The Center for Visual Arts engages and challenges students in the study and practice of the visual arts to encourage innovative making and thinking, risk taking and creative problem solving that is applicable to research across disciplines.

Visual arts courses examine contemporary and historical perspectives in art while providing an inclusive environment where ideas are shared and acted upon.

Central to this mission of challenging students and advancing their knowledge and skills in the arts are classes that offer faculty led cross-disciplinary collaboration within diverse academic programs at JHU and the greater Baltimore community. CVA faculty are accomplished artists, photographers, designers, and illustrators.

Students can minor in art or take general elective classes from a diverse curriculum that includes drawing, painting, cartooning, sculpture, printmaking, digital photography, fiber art and a range of special topics courses. Through Hopkins’ cooperative programs with MICA and other colleges in the Baltimore area, students can take courses not offered at the Center for Visual Arts.

Each spring, the Hopkins community is invited to attend an exhibition of the year’s best work by CVA students. Additionally, a variety of temporary exhibits are hosted in the department throughout the year.

The CVA invites award winning artists to campus every semester to work with students and give a public presentation about their art practice. News and events can be found on our social media pages:

https://www.facebook.com/jhuvisualarts/

https://www.instagram.com/explore/tags/jhuvisualarts/

The photography, painting and drawing departments offer a summer study abroad program at Burren College of Art in Ballyvaughan, Ireland. More information can be found on the Study Abroad website (http://jhu-sa.terradotta.com/).

Programs

- Visual Arts, Minor (https://e-catalogue.jhu.edu/arts-sciences/full-time-residential-programs/degree-programs/art-workshops/visual-arts-minor/)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.371.126. Fiber Art and the String Revolution. 2 Credits.
This course presents students with technical, historical and cultural understanding of the fiber medium. Students learn the basics of textile processes, including dyeing, felting, knitting, weaving, sewing, and lacemaking. Technical demonstrations and samples will be covered in class while students are encouraged to expand upon covered material through long-term personal projects. Technical demonstrations will be supported with slide lectures demonstrating the historical context of fiber processes and their contemporary applications. Attendance in 1st class is mandatory.
Area: Humanities

AS.371.129. Botanical Painting in Watercolor and Gouache. 3 Credits.
This introductory painting class is an exploration of the ways watercolor and designer gouache are used together to paint organic materials representationally. We’ll study the difference between botanical painting and illustration and trace how women specifically have shaped this genre of art through history. Students will learn techniques from both observation and invention and artwork will be assessed in weekly group critiques. Course includes demonstrations, short readings and a research paper about a botanical artist.
Area: Humanities

AS.371.131. Studio Drawing I. 2 Credits.
This course is designed as an introduction to the tools, techniques and concepts of basic drawing for students with little or no previous experience. Studio assignments focus on developing strong observation and rendering skills while experimenting with traditional and contemporary practices in drawing. Wet and dry media will be used. Attendance at 1st class is mandatory.

AS.371.133. Oil Painting I. 2 Credits.
This course is designed as an introduction to the tools, techniques and concepts of basic painting for the serious student with little or no previous experience. Studio assignments focus on developing strong observation and rendering skills focusing on issues of light, color and composition while experimenting with traditional and contemporary practices in painting. Lectures and a museum trip give students an art historical context in which to place their own discoveries as beginning painters. Oil paint will be used. Attendance at 1st class is mandatory. Approval for this course will be considered after enrollment in SIS.

AS.371.140. Cartooning. 3 Credits.
Not open to Freshmen. A history-and-practice overview for students of the liberal arts. The conceptual basis and historical development of cartooning is examined in both artistic and social contexts. Class sessions consist of lecture (slides/handouts), exercises, and ongoing assignments. Topics include visual/narrative analysis, symbol & satire, editorial/political cartoons, character development, animation. Basic drawing skills are preferred but not required.
Area: Humanities
AS.371.147. Art of Architecture: Homewood, Baltimore and Beyond. 3 Credits.
In this course, students will learn to design, draw, and see like an architect. A series of progressive design exercises will teach the practical capacities and habits of mind that lead not merely to competence but success and advancement in the field. We will look at what architecture has been, discuss what it is becoming, and explore both formal and narrative methodologies for design. The class will use the built environment of the city - and the Homewood campus - as a classroom and a site for interpretive drawing and creative design work. Essential in the architect's education is the sketchbook, which functions not merely as a place to 'store' what has been witnessed, but a place to interpret and explore implications of design in the world, whether close to home or traveling in exotic locales.
Area: Humanities

AS.371.151. Photoshop/Digital Darkroom. 3 Credits.
Photoshop is not only the digital darkroom for processing images created with digital cameras; it is also a creative application for making original artwork. In this course, students use Photoshop software as a tool to produce images from a fine art perspective, working on projects that demand creative thinking while gaining technical expertise. Students will make archival prints, have regular critiques, and attend lectures on the history of the manipulated image and its place in culture. We will look at art movements which inspire digital artists, including 19th-century collage, dada, surrealism, and the zeitgeist of Hollywood films. Students must have a digital SLR camera. Prior knowledge of Photoshop is not required. Attendance at first class is mandatory. Approval for this course will be considered after enrollment on SIS; no need to email.
Area: Humanities

AS.371.152. Introduction to Digital Photography. 3 Credits.
In this foundation course students learn to use their digital cameras through a variety of projects that will help them develop technical and creative skills. Frequent critiques of students work and slide lectures of historic photographs, which range from postmortem daguerreotypes to postmodern digital imagery, help students develop a personal vision. Students gain proficiency with post processing software including Lightroom and Photoshop, culminating in a final project of their choice. Cameras are provided for students during the semester. Attendance at first class is mandatory.
Area: Humanities

AS.371.154. Introduction to Watercolor. 2 Credits.
Watercolor is simultaneously the most accessible of all painting media and the most misunderstood. This course provides experience and instruction in observational and expressive watercolor techniques, materials, concepts, and vocabulary. Topics to be reviewed include line, perspective, value, texture, composition, color, and pictorial space. There will be an introduction to contemporary practices in watercolor, as well as experimental and abstract exercises, collage, and conceptual work.

AS.371.155. Introduction to Sculpture. 2 Credits.
A studio course introducing students to sculptural concepts and methods. Emphasis is on the process of creating. Even the simplest materials can effectively activate space, convey meaning, and elicit emotion when used thoughtfully and imaginatively. Students will learn different methods including additive and reductive techniques, construction, modeling, and mold-making. No prerequisites except a willingness to experiment, make mistakes... and clean up when you are done. Approval in this course will be considered after enrollment in SIS. Attendance in 1st class is mandatory.

