seminar in New Performance
M 10:00-1:50 Oliveros
Students will engage in designing and building new instruments and interfaces for performance. There will be a special emphasis on building instruments for the hearing impaired through study of Deaf Space (http://www.gallaudet.edu/campus_design/deafspace.html) with EMPAC guest artist Tarek Atoui.
New Performance Instrumentation research focuses on understanding how one designs hardware and software to achieve the best possible interface for live multi-media performance. For example, each performer has different performance goals to achieve and a different array of AV functions needing access during performance. How to effectively access functions via software and hardware during performance without breaking attention to the sound and/or image stream is the core of this research seminar. (http://www.houseofcouncil.org/Tacet-poster-solo.pdf)

Students may also propose their own projects with a performance goal by the end of the semester. Seminar time will be utilized to discuss, work on and demonstrate projects in progress. Prerequisite is demonstrated ability to engage in design, engineering, programming and building skills in software and/or hardware for musical instruments via portfolio of achievements.

ARTS 4964-01 CRN 88645 Eco Chic: Living Art W 12:00-3:50
High
Living Art is an upper level production and theory class about art, biology, and the study of life covering topics such as environmentalism, land art, food art, sustainable practices with art, body art, bio-art. Part lecture, part hands-on workshop, Eco Chic encourages students to redefine and experimentally express their relationships with the varied aspects of everyday living systems and manipulating life.
(Meets with ARTS-6968)

ARTS 4965 CRN 88646/ CRN 88647 6965-01 Hactivism T 6:00-9:50PM
Vamos
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 “hactivism” 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/ARTS 496X-01 Sensibilities: Writing Across Disciplines
Co-taught by professors: Tomie Hahn (Arts) Alicia Walf (Cognitive Science) R 4:00-7:50
“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.
Location: EMPAC, Studio Beta
Prerequisite: any 2000-level or higher COGS course, or permission of instructor

ARTS 4969/01 CRN 88743 Performance For The Camera
Performance for the Camera is a course for those interested in the performative and narrative dimensions of their work. Together, we will look at creating a snapshot and/or moving image narrative, manipulating temporal space to lock it into a frame. We will look at examples of iconic performance documentation and make work that slips between functional documentation and tableau-like narrative. We will also mount and exhibition of our work at the end of the semester.
BIOL 4960/01 CRN 88709 Lake George BLUE
The goal of this interdisciplinary course is to teach students about limnology and freshwater ecology using Lake George as a model system. Chemical, physical and biological characteristics that are critical for understanding the functioning of an aquatic ecosystem will be examined, as will the utilization of traditional and modern instrumentation and sampling and the analysis of big environmental data sets. Credit hours: 4; Prerequisite: Ecology or Permission of Instructor

Catalog title: Lake George BLUE (Biology Limnology and Underwater Ecology)

CIVL 6960 CRN 88652 Fundamental Geomechanics
Geomechanics consist of the disciplines of soil mechanics and rock mechanics and are the bases of many engineering applications associated with geomaterials. These include in the field of civil, geotechnical, earthquake, foundation, petroleum and the list goes on. Therefore, a better understanding of fundamentals of geomechanics would certainly help to build a strong platform for your engineering skills.

This course focuses mainly on introductory geomechanics covering continuum mechanics and theory of elasticity. Students would gain a general idea of the use of elasticity in solving engineering problems such as consolidation, soil dynamics, foundation settlement and wellbore stability.

Instructor: Shun Uchida
3 credit hours
M/R 10:00-11:50 AM

CIVL 6961 CRN 88650 Masonry Design
This course will discuss fundamental trends in the history of masonry construction; describe the nomenclature, properties, and material specifications associated with each basic component of masonry (units, mortar, grout, accessory materials); describe how masonry assemblages behave with respect to differential movement, water permeability, thermal properties, acoustical properties, and fire resistance; design simple masonry structures (requiring little structural calculation) for satisfactory performance with respect to the characteristics covered in the above. Carry out structural calculations for unreinforced and reinforced masonry elements, using the strength design and allowable-stress design provisions of the 2009 International Building Code, ASCE7-10, and the 2011 MSJC Code and Specification. Design more complex masonry structures (requiring structural calculation) for satisfactory performance with respect to the characteristics covered above, the strength design and allowable-stress design provisions of the 2009 International Building Code, ASCE7-10, and the 2011 MSJC Code and Specification. Introduce basic laboratory practices such as prism testing, mixing of grout and mortar, laying masonry units, etc.

Instructor: Mark Kanonik
Monday – 6:00-8:50 PM
3 credits

COGS 4961 CRN 88654/ PSYC 4961-01 CRN 88655 Hormones, Brain & Behavior
T/W 6:00-7:50 PM Walf
Course description: 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.
Other details: 4 credits, lecture, offered Fall semester,

**Prerequisites**: PSYC1200, COGS4330/PSYC4330 or permission of instructor.
COGS 4700/PSYC4700 are cross-listed; this course cannot be taken twice under different numbers for credit.

**COGS 4965 CRN 88651 / 6965-01 CRN 88653 Semantics and Discourse**
T/F 12:00-13:50 McShane
In this course we will explore the cognitive modeling of language use in context. For example, although "I'm cold" has a single core meaning, it can be used as a request to close the window, as a complaint about the temperature in the dorm, or as a medical patient's reporting of a symptom. We will develop models of how the basic meaning of an utterance contributes to the overall construction of a context within different linguistic genres. We will focus particularly on less formal genres, such as colloquial dialog and text messaging, since they are marked by extensive ellipsis and implicature. A central topic of study will be mental model ascription, also called "mindreading". Mindreading is hypothesizing about what another person thinks, knows, wants, believes and feels -- all of which can centrally contribute to the form and content of natural language interaction. Course readings will draw from the fields of theoretical and descriptive linguistics, philosophy, cognitive science and artificial intelligence. No prerequisites.

**COGS 4967 CRN 87570/ CRN 87571 6961-01 CSCI 4972-01 Affective Computing**
M/R 12:00-1:50 Si
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.

**COGS 6960-01 CRN 88128 Game AI**
M/R 2:00-3:50 Si
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)

**COGS 6962-01 CRN 85701 Professional Seminar**
T 2:00-5:50 Sun
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.

**COGS 6963-01 CRN 88656 Vis, Games, Eye Data, & Extreme Exp**
F 12:00-4:00 Gray
A variety of recent topics in Cognitive Science. Some of the topics will be updates on topics covered in prior graduate seminars. A few will be papers that cite and critique work published by the CogWorks Laboratory. The rest will be recent papers on a variety of topics that help us triangulate on research
issues and topics of interest.

**COGS 6966-01 CRN 88657 Computational Axiomatic Science**
M/R 12:00-1:50 Staff

**COGS 6968-01 CRN 87569 Research Problems in Cognitive Science**
Wednesday 12:00-1:50 Bringsjord
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.

**COMM 4960 CRN 87587/ CRN 88189 6960-01 Communication, Tech & Society**
M/R 6:00-7:50 Spina-Caza
This course offers students the opportunity to delve deeper into topics related to communication, technology, and society. Students will focus on technology-mediated communication practices with an emphasis on the application of communication theory to "real world" situations and events. Topics might include explorations of the role social media play in times of crises (i.e., What role did Twitter play in agenda setting during the Boston Marathon bombing?). Or, the examination of interpersonal communication practices in virtual spaces (the Internet or video games). Issues related to gender, race, and socioeconomic status, will be addressed within the context of technology-mediated communication practices. As specific topics and theories will vary from semester to semester, the course can be repeated for credit with permission of both the department and instructor.