AS.371.162. Black and White: Digital Darkroom. 3 Credits.
In this digital photography course, students explore the beauty and drama of the black-and-white aesthetic. Students learn the elements of composition, style, and content through discussions of historic and contemporary imagery. They gain proficiency in Photoshop, Lightroom, and NIK software. Projects enhance students' artistic vision and include the Evocative Landscape, Surrealism, and a DADA collage. Students work on a final project of their choice. Digital SLRs are provided. Attendance at 1st class is mandatory. Camera experience is a plus but not a requirement. Approval for this course will be considered after enrollment on SIS.
Area: Humanities

AS.371.164. Introduction to Printmaking. 2 Credits.
Working with non-toxic/water based inks and both an engraving press and hand tools, students will explore several types of printmaking. Methods will include intaglio, collograph and both simple and multi-plate relief. As they develop their prints, students can then observe and exploit the strengths that each method has to offer. Drawing and Photoshop skills are helpful but not required.

AS.371.165. Location Photography. 3 Credits.
Working in the studio and in various locations, students will learn the fundamentals of lighting interiors and strategies for working in almost any environment. Field trips will include the National Aquarium, Evergreen Museum & Library, a Howard County horse farm, a Tiffany-designed church and a photo studio. Students will also concentrate on the fine art of printing in our digital lab. They will develop a final portfolio of 10 photographs which express a personal vision about a location of their choice. A basic knowledge of digital photography is helpful, but not required. Approval for this course will be considered after enrollment on SIS. First class is mandatory.
Area: Humanities

AS.371.166. Landscape Photography. 3 Credits.
Class begins: Wednesday, July 6th. In this course students will experience the drama and beauty of the urban and rural landscape. On numerous field trips they will hone their camera technique as well as learn elements of composition and develop a personal style. Students will learn the fundamentals of Photoshop and they will also be introduced to the beauty of black and white in Silver Efex software. Digital SLR cameras will be provided.
Area: Humanities

AS.371.180. Exploring Line. 2 Credits.
This challenging yet creatively playful course presents abstract, perceptual and conceptual concepts in art to understand line, one of the elements of art, from multiple perspectives, materials and practices. Be prepared to collaborate and experiment! Through an intense exploration of line, students will create artworks exploring line as marks on a flat surface (drawing), lines that communicate data (design), lines that build form (sculpture) and lines that embody movement (performance and video). Possible assignments will include projects with drawing, printmaking, fiber, cell phone video, installation, unconventional or recycled materials and collaboration. * This is not a drawing class but a multimedia course on one of the elements of art. Instructor approval and attendance at first class is mandatory.
Area: Humanities
AS.371.185. Printmaking: Multiples and Variations. 2 Credits.
In this course students learn to create marks, textures and imagery using a variety of printmaking techniques. Students create relief and intaglio printing matrices and practice printing by hand and with a press to reproduce their images. The class culminates with explorations of layered printing, monoprinting, and mixed media approaches to create unique 2-dimensional and 3-dimensional works. Attendance in first class is mandatory. No prior experience is needed.
Area: Humanities

AS.371.186. Fundamentals of Design Drawing and 3-D Visualization. 2 Credits.
This course introduces the tools, techniques, and technologies of design representation in a project-based setting. Students will build drawing skills, learn the principles of perspective, and explore theories and applications of design media and emerging digital technologies. Designing projects at various scales from the hand-held object to the public realm, we will develop creative problem solving, design thinking, and iterative design methodologies, leaving the course with the ability to apply the foundations of design to any discipline. Special note: This spring our course will be geared toward collaborative and site-based practices. Class meetings will begin with remote instruction and collaboration, and expand to include site visits as the season progresses. This course will satisfy the foundation drawing class for the art minor.
Area: Humanities

This is an intermediate drawing class that builds on the concepts and skills in Studio Drawing 1. Students will explore contemporary and conceptual approaches to drawing while further developing their skills in various graphic mediums. Risk taking and experimentation will be encouraged while learning about contemporary practices in the medium. The course will conclude with students creating an individual series of drawings of their choice.
Prerequisite(s): AS.371.131 OR AS.371.186
Area: Humanities

What makes an image truthful? Students will create drawings utilizing both traditional and unconventional processes through the lens of historical and political illustrations, propaganda graphics and misinformation, and current events. The course is anchored in, but not limited to, the art practices of Kara Walker’s slavery narrative, George Grosz’s political caricatures of First War Germany, historical war posters, Hugo Crosthwaite’s depiction of the US/MX border to Coronavirus "beauty shot.” Projects may include revising a historical artwork, manipulating propaganda graphics of the past and the present, redrawing a visual data, and designing a personal narrative drawing project. Field trips, technical demos, discussions, and lectures will provide context and support for students to become image-makers of their own narrative and history. Attendance in first class is mandatory. Recommended but not required: AS.371.131
Area: Humanities

AS.371.226. Sculptural Fibers. 2 Credits.
The fabric of the universe, a wrinkle in time and space: our physical universe is frequently described through fiber metaphors. Fiber processes are algorithmic. They grow exponentially, they fold, they tear, they wrinkle. These processes function as a pliable plane that can be bent, stretched, and turned inside out. This course offers students an opportunity to explore fiber processes through this sculptural lens. Topics include knitting, crochet, basketry, and lace as they come together to form sculptural armatures and objects. Together we will explore the physical properties of fiber and textiles, how they take up space and function in our world. Attendance in first class is mandatory. Recommended but not required: AS.371.126 Fiber Art and the String Revolution.
Area: Humanities

AS.371.230. Portrait Photography. 3 Credits.
In this course students will gain insight into the art of portraiture with projects such as the self-portrait, collaborative portraiture, portrait of a place, and image and text. In representing people, we'll explore developing an understanding of people in relation to power and representation, the body, environments and society. Lectures on the history of the portrait and its practitioners, new directions in portraiture as well as empathy and the gaze will inspire students to bring greater depth to their image making. Camera experience is a plus but not a requirement. Cameras will be provided for the semester. First class is mandatory.
Area: Humanities

AS.371.233. Environmental Photography. 3 Credits.
Environmental cognition, consciousness and communication are formed, deciphered and internalized with the support of visual representations and, in particular, photography. Images increasingly structure our experience of nature, environmental problems, human-environmental relations, and ecological awareness. Students will engage with the local community, identify and investigate environmental issues affecting Baltimore, participate in photographic critiques, and develop a final, in-depth environmental photo-documentary project. This studio/ seminar course is designed with an emphasis on individual research and practice. Attendance in first class is mandatory.
Area: Humanities

AS.371.234. Oil Painting II. 2 Credits.
Students who have mastered basic painting skills undertake sustained projects, including portrait and plein air landscape work. Slide lectures and handouts deepen students’ appreciation of representational traditions. Advanced techniques, materials, and compositional issues are also investigated. Recommended Course Background: AS.371.133 or equivalent.