Fall term annually. Prerequisites: COMM 1510

**CSCI 2961-01 CRN 87372 Introduction to Open Source [4 credits]**
T/F 12:00-1:50PM Mukkai Krishnamoorthy
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.

**Prerequisites:** CSCI 1100 or permission of instructor

**Co-requisites:** CSCI 1200

**CSCI 4960-01 CRN 87593 Frontiers of Network Science [4 credits]**

**CSCI 6960-01 CRN 87375 Frontiers of Network Science [3 credits]**
M/R 12:00-1:50PM Boleslaw Szymanski
Course will offer the introduction to network science and review of current research in this area. Classes will interchangeably present chapters from the textbook and the related current research. The emphasis
will be on mathematical background of network science: graphs and networks; random networks and various types of scale-free networks; network properties such as assortatitivity, mobility, robustness, social networks and communities; and dynamics of spreading in networks.

**Prerequisites:** CSCI 2300; a 4000 level algorithms-based CSCI (e.g. 4020, 4050, 4260, 4800), or MATH (4100, 4150, 4200, 4210, 4800) course; junior or senior level standing; familiarity with probability, linear algebra, and calculus; or permission of the instructor

*(Note that this course is being added to the catalog as CSCI 4250/6250)*

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CSCI 4971/6961 Intro to Computational Biology

**COURSE NUMBERS:** CSCI-496x/696x (both UG and GR levels)

**CREDITS:** 4

**MEETS:** MR 12:00-1:50PM

**MAX ENROLLMENT:** 30 (20 undergrad, 10 graduate)

**PREREQUISITES:** CSCI 2300 Intro to Algorithms and BIOL 1010 (or permission of instructor).

**COURSE DESCRIPTION:** 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.

**Prerequisites:** CSCI 2300 Intro to Algorithms and BIOL 1010 (or permission of instructor).

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CSCI 4976/6976 88777/87944 Malware Analysis

With the increased use of the Internet and prevalence of computing systems in critical infrastructure, technology is undoubtedly a vital part of modern daily life. Unfortunately, the increasingly networked nature of the modern world has also enabled the spread of malicious software, or “malware”, ranging from annoying adware to advanced nation-state sponsored cyber-weaponry. As a result, the ability to detect, analyze, understand, control, and eradicate malware is an increasingly important issue of economic and national security.

This course will introduce students to modern malware analysis techniques through readings and hands-on interactive analysis of real-world samples. After taking this course students will be equipped with the skills to analyze advanced contemporary malware using both static and dynamic analysis.

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CSCI 4962-01 CRN 87846 Natural Language Processing [4 credits]

CSCI 6962-01 CRN 86696 Natural Language Processing [3 credits]

**W 1:00-3:50PM Heng Ji**

This course is designed to introduce students to the fundamental concepts and ideas in Natural Language Processing (NLP) and to get them up to speed with current research in the area. NLP addresses fundamental questions at the intersection of human languages and computer science. How can computers acquire, comprehend, and produce English? How can computational methods give us insight into observed human language phenomena? How can Google search be improved using NLP methods?
What’s the magic behind the IBM Watson system? In this interdisciplinary introductory course, students learn how computers can do useful things with human languages, such as filter junk email, extract social networks from the web, extract entities, relations and events from news articles, automatically analyze movie reviews, perform speech recognition and synthesis, and translate foreign languages into English. Students also learn how computational methods can help linguists explain language phenomena, including automatic discovery of different word senses and phrase structure. Over the past decade, NLP has been revolutionized by statistical and probabilistic methods; students learn robust approaches to understanding powerful models for various NLP applications. The course will include introducing basic methods, discussions, and hands-on laboratories.

**Prerequisites:** CSCI 2300

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CSCI 4963-01 CRN 87330 Distributed Systems [4 credits]
CSCI 6963-01 CRN 86904 Distributed Systems [3 credits]

T/F 12:00-1:50PM Stacy Patterson

*Description TBD*

**Prerequisites:** CSCI 2300 and CSCI 4210 or permission of instructor

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CSCI 4964-01 CRN 86159 Cognitive Computing [4 credits]
CSCI 6964-01 CRN 88287 Cognitive Computing [3 credits]

W 1:00-3:50PM Jim Hendler

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! 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.

**Prerequisites:** CSCI 2300 or permission of the instructor

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CSCI 4965-01 CRN 88205 RCOS [0 credits]

T/F 4:00-5:50PM David Goldschmidt & Mukkai Krishnamoorthy

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 credit hours, a limited stipend, or do RCOS for the experience only.

**Prerequisites:** CSCI 1200; a 2000-level course in CSCI, ECSE, ITWS (or permission of the instructors)

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**CSCI 4966-01 CRN 86399 Programming for Cognitive Science & AI [4 credits]**
T/F 2:00-3:50PM Schoelles
*See COGS 4410-01*

**CSCI 4967-01 CRN 86704 Game AI [4 credits]**
M/R 2:00-3:50PM Mei Si
*See COGS 4420-01*

**CSCI 4968-01 CRN 88649 Affective Computing [4 credits]**
**CSCI 6961-01 CRN 88903 Affective Computing [3 credits]**
M/R 12:00-1:50PM Mei Si
*See COGS 4967-01 and COGS 6961-01*

**CSCI 4969-01 CRN 88660 Computational Axiomatic Science [4 credits]**
**CSCI 6967-01 CRN 88659 Computational Axiomatic Science [4 credits]**
M/R 12:00-1:50PM Selmer Bringsjord
*See PHIL 4966-01 and COGS 6960-01*

**CSCI-4964/6964  86159 / 88287  Projects in Cognitive Computing**
Instructor: Jim Hendler
max enrollment: 20
credits: 4 undergrad; 3 grad
prereqs: CSCI-2300 Intro to Algorithms or permission of instructor
meets: Wed 1:00-3:50PM
description: Cognitive Computing is a term being used for a new generation of artificially intelligent 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! 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.

**ECON 4960-01 CRN 88724 INTERNATIONAL FINANCE**
M/R 4:00-5:50
"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

**ECON 4961-01 CRN 88137 ECON of Financial Inst & Markets**
T/F 10:00-11:50 Jones
The course focuses on the economic analysis of non-money financial markets and of financial institutions that operate in those markets. Markets considered include bond, stock, and derivative markets, as well as asset securitization. The institutional focus is primarily on non-banks, and includes investment companies, insurance companies, and pension funds. The course investigates the rationale for and the economic consequences of financial markets and institutions.
Prerequisite: ECON 1200

**ECON 4962-01 CRN 88675 Financial Economics**
M/R 10:00-11:50 Estrella
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

**ECSE 4960/6963 CRN 87181/CRN 88717 Computer Vision for Visual Effects**
Until the early 1990's, visual effects for movies generally meant practical effects such as forced-perspective shots, highly detailed matte paintings on huge glass plates, and stop-motion animations with physical miniatures. However, technological advances in computer vision and graphics have ushered in a major shift to an all-digital pipeline in which most visual effects are added semi-automatically in post-production. Furthermore, a home enthusiast can now generate convincing visual effects with a small investment of time, hardware, and software, resulting in an explosion of user-generated content on video-sharing sites.
The main objective of this course is to describe the computer vision problems that underlie modern visual effects in movies, in which original video footage is transformed or augmented to create fantastic, yet plausible environments. We will critically overview the important literature for several problem categories, describing "under-the-hood" concepts and algorithms in mathematical detail. In many cases, the relevant academic research is only a few years old and has only recently been applied to movies, TV shows, and commercials.
**Prerequisites**: MATH 2010 and general understanding of digital images and their manipulation. Courses like ECSE 4540, CSCI 6270, or ECSE 6650 may be helpful but aren't necessary.