AS.371.250. Life Drawing. 3 Credits.
An intermediate drawing course focusing on drawing the human form and studying anatomy for artists. Working from live models, students will draw the clothed and nude figure, portrait drawing, gesture drawing and anatomy tracings of the skeleton and muscles. Students will use drawing skills learned in Drawing I to explore the human form using wet and dry material, collage and color. The class will study the figure drawings and paintings from Renaissance to contemporary artists. Attendance in 1st class is mandatory.
Prerequisite(s): AS.371.131 or permission of Instructor.
Area: Humanities
AS.371.302. Photographic Portfolio. 3 Credits.
In this upper level course, students will work on a semester-long project. They will develop their ideas within a seminar style format that allows for conversation and debate and provides a forum for the evolution of their work. Students will learn advanced techniques in Photoshop, Nik software and Lightroom to enhance content and develop a personal style. Through a combination of critique, lecture, and lab, students will complete a portfolio of ten printed images that work together in a series. Approval for this course will be considered after enrollment on SIS. Attendance in 1st class is mandatory.
Area: Humanities

AS.371.303. Documentary Photography. 3 Credits.
In this course, we will explore different genres and approaches to documentary photography and the questions inherent to this mode of image-making like representation, storytelling, records and archives, journalism, community engagement, research and personal perspective. Baltimore neighborhoods and contemporary issues will provide inspiration for student work. Students will learn camera operation, photo editing and produce a final documentary project on a subject of their choice as the culmination of their semester's work. Digital SLRs are available on loan for the semester. Attendance at first class is mandatory.
Area: Humanities

AS.371.307. The Photographer's Book. 3 Credits.
Students create a handmade book of photographs that illustrate a favorite piece of text. They may work with poetry, song lyrics, a play, a narrative, a blog, a diary, any writing (including their own). Students may look at historical texts such as medieval manuscripts or even scientific treatises. The possibilities are endless. We will take fieldtrips to book collections at the George Peabody Library, Evergreen Museum and Library and the Betty and Edgar Sweren Collection. This course will be taught by a photographer and an artist book designer. A previous photography class is a plus, but not a requirement. Students who would like to combine their painting and drawing skills with their photographs are welcome to do so. Attendance in first class is mandatory. Students will have an exhibition of their artist books in the Special Collections Rare Books room of the MSE library. Approval for this course will be considered after enrollment in SIS.

AS.371.330. Evergreen as Muse: A Photographic Exploration. 3 Credits.
In this course taught by a historian and a fine art photographer, students are introduced to the delights of the Evergreen Museum and Library of the Johns Hopkins University. The history of Evergreen, its inhabitants including family members and servants, the world-famous library, art collection and grounds, all serve to inspire students to produce a portfolio of photographs. There will be an exhibition showcasing student work at the museum as the culmination of their semester's work.
Prerequisite(s): AS.371.152 OR AS.371.162 OR AS.371.303
Area: Humanities

AS.371.501. Independent Study. 2 Credits.
Prerequisite(s): You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration &gt; Online Forms.

AS.371.502. Independent Study. 1 - 2 Credits.
Prerequisite(s): You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration &gt; Online Forms.

AS.371.590. Independent Study. 3 Credits.
Prerequisite(s): You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration &gt; Online Forms.

Cross Listed Courses

Anthropology
AS.070.379. Social Ecology Studio. 3 Credits.
This course will grapple with the social and cultural dimensions of contemporary ecological problems through a local, project-based approach. Coursework will be organized on a studio basis in partnership with a local environmental organization, Friends of Stony Run. Continuing a collaborative project initiated in the fall of 2019, we will work together to develop interpretive materials for the Stony Run stream and urban watershed adjoining our campus.
Area: Humanities, Social and Behavioral Sciences

Applied and Computational Mathematics
EN.625.638. Neural Networks. 3 Credits.
This course provides an introduction to concepts in neural networks and connectionist models. Topics include parallel distributed processing, learning algorithms, and applications. Specific networks discussed include Hopfield networks, bidirectional associative memories, perceptrons, feedforward networks with back propagation, and competitive learning networks, including self-organizing and Grossberg networks. Software for some networks is provided. Prerequisite(s): Multivariate calculus and linear algebra. Course Note(s): This course is the same as EN.605.647 Neural Networks.

Asia
SA.755.740. The Indo-Pacific: Cooperation & Contestation. 4 Credits.
The Indo-Pacific has developed into a new framework for regional cooperation and contestation between the major powers, replacing the earlier notion of the Asia-Pacific. It reflects the rise of China and its Belt and Road Initiative, which aspires to weld together the Eurasian landmass and its adjacent areas in a two-pronged, transcontinental and maritime drive. This course explores the material foundations, the perspectives and strategies of the major players in this huge maritime area, the patterns of co-operation and conflict in their interactions and the arrangements - and their deficiencies - for transregional international order.