3 credit hours

**ECSE 4964 CRN 88722 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

**IHSS 1960-01 CRN 88637 Eddie Ade Knowles, Prof. of Practice in the Arts**

**Course Title: 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.

**IHSS 1961-01 CRN 88677 American Society & “The Wire”**

T/F 10:00-11:50 Kinchy

This course examines the politics, economy, and culture of the United States. In addition to reading assignments, students watch the first two seasons of “The Wire” outside of class, treating the program as a key “text” for analyzing the social institutions and social problems that shape urban life in the United States. Course work includes team-based, participatory projects that teach how to collaborate, debate, and use a sociological perspective to investigate complex problems.

**IHSS 1962-01 CRN 88117 Public Health & War on Drugs**

M/R 10:00-11:50 Campbell

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.

**IHSS 1963-01 CRN 88678 Century of Environmental Thought**

T/F 2:00-3:50 Kinchy
This course examines the development of the worldviews, organizations, and practices that shaped the 20th century American environmental movement. Students will read the original writings of some of the most important thinkers and activists in the history of environmentalism. Lectures and projects will examine the cultural contexts for the emergence of environmental ideas and their impacts. This course is cross listed with STSS/STSH 2310 and cannot be taken twice under different numbers.

**IHSS 1968-01 CRN 88122 BLENDED REALITY & INTERNET**
M/R 2:00-3:50 NOBLE

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.

**IHSS 1969-01 CRN 88123 ARE HUMANS RATIONAL?**
M/R 4:00-5:50 BRINGSJORD

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.

**ISYE 4961/6961  88209/8871 Projects in Big Data Analytics**

Description: Data has always driven scientific discovery and engineering progress. Unprecedented growth in dataset size and variation across virtually every arena of human endeavor has strained our ability to keep pace with societal needs and demands. The data analytics technologies of the past have been stretched and augmented in novel ways to solve problems as never before. Those equipped with the data science and domain skills to conduct innovative data analytics problem solving will lead the next generation of scientists, engineers and entrepreneurs. In this class, lectures and project-oriented laboratory sessions will expose students to a range of big data analytics skills including: preparation of informative, manageable datasets; accessing "big data" quickly and reliably during and subsequent to analysis; data pre-processing, analytics methods selection and testing, work flow design, and bulk data processing; exploratory data analysis including interpretation, generation of hypotheses and intuition about the data; prediction, utilizing statistical tools such as regression, classification, and clustering; communication of results through visualization, stories, and interpretable summaries.

Students with prior experience/coursework in data analytics or statistics, students with experience in domains where big data techniques are employed, and students interested in graphical and written communication are all encouraged to join the class. Students will work together in teams to develop significant analytics projects as a major part of this course.

Requirements: No specific prerequisites
ITWS 6963 CRN 88264 IT Software Development
This course teaches students about the roles and infrastructure of IT departments in modern organizations, IT software engineering technologies and methodologies for software development life cycle through hands-on experience.

3 credits
Instr. – Liu
20 total students
M/R – 10:00-11:50
Room requirements – Video projector. No additional laptops needed but will need internet.

LITR 4960-01 CRN 88667 Irish Literature
T/F 12:00-1:50 Deery
A survey of major works by Irish authors writing in English, with a particular focus on fiction and drama of the twentieth century. Authors will include: Oscar Wilde, Samuel Beckett, James Joyce, and W.B. Yeats.

MANE-2961-01 88799
How To Change The World (HTCTW) using Ideation and Innovation Tools for New Technology/Product Development

This is an advanced level course which synthesizes and extends the contents covered in MANE 2961 Innovation Tools and Technology and ENGR-1961 How to Change the World. Students will learn how to: 1) Build on your personal values, purpose, and mission, to prepare and build confidence for a career as a leader of technological innovation; 2) Learn critical thinking, problem solving, and interpersonal skills required for success in the world as an innovator; 3) Regain your creativity, and develop the mindset of an innovator; 4) Understand how to create a culture of innovation. Specifically you will learn a) 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) to iterate on fine tuning innovative idea, learning from each "iteration" using an ideate-build-learn cycle; 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. NOTE: if the 2nd MANE.Innovation course is taken after this course, the two courses together will satisfy both of the Mechanical Engineering Technical Electives; this course alone will count as free elective credits.

3 credits; restricted to Sophomores, Juniors, and Seniors

Mechatronics Hardware and Software 87850 / 87886 – MANE-2960 / ECSE-2960
A laboratory introduction to programming with MATLAB and Simulink with hardware implementation on Arduino. This course will cover the fundamental theory and programming tools for common sensors and actuators: gyroscopes, accelerometers, rotary encoders, analog sensors, DC Motors, PWM and motor drivers. Including the basic supporting theory: discretization, sampling, integration, differentiation and filtering. All the material covered is in a hands on, application specific and relevant way. Every concept has a real, observable effect on the actual system: students will be required to purchase a MinSeg - a Miniature Segway kit which will be used for the weekly labs. Weekly 1 hour lectures will introduce basic topics. Labs reinforce these topics and are performed at home with hardware kits. Each lab is designed to be 1-2 hours. MinSeg (www.minseg.com) kits contain all the hardware listed and required. A Windows computer is required with Matlab/Simulink.

1 credit hour.

**Rotordynamics 87381 – MANE-4960**

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. I am in the process of selecting a textbook, which I will post when I get some information on cost and availability.

Topics will include: general vibration behavior, bearings and seals, and the rotordynamic phenomena of critical speeds, response to unbalance, and instabilities.

Prerequisites: Engineering Dynamics ENGR 2090 and Thermal and Fluids Engineering I ENGR 2250

**Design of Nuclear Systems for Safety and Operations II 87579 – MANE-4961**

This course covers the operational aspects of nuclear power reactor design and balance of plant design and the intersection of efficient operation with safe operation. The course synthesizes students’ prior knowledge to learn the analytical and numerical skills necessary for the design of nuclear power plant systems for efficient operations.

4 credit hours. **Part I is not a prerequisite**
Advanced Manufacturing Processes and Systems  86920 / 87855 – MANE-6961 / ENGR-6960

Advanced Manufacturing Processes and Systems is a graduate-level pilot course that will provide engineering students with in-depth theoretical and practical knowledge of selected advanced manufacturing processes and related topics. During the first half of the semester, students learn about composites manufacturing, micro- and nano-manufacturing, advanced machining, additive manufacturing, and manufacturing systems. Five student teams will then be tasked to develop and demonstrate meaningful lab modules in each topic area under the direction of a faculty or staff expert for future use in a 2-semester expanded version of this course. Each team must then perform and critically evaluate the other four labs at the end of the semester.

Structural Dynamics  87849 MANE-6962

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.

Aerodynamic Flow Control  87135 MANE-6965

The course covers two of the most important topics in fluid dynamics / aerodynamics, which are hydrodynamic stability and flow control. These topics are at the front of ongoing and future research, and have extensive application to real systems such as airplanes, wind turbines, buildings, etc. Students from multiple departments can benefit from this course.

Prerequisites: MATH-2400 Introduction to Differential Equations; ENGR-2250 Thermal and Fluids Engineering I or equivalent; MANE-6960 Fluid Mechanics.

MATH-4960-01 Mathematics Teaching and Mentoring

This is a course in learning how to mentor students in Calculus I. Students in this course will learn effective ways of presenting mathematics and providing feedback to students on mathematics problems. They will get hands on experience in utilize these techniques as they mentor groups of students through Calculus I.

Credit Hours:  2
Course Time:  Fall 2015, Wednesday, 3:00 -4:50 PM
Instructor:  Bruce Piper

MATH-4960-02 Mathematics Teaching and Mentoring
This is a course in learning how to mentor students in Calculus I. Students in this course will learn effective ways of presenting mathematics and providing feedback to students on mathematics problems. They will get hands on experience in utilize these techniques as they mentor groups of students through Calculus I.