Classics
AS.040.214. Antigone's Echoes: Activism and the Law from Ancient Greece to Today. 3 Credits.
Where should the law come from, the individual or the state? What does it mean to apply a law equitably? How can one protest an unjust system? These are just a few questions that Antigone, long considered to be one of the most important dramatic works in the western tradition, has raised for philosophers and playwrights across the centuries. In this class we will read several versions of Sophocles' Antigone and explore this character's enduring relevance to theories of gender, performance, world literature, and politics. Dean's Teaching Fellowship course.
Area: Humanities

AS.040.218. Celebration and Performance in Early Greece. 3 Credits.
Surviving imagery suggests that persons in Minoan and Mycenaean societies engaged in various celebratory performances, including processions, feasts, and ecstatic dance. This course explores archaeological evidence of such celebrations, focusing on sociocultural roles, bodily experience, and interpretive challenges.
Area: Humanities
AS.040.366. The Archaeology of Ancient Cyprus: Investigating a Mediterranean Island World in the JHU Museum. 3 Credits.
This course explores the visual and material worlds of ancient Cyprus from the earliest human evidence through the Iron Age. Course topics will include the island’s unique position between the Aegean and Near East and how this has impacted both Cyprus’ ancient past and the way in which it has been conceived in the modern world. Class involves regular analysis of artifacts based in the Archaeological Museum.
Area: Humanities

AS.040.373. Propaganda and the Art of Visual Politics during the Roman Empire. 3 Credits.
We will examine visual expressions of propaganda in the city of Rome, considering how emperors used public art to promote their political agendas and their ideological vision of power. Dean’s Teaching Fellowship course
Area: Humanities

AS.040.426. Classics Research Lab: The Baltimore Casts Project. 3 Credits.
Classics Research Lab: The Baltimore Casts Project will continue work begun in Fall 2020 researching a remarkable collection of plaster casts of classical Greek and Roman sculptures, created ca. 1879 for the Peabody Institute’s art gallery. Such cast collections were a highly valued cultural resource in Europe and North America, produced for major museums, academic institutions and wealthy individuals. Because of the technical process of the cast formation, based directly upon the ancient sculptural surface, cast collections brought contact with the actual ancient artifacts into temporally and spatially distant contexts—including the burgeoning urban space of 19th century Baltimore. In Spring 2021, the Lab will continue archival/field research on the cast collection’s context, content, formation, and usage by the people of Baltimore, and its eventual disbanding. We will also begin construction of the virtual exhibition that reassembles the collection’s member objects, charting their biographies and current locations. A major dimension of the Lab’s research is contextualizing the casts in Baltimore of the mid 19th to mid-20th centuries, considering different forms of access and restriction to ancient culture that were forming throughout the city and its diverse population, including who truly had access to the cast collection in Mount Vernon, and in which capacities.
Area: Humanities

Classics Research Lab: The Baltimore Casts Project will continue work begun in Fall 2020 researching a remarkable collection of plaster casts of classical Greek and Roman sculptures, created ca. 1879 for the Peabody Institute’s art gallery. Such cast collections were a highly valued cultural resource in Europe and North America, produced for major museums, academic institutions and wealthy individuals. Because of the technical process of the cast formation, based directly upon the ancient sculptural surface, cast collections brought contact with the actual ancient artifacts into temporally and spatially distant contexts—including the burgeoning urban space of 19th century Baltimore. In Spring 2021, the Lab will continue archival/field research on the cast collection’s context, content, formation, and usage by the people of Baltimore, and its eventual disbanding. We will also begin construction of the virtual exhibition that reassembles the collection’s member objects, charting their biographies and current locations. A major dimension of the Lab’s research is contextualizing the casts in Baltimore of the mid 19th to mid-20th centuries, considering different forms of access and restriction to ancient culture that were forming throughout the city and its diverse population, including who truly had access to the cast collection in Mount Vernon, and in which capacities.

Comparative Thought and Literature
AS.300.353. Present Mirth: Stages of Comedy. 3 Credits.
A comparative survey of presentational comedies from Aristophanes to Beckett on stage and screen, with some attention to to the vexed question of theories of comedy [no laughing matter].
Area: Humanities
Writing Intensive

Computer Science
EN.605.613. Introduction to Robotics. 3 Credits.
This course introduces the fundamentals of robot design and development with an emphasis on autonomy. Robot design, navigation, obstacle avoidance, and artificial intelligence will be discussed.
Topics covered in robot design include robot structure, kinematics and dynamics, the mathematics of robot control (multiple coordinate systems and transformations), and designing for autonomy. Navigation topics include path planning, position estimation, sensors (e.g., vision, ultrasonics, and lasers), and sensor fusion. Obstacle avoidance topics include obstacle characterization, object detection, sensors and sensor fusion. Topics to be discussed in artificial intelligence include learning, reasoning, and decision making.
Students will deepen their understanding through several assignments and the term-long robot development project.

EN.605.617. Introduction to GPU Programming. 3 Credits.
This course will teach the fundamentals needed to utilize the ever-increasing power of the GPUs housed in the video cards attached to our computers. For years, this capability was limited to the processing of graphics data for presentation to the user. With the CUDA and OpenCL frameworks, programmers can develop applications that harness this power directly to search, modify, and quickly analyze large amounts of various types of data. Students will be introduced to core concurrent programming principles, along with the specific hardware and software considerations of these frameworks. In addition, students will learn canonical algorithms used to perform high-precision mathematics and data transformations. Class time will be split between lectures and hands-on exercises. There will be two individual projects in both CUDA and OpenCL programming, which will allow students to independently choose demonstrable goals, develop software to achieve those goals, and present the results of their efforts.

EN.605.621. Foundations of Algorithms. 3 Credits.
This follow-on course to data structures (e.g., 605.202) provides a survey of computer algorithms, examines fundamental techniques in algorithm design and analysis, and develops problem-solving skills required in all programs of study involving computer science. Topics include advanced data structures (red-black and 2-3-4 trees, union-find), recursion and mathematical induction, algorithm analysis and computational complexity (recurrence relations, big-O notation, NP-completeness), sorting and searching, design paradigms (divide and conquer, greedy heuristics, dynamic programming, amortized analysis), and graph algorithms (depth-first and breadth-first search, connectivity, minimum spanning trees, network flow). Advanced topics are selected from among the following: randomized algorithms, information retrieval, string and pattern matching, and computational geometry.
Prerequisite(s): EN.605.202 Data Structures or equivalent. EN.605.203 Discrete Mathematics or equivalent is recommended. Course Note(s): The required foundation courses may be taken in any order but must be taken before other courses in the degree. Students can only earn credit for one of EN.605.620, EN.605.621, or EN.685.621.
EN.605.624. **Logic: Systems, Semantics, and Models.** 3 Credits. The use of predicate logic for modeling information systems is widespread and growing. Knowledge representation, for example, has long been important in artificial intelligence applications and is now emerging as a critical component of semantic web applications. Similarly, predicate logic is the basis for ontologies and inferential knowledge bases that support systems managing “big data” using graph databases and triple stores. This course teaches the fundamentals of propositional and predicate logic, with an emphasis on semantics. We start with a fast-paced introduction or a refresher on propositional and predicate logic, to serve as a stepping stone to more advanced topics in logics with application to computer science. Modal logic is introduced as a tool to manage non-truth functional systems, and dynamic logic is introduced to manage potentially inconsistent systems, such as may arise in merging disparate databases or in combining diagnostic models of related systems (e.g., “Agent A knows that Agent B knows fact X”), and has been key to the development of IBM’s Watson and RDF/OWL. Finally, dynamic logic is introduced to manage potentially inconsistent systems, such as may arise in merging disparate databases or in combining diagnostic models of related systems. Course Note(s): This course may be counted toward a three-course track in Database Systems and Knowledge Management.