**Credit Hours:** 2  
**Course Time:** Fall 2015, Thursday, 3:00 -4:50 PM  
**Instructor:** Bruce Piper

**PHIL 2961-01 CRN 88661 Democracy, Insight & Practice**  
T/F 12:00-1:50 Puka  
Resolved: 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 crs.

**PHIL/88133 CRN 88132 STSS 4960-01 A Social Animal**

Drawing on biological and cultural perspectives, this course considers continuities and discontinuities between humans, animals, and digital beings from a number of perspectives, including those relating cognition, sociality and embodiment. Broadly we explore the attribution of human characteristics to non-humans and machine characteristics to humans. We consider what makes an entity a “social animal” through comparative studies, experiments in cognitive science, and observations in the wild and how such work influence, and is influenced by, familiar concepts such as society, innateness, mating, ethics and what constitutes “normal.” Prerequisites: Phil 1120 Mindes and Machines, STSS 1510 Introduction to Cultural Anthropology (or equivalent), STSS 2200 Engineering, Design, and Society; LITR 2150 or LITR 4160 The Human Mind in Fiction; Psych 2730 Social Psychology or Permission of the instructor.

**PHIL/ CRN 88135 STSH/ CRN 88136 STSS 4961-01 Intersections: Evolution, Culture, Cognition**  
M/R 10:00-11:50 Caporael  
What does evolutionary theory add to our understanding of human behavior, cognition, organization, and society? This course presents new perspectives in the philosophy of biology, particularly as it relates to humans, levels of selection, nature-nurture issues, and cultural evolutionary theories. The course will focus on new directions from extended evolutionary theory as applied to humans as well as the relationship between biology and society. Prerequisites: Biology 1010 or equivalent or PHIL 296x Philosophy of Biology or permission of the instructor.

**PHIL 4962-01 CRN 88662 Computational Axiomatic Science**  
M/R 12:00-1:50 Staff

**PHYS 4962/01 88757 Electromagnetic Radiation and Physical Optics**
4 CR
Instructors: P Persans and J Schroeder
TIME: TBA
An extension of PHYS 4210 Electromagnetic Theory addressing radiation from accelerating charges and electromagnetic wave propagation. Applications include waveguides, antennas, and physical optics including diffraction and interference.
Text: Electromagnetic Radiation 3rd edition, Heald and Marion, Dover Press
Prerequisite: PHYS 4210 or permission of instructor.

PSYC 4960-01 CRN 88664 Psychology of Gender
T/F 2:00-3:50 Traver
We will discuss issues related to the psychology of women and men such as achievement, interpersonal relationships, victimization, parenting, health, and adjustment. We will focus on theories of and research about women and gender, as well as historical and social themes that influence human experience. Women’s and men’s life choices and tasks, gender similarities and differences, and the psychological health of women will receive special emphasis. This class will also explore the diversity of women by examining the impact of social factors, race, ethnicity, class values, cultural themes, and sexual and gender role orientations on women and men. We will explore the complex intersections of these various social identities and how certain identities may confer privilege while others are often associated with societal oppression and discrimination. The expression of diverse viewpoints is highly valued in this class. It is expected that students and the instructor will strive to create a mutually respectful environment in which it is safe to express multiple perspectives.

PSYC 4962-01 CRN 87873 PHIL 4963 CRN 88874
Economic and Philosophical Perspectives on Happiness"

Happiness is a cornerstone concept in the decision sciences, but raises many philosophical problems. Is happiness a subjective emotional state (can a deeply distressed individual who manages to constantly distract themselves with fun activities be considered happy)? Or is happiness more of an objective state of well-being, independent of feelings or emotions? Is happiness all that matters to living a good life, or is happiness overrated? What are the empirical findings on reports of subjective well-being, and how do they inform such philosophical questions? How do our conclusions about these philosophical questions bear on the standard assumptions of microeconomic theory, that individuals seek to maximize utility (commonly understood to be related to satisfaction or happiness)?
According to rational choice theory, the rational choice is that which maximizes expected utility (the goodness of an outcome multiplied by its probability). In many cases however, probabilities of outcomes are only rough estimates, and so only expected utility estimations are possible; given only rough expected utility estimations, what is rational choice and how might the specifics of different contexts matter? Worse yet, some choice options introduce the possibility of unknown outcomes. Since unconsidered outcomes will sometimes seem especially likely, how is rational choice possible under such circumstances? Can we model or measure how people in fact value the likely presence of unconsidered outcomes, and how might such valuation depend on contextual features of decisions? Independent of how actual people assign value or disvalue to unknowns, how should a rational agent value an unknown outcome (or a "mystery box")?

STSH CRN 88135/ STSS CRN 88136/ PHIL 4961-01 CRN 88134 Intersections: Evolution, Culture, Cognition
M/R 10:00-11:50 Caporael
What does evolutionary theory add to our understanding of human behavior, cognition, organization, and society? This course presents new perspectives in the philosophy of biology, particularly as it relates to humans, levels of selection, nature-nurture issues, and cultural evolutionary theories. The course will focus on new directions from extended evolutionary theory as applied to humans as well as the relationship between biology and society. Prerequisites: Biology 1010 or equivalent or PHIL 296x Philosophy of Biology or permission of the instructor.

STSS 4962-01 CRN 87584 China & The US
M/R 12:00-1:50Winner
This class studies the social relations, politics, and economics of China in its relationship to the United States. Beginning with readings on modern Chinese history, the founding of the People’s Republic of China, Communist Party, Cultural Revolution, new opening of relations between the U.S. and China, and economic reforms of the past three decades, we will discuss a range of contemporary issues of concern to both the American and Chinese people.

STSS 4963-01 CRN 88663 Religion & Society: An Anthropological Perspective
M/R 4:00-5:50 Royer
This course is an introduction to the anthropological study of religion. Based on the study of local religious experiences and practices, cultural anthropology has generated a variety of theories on the nature and functions of religion and ritual which will be examined throughout the course in relation to
ethnographic cases. We will also analyze relationships between beliefs and their economic and political context as well as contemporary issues of religious conflict and identity.

**STSS 4964-01 CRN 88143 Sustainability Research Design**  
W 4:00-5:50 Costelloe-Kuehn  
This course guides students through research design for a social science thesis, resulting in a thesis proposal and plan of work. The course helps students think about and focus their research goals, and identify sources of data. Students produce extensive research memos every week, which feed into the proposal due at the end of the semester. Restricted to STS, SUST and DIS majors.

**STSS 4966-01 CRN 88145 International Economics & Globalization**  
M/R 12:00-1:50 Duchin  
This course investigates the significance of economic globalization, covering the following topics: international trade and financial flows, technological innovation and intellectual property, technology transfer, national government and transnational corporations, natural resources, health and the environment, impacts on selected industries and countries, and roles of the world trade organization and international monetary fund. The major controversies surrounding globalization are identified, and alternative arguments are evaluated based on available evidence.  
**Prerequisites/Corequisites:** Prerequisite: ECON 1200 or permission of instructor.  
**When Offered:** Upon availability of instructor. (meets with ECON 4190)

**STSS 6962-01 CRN 87947 STS COLLOQUIUM**  
W 1:00-2:50 KINCHY  
This one-credit course is intended for STS graduate students. Students attend weekly presentations by faculty, students, and visiting scholars. There is no limit on the number of times that students may enroll in this course.

**STSS 4965-01 CRN 88680 FUTURISM: UTOPIAS & DYSTOPIAS**  
T/F 10:00-11:50 Woodhouse  
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.