EN.605.635. **Cloud Computing.** 3 Credits. Cloud computing helps organizations realize cost savings and efficiencies without spending capital resources up front, while modernizing and expanding their IT capabilities. Cloud-based infrastructure is rapidly scalable, secure, and accessible over the Internet—you pay only for what you use. So, enterprises worldwide, big and small, are moving toward cloud-computing solutions for meeting their computing needs, including the use of Infrastructure as a Service (IaaS) and Platform as a Service (PaaS). We have also seen a fundamental shift from shrinkwrapped software to Software as a Service (SaaS) in data centers across the globe. Moreover, providers such as Amazon, Google, and Microsoft have opened their datacenters to third parties by providing low-level services such as storage, computation, and bandwidth. This trend is creating the need for a new kind of enterprise architect, developer, QA, and operational professional—someone who understands and can effectively use cloud-computing technologies and solutions. In this course, we discuss critical cloud topics such as cloud service models (IaaS, PaaS, SaaS); virtualization and how it relates to cloud; elastic computing; cloud storage; cloud networking; cloud databases; cloud security; and architecting, developing, and deploying apps in the cloud. The format of this course will be a mix of lectures, and hands-on demos. Upon completing this course, students will have a deeper understanding of what cloud computing is and the various technologies that make up cloud computing, along with hands-on experience working with a major cloud provider. Prerequisite(s): 605.202 Data Structures.

EN.605.646. **Natural Language Processing.** 3 Credits. This course surveys the principal difficulties of working with written language data, the fundamental techniques that are used in processing natural language, and the core applications of NLP technology. Topics covered in the course include language modeling, text classification, labeling sequential data (tagging), parsing, information extraction, question answering, machine translation, and semantics. The dominant paradigm in contemporary NLP uses supervised machine learning to train models based on either probability theory or deep neural networks. Both formalisms will be covered. A practical approach is emphasized in the course, and students will write programs and use open source toolkits to solve a variety of problems. Course prerequisite(s): There are no formal prerequisite courses, although having taken any of 605.649 Introduction to Machine Learning, 605.744 Information Retrieval, or 605.645 Artificial Intelligence is helpful. Course note(s): A working knowledge of Python is assumed. While some of the assigned exercises can be done in any programming language, we will sometimes provide example code in Python, and many of the labs are best solved in Python.

EN.605.647. **Neural Networks.** 3 Credits. This course provides an introduction to concepts in neural networks and connectionist models. Topics include parallel distributed processing, learning algorithms, and applications. Specific networks discussed include Hopfield networks, bidirectional associative memories, perceptrons, feedforward networks with back propagation, and competitive learning networks, including self-organizing and Grossberg networks. Software for some networks is provided. Prerequisite(s): Multivariate calculus and linear algebra. Course Note(s): This course is the same as 625.638 Neural Networks.

EN.605.649. **Introduction to Machine Learning.** 3 Credits. Analyzing large data sets (“Big Data”), is an increasingly important skill set. One of the disciplines being relied upon for such analysis is machine learning. In this course, we will approach machine learning from a rigorous algorithmic perspective. We will examine the issues that impact our ability to learn good models (e.g., the curse of dimensionality, the bias-variance dilemma, and no free lunch). We will then examine a variety of approaches to learning models, covering the spectrum from unsupervised to supervised learning, as well as parametric versus non-parametric methods. Students will explore and implement several learning methods, including logistic regression, Bayesian classification, decision trees, support vector machines, and feed-forward neural networks, and will incorporate strategies for addressing the issues impacting performance (e.g., regularization, clustering, and dimensionality reduction). In addition, students will engage in online discussions, focusing on the key questions in developing learning systems. At the end of this course, students will be able to implement and apply a variety of machine learning methods to real-world problems, as well as be able to assess the performance of these algorithms on different types of data sets. Prerequisite(s): Two semesters of calculus, linear algebra, probability and statistics, discrete mathematics, and proficiency in programming in either Java, C, C++, or Python.

EN.605.662. **Data Visualization.** 3 Credits. This course explores the underlying theory and practical concepts in creating visual representations of large amounts of data. It covers the core topics in data visualization: data representation, visualization toolkits, scientific visualization, medical visualization, information visualization, flow visualization, and volume rendering techniques. The related topics of applied human perception and advanced display devices are also introduced. Prerequisite(s): Experience with data collection/analysis in data-intensive fields or background in computer graphics (e.g., 605.667 Computer Graphics) is recommended.
EN.605.745. Reasoning Under Uncertainty. 3 Credits.
This course is concerned with the problems of inference and decision making under uncertainty. It develops the theoretical basis for a number of different approaches and explores sample applications. The course discusses foundational issues in probability and statistics, including the meaning of probability statement, and the necessity of a rational agent acting in accord with probability theory. We will look at possible generalizations of Bayesian probability, including Dempster-Shafer theory. Next, we will develop algorithms for Bayesian networks—graphical probabilistic models—for exact and approximate inference and consider several application areas. Finally, the course will examine the problem of making optimal decisions under uncertainty. We will explore the conceptual foundations of decision theory and then consider influence diagrams, which are graphical models extending Bayesian networks to the domain of decision analysis. As time permits, we will also look at Bayesian games and Markov decision processes. Pertinent background in probability and theoretical computer science is developed as needed in the course.

EN.605.746. Advanced Machine Learning. 3 Credits.
This course focuses on recent advances in machine learning and on developing skills for performing research to advance the state of knowledge in machine learning. The material integrates multiple ideas from basic machine learning and assumes familiarity with concepts such as inductive bias, the bias-variance trade-off, the curse of dimensionality, and no free lunch. Topics range from determining appropriate data representations and models for learning, understanding different algorithms for knowledge and model discovery, and using sound theoretical and experimental techniques in assessing learning performance. Specific approaches discussed cover nonparametric and parametric learning; supervised, unsupervised, and semi-supervised learning; graphical models; ensemble methods; and reinforcement learning. Topics will be discussed in the context of research reported in the literature within the previous two years. Students will participate in seminar discussions and will present the results of a semester-long research project of their own choosing.

Prerequisite(s): EN.605.649 Introduction to Machine Learning; multivariate calculus; Students cannot receive credit for both EN.605.746 and EN.625.742.

EN.605.747. Evolutionary Computation. 3 Credits.
Recently, principles from the biological sciences have motivated the study of alternative computational models and approaches to optimization and machine learning. This course explores how principles from theories of evolution and social behavior can be used to solve such problems. In particular, the course covers techniques using evolutionary (e.g., genetic algorithms and evolution strategies) and swarm-based (e.g., ant colony optimization and particle swarm optimization) algorithms for developing software agents capable of solving problems as individuals and as members of a larger community of agents. Specific topics addressed include representation and schemata; selection, reproduction, and recombination; theoretical models of evolutionary and swarm-based computation; optimal allocation of trials (i.e., bandit problems); search, optimization, and machine learning; evolution of programs; population dynamics; and emergent behavior. Students will participate in seminar discussions and will complete and present the results of a semester-long project of their own choosing.

Prerequisite(s): EN.605.649 Introduction to Machine Learning; multivariate calculus.

Cybersecurity
EN.695.637. Introduction to Assured AI and Autonomy. 3 Credits.
In order to drive a future where artificial intelligence (AI) enabled autonomous systems are trustworthy contributors to society, these capabilities must be designed and verified for safe and reliable operation and they must be secure and resilient to adversarial attacks. Further, these AI enabled autonomous systems must be predictable, explainable and fair while seamlessly integrated into complex ecosystems alongside humans and technology where the dynamics of human-machine teaming are considered in the design of the intelligent system to enable assured decision-making. In this course, students are first introduced to the field of AI, covering fundamental concepts, theory, and solution techniques for intelligent agents to perceive, reason, plan, learn, infer, decide and act over time within an environment often under conditions of uncertainty. Subsequently, students will be introduced to the assurance of AI enabled autonomous systems, including the areas of AI and autonomy security, resilience, robustness, fairness, bias, explainability, safety, reliability and ethics. This course concludes by introducing the concept of human-machine teaming. Students develop a contextual understanding of the fundamental concepts, theory, problem domains, applications, methods, tools, and modeling approaches for assuring AI enabled autonomous systems. Students will implement the latest state-of-the-art algorithms, as well as discuss emerging research findings in AI assurance.

Data Science
EN.685.621. Algorithms for Data Science. 3 Credits.
This follow-on course to data structures (e.g., EN.605.202 Data Structures) providing a survey of computer algorithms, examines fundamental techniques in algorithm design and analysis, and develops problem-solving skills required in all programs of study involving data science. Topics include advanced data structures for data science (tree structures, disjoint set data structures), algorithm analysis and computational complexity (recurrence relations, big-O notation, introduction to complexity classes (P, NP and NP-completeness)), data transformations (FFTs, principal component analysis), design paradigms (divide and conquer, greedy heuristic, dynamic programming), and graph algorithms (depth-first and breadth-first search, ordered and unordered trees). Advanced topics are selected from among the following: approximation algorithms, computational geometry, data preprocessing methods, data analysis, linear programming, multi-threaded algorithms, matrix operations, and statistical learning methods. The course will draw on applications from Data Science. Course Prerequisite(s): EN.605.201 Introduction to Programming Using Java or equivalent. EN.605.203 Discrete Mathematics or equivalent is recommended. Course Note(s): This required foundation course must be taken before other 605.xxx courses in the degree. This course does not satisfy the foundation course requirement for Bioinformatics, Computer Science, or Cybersecurity. Students can only earn credit for one of EN.605.620, EN.605.621, or EN.685.621.
Electrical and Computer Engineering
EN.525.661. UAV Systems and Control. 3 Credits.
This hardware-supplemented course covers the guidance, navigation- and control principles common to many small fixed-wing and multirotor unmanned aerial vehicles (UAVs). Building on classical control systems and modeling theory, students will learn how to mathematically model UAV flight characteristics and sensors, develop and tune feedback control autopilot algorithms to enable stable flight control, and fuse sensor measurements using extended Kalman filter techniques to estimate the UAV position and orientation. Students will realize these concepts through both simulation and interaction with actual UAV hardware. Throughout the course, students will build a full 6-degree-of-freedom simulation of controlled UAV flight using MATLAB and Simulink. Furthermore, students will reinforce their UAV flight control knowledge by experimenting with tuning and flying actual open-source quadrotor UAVs. Prerequisite(s): Background in control systems (e.g., EN.525.609 Continuous Control Systems) and matrix theory along with a working knowledge of MATLAB. Experience using Simulink is desired. Existing familiarity with C programming language, electronics, and microcontrollers will be helpful but is not required.

EN.525.670. Machine Learning for Signal Processing. 3 Credits.
This course will focus on the use of machine learning theory and algorithms to model, classify, and retrieve information from different kinds of real world signals such as audio, speech, image, and video. Prerequisite(s): EN.525.627 Digital Signal Processing and EN.525.614 Probability and Stochastic Processes for Engineers

EN.525.724. Introduction to Pattern Recognition. 3 Credits.
This course focuses on the underlying principles of pattern recognition and on the methods of machine intelligence used to develop and deploy pattern recognition applications in the real world. Emphasis is placed on the pattern recognition application development process, which includes problem identification, concept development, algorithm selection, system integration, and test and validation. Machine intelligence algorithms to be presented include feature extraction and selection, parametric and non-parametric pattern detection and classification, clustering, artificial neural networks, support vector machines, rule-based algorithms, fuzzy logic, genetic algorithms, and others. Case studies drawn from actual machine intelligence applications will be used to illustrate how methods such as pattern detection and classification, signal taxonomy, machine vision, anomaly detection, data mining, and data fusion are applied in realistic problem environments. Students will use the MATLAB programming language and the data from these case studies to build and test their own prototype solutions. Prerequisite(s): EN.525.614 Probability and Stochastic Processes for Engineers or equivalent. A course in digital signal or image processing is recommended, such as EN.525.627 Digital Signal Processing, EN.525.619 Introduction to Digital Image and Video Processing, 525.643 Real-Time Computer Vision, or 525.746 Image Engineering.

EN.525.733. Deep Learning for Computer Vision. 3 Credits.
Recent technological advances coupled with increased data availability have opened the door for a wave of revolutionary research in the field of Deep Learning. In particular, Deep Neural Networks (DNNs) continue to improve on state-of-the-art performance in many standard computer vision tasks including image classification, segmentation, object recognition, object localization, and scene recognition. With an emphasis on computer vision, this course will explore deep learning methods and applications in depth as well as evaluation and testing methods. Topics discussed will include network architectures and design, training methods, and regularization strategies in the context of computer vision applications. Following a seminar format, students will be expected to read, understand, and present recent publications describing the current state-of-the-art deep learning methods. Additionally, team projects will give students an opportunity to apply deep learning methods to real world problems. Prerequisite(s): Students should have taken courses in computer vision and machine learning/pattern recognition, have basic familiarity with OpenCV, Python and C++, as well as prior class instruction in neural networks.

EN.525.770. Intelligent Algorithms. 3 Credits.
Intelligent algorithms are, in many cases, practical alternative techniques for tackling and solving a variety of challenging engineering problems. For example, fuzzy control techniques can be used to construct nonlinear controllers via the use of heuristic information when information on the physical system is limited. Such heuristic information may come, for instance, from an operator who has acted as a “human-in-the-loop” controller for the process. This course investigates a number of concepts and techniques commonly referred to as intelligent algorithms; discusses the underlying theory of these methodologies when appropriate; and takes an engineering perspective and approach to the design, analysis, evaluation, and implementation of intelligent systems. Fuzzy systems, genetic algorithms, particle swarm and ant colony optimization techniques, and neural networks are the primary concepts discussed in this course, and several engineering applications are presented along the way. Expert (rule-based) systems are also discussed within the context of fuzzy systems. An intelligent algorithms research paper must be selected from the existing literature, implemented by the student, and presented as a final project. Prerequisite(s): Student familiarity of system-theoretic concepts is desirable.

EN.525.786. Human Robotics Interaction. 3 Credits.
This course provides an investigation of human-robot interaction and prosthetic control, with a focus on advanced man-machine interfaces including neural signal processing, electromyography, and motion tracking interfaces for controlling and receiving feedback from robotic devices. The course will also cover human physiology and anatomy, signal processing, intent determination, communications between the human and the device, haptic feedback, and telepresence. It is designed to be a hands-on course with class time spent in the dedicated robotics lab designing interfaces and performing experiments in a Virtual Integration Environment (VIE) and with robotic devices. Additional time in the lab, outside of class time, may be required to complete the course project. Programming for the class will be in MATLAB and Simulink. Prerequisite(s): Linear algebra, ordinary differential equations, and programming experience with Python or MATLAB.
Energy, Resources & Environment
SA.680.680. Introduction to Energy, Resources & Environment. 4 Credits.
This course introduces students to the fundamentals of energy, resources and environment. It covers a wide range of topics from the functioning of electricity markets to the challenge of climate policy and the management of air pollution. It also introduces a host of key concepts and analytical frameworks that underpin policy analysis in the field, such as notions of collective action and the role of regulatory agencies in monopolistic markets. The course pays particular attention to the energy-environment nexus, including the challenge of low-carbon development in an era of climate change. The course lays the foundation for other courses in the program.

SA.680.697. Global Energy Fundamentals. 4 Credits.
This class is geared to provide a good energy background to students who have previously not had much exposure to the wide array of issues that encompass the energy policy arena. Topics covered include: oil; gas; electricity (including traditional and new generation resources); alternative transportation fuels; energy efficiency options across the transportation, industrial, and buildings economic sectors; climate change, and energy in developing countries. Students learn how to make "back-of-the-envelope" calculations regarding the scope of a given problem or a proposed solution. They also learn how to evaluate problems and suggest solutions within a two-page policy format that is used widely both in the public and private sectors. The class will be taught in an innovative format called the flipped class where students will be asked to view the online lectures outside the class. Class time will be devoted to more interactive group activities as well as professor-student interaction providing students a higher critical understanding of policy issues related to energy. First and second year ERE primary concentrators will have seating priority.
Prerequisite(s): AS.680.600[C] &lt;a href="http://bit.ly/2usTNAl" target="_blank">Click here to see a video introduction for the course.</a>&lt;a href="https://jh.app.box.com/EREQuiz" target="_blank">Click here for the self-diagnosis quiz</a> - developed to assist students in diagnosing whether they already have the level of knowledge taught in this class.


History
AS.100.331. Reading through Things: Early Modern Chinese Medicine, Technology, and Art. 3 Credits.
This course introduces the history of late imperial China from the perspective of medicine, technology, and the arts.
Area: Humanities, Social and Behavioral Sciences

Interdepartmental
AS.360.339. Planets, Life and the Universe. 3 Credits.
This multidisciplinary course explores the origins of life, planet formation, Earth's evolution, extrasolar planets, habitable zones, life in extreme environments, the search for life in the Universe, space missions, and planetary protection. Recommended Course Background: Three upper level courses in sciences and buy textbooks
Prerequisite(s): Students may not register for this class if they have already received credit for AS.020.334 OR AS.020.334 OR AS.171.333 OR AS.171.699 OR AS.270.335 OR AS.360.671
Area: Natural Sciences

AS.360.671. Planets, Life and the Universe.
This multidisciplinary course explores the origins of life, planet formation, Earth's evolution, extrasolar planets, habitable zones, life in extreme environments, the search for life in the Universe, space missions, and planetary protection. Recommended Course Background: Three upper level courses in sciences and buy textbooks
Prerequisite(s): Students may not register for this class if they have already received credit for AS.020.334 OR AS.020.334 OR AS.171.333 OR AS.171.699 OR AS.270.335 OR AS.360.339.
Area: Natural Sciences

Modern Languages and Literatures
AS.210.308. Acting French: learning about French language and culture through theater. 3 Credits.
This course proposes to enhance students' verbal (pronunciation, intonation, syntax, vocabulary) and nonverbal skills (body language, vocal projection, spatial awareness) by performing excerpts from French and Francophone plays ranging from the Middle Ages to the 21st century. A closer analysis of these excerpts will lead us to consider how theater uses the physicality and immediacy of human experience to create a more universal form of connectivity with the world.
Recommended course background: AS.210.301.
Area: Humanities

AS.211.231. Freshman seminar: Planet Amazonia: Culture, History, and the Environment. 3 Credits.
Without Amazonia, global warming could reach levels that threaten life on the planet. Yet, in an era of deforestation and climate change, Amazonia itself might be on the verge of disappearance, with disastrous consequences for the world. This course proposes interdisciplinary perspectives on Amazonia through a range of works drawn from history, anthropology, archeology, environmental studies, literature, and the arts. We'll look at texts by European travelers and missionaries who contributed to the paradoxical image of Amazonia as a "virgin paradise" or a "green hell"; scientific studies and artists' depictions of the region's flora and fauna; the often-overlooked history of human occupation of the region; and projects to colonize, develop, or conserve the world's largest tropical forest. What importance does Amazonia hold for Latin American and global geopolitics? How do art and literature, including indigenous writings, create, reinforce, or deconstruct clichés about the region? What alternative futures for our planet can Amazonia help us to imagine? Minors in Latin American Studies may count the class toward the Portuguese Language and Brazilian Culture concentration.
Area: Humanities

AS.211.327. Ecocinema: Framing Italy's Environmental Crises. 3 Credits.
Over the past decade, growing numbers of filmmakers in Italy have addressed ecological crises in their work. This class takes an ecological approach to contemporary Italian cinema, examining a body of compelling place-centered stories that deal with local and global issues. Defining the scope of eco-cinema and the ways we can interrogate films as ecological texts, we shall screen earth-centered films that raise consciousness about the consequences of human manipulation of the natural world; the complicity of industry, government, and organized crime in creating environmental crises; and the effects of economic and social malaise. Screenings include iconic films such as Michelangelo Antonioni's Red Desert (1963), more recent, critically acclaimed films such as Matteo Garrone's Gomorrah (2008), Alice Rohrwacher's Happy as Lazzaro (2018), and many others.
Area: Humanities
AS.213.763. Contemporary Theater: Gender/Violence.
The course explores 21st-century German theater in its diverse aesthetic and textual forms. Due to comparatively generous funding, German non-commercial theater has over the last decades been able to develop, adapt, and maintain a great variety of at one point "experimental" artistic styles, including frequently stark depiction of gender and violence. We will focus on the ways in which the productions take up, amplify, displace, disrupt, and/or reinforce cultural codes and images of gender and violence both in their symbolic and physical dimension. Topics include the “directors’ theater,” political theater, “pop-theater,” “discourse-theater,” “new documentary theater,” “post-migratory theater,” postcolonial theater and live art. The readings may include Nobel laureate Elfriede Jelinek, Dea Loher, René Pollesch, Milo Rau, Falk Richter, Sasha Marianna Salzmann and various works of shared authorship such as She She Pop, Rimini Protokoll, Gintersdorfer/Klaßen, and Yael Ronen. The Tuesday sessions will be used for the joint viewing of production recordings. Taught in English. Course material in German. No sessions after March 27th.
Area: Humanities

AS.217.425. Latin American Ecocriticism. 3 Credits.
Increased awareness of climate change has led to a shift in the way we address and intervene in environmental issues in the new millennium. Yet the interest in making sense of the environment has a long history in literature and the arts. How have Latin American writers and artists understood and depicted their environments and environmental questions? How do the form and content of texts and cultural artifacts influence our understanding of the non-human world? Can works of fiction shape ecological transformations? In this course we will discuss texts from the early colonial period to the present, including the literary works of Graciliano Ramos, Horacio Quiroga, and Clarice Lispector; political ecology; film; Ana Mendieta's earth-body art; contemporary experiments in bio-art; postcolonial theory; and the intersection of environmental justice with such topics as nationalism and human rights. Going beyond ecocriticism's original focus on the Anglo-American world, we will engage recent scholarship on Latin America that sheds light on the region's cultural and geopolitical importance to the global climate, with particular attention to Brazil. This course aims to introduce students to current debates in Latin American Ecocriticism and the Anthropocene and thus contribute to an incipient but expanding field.
Area: Humanities

Near Eastern Studies

AS.130.129. Freshman Seminar: The Art of War and Peace in Ancient Mesopotamia. 3 Credits.
Ancient Mesopotamia, modern-day Iraq, Syria, and Iran, is the "cradle of civilization." It witnessed new inventions previously unknown to the ancient world: urban cities, writing systems, kingship, and empires. This course examines the close relationship between war and peace and art in ancient Mesopotamia (ancient Sumer, Babylonia, and Assyria) from 3500 to 539 BCE. During the semester students will be introduced to the art, architecture, and archaeology of ancient Mesopotamia. This course is aimed at students without a previous background in art historical or archaeological approaches to Mesopotamia, but more advanced students are welcome.
Area: Humanities

AS.130.222. From Papyrus to Pixels: The Materiality of Writing from Past to Present. 3 Credits.
For over 5,200 years humans have used writing as a record for political, administrative, social, religious, and scholarly pursuits. Over millennia diverse scripts have been written, inscribed, carved, impressed, and painted on a variety of objects such as papyrus, stone, ivory, clay, leather, wax, rope, paper, metal, bone, wood, and other mediums. Today, the practice of writing has primarily shifted to the digital world. Computers are often the preferred way for people to "write." In this course students will be invited to critically examine relationships between scribes, craftsmen, writing, and materials. The goal of the course is for students to recognize how writing has shaped religious and political movements, and aided bureaucratic endeavors from the invention of writing around 3200 B.C. to the present day. In the first part of the semester we will explore the emergence of writing in Egypt, Mesopotamia, China, and Mesoamerica. In the second half of the course students will explore how the act of writing transitioned from hand written manuscripts, to printed books, and now digitized texts. We will explore the way that computers and social media have changed the way that people interact with writing. The seminar will include lecture, discussion, museum fieldtrips, and experimental archaeology labs to investigate and engage with the materiality of clay cuneiform tablets, Egyptian papyrus, Roman wax writing boards, and more!
Area: Humanities

AS.130.377. Creating an Egyptian Temple. 3 Credits.
This class will challenge every participant to plan a temple environment for a particular deity. The readings, lectures, and discussions will cover the mythology around specific gods and how it influenced temple architecture, location, ritual, and festivals. It will survey the history of temple building in Egypt, the role of architecture and art – particularly wall reliefs – in communicating the functions of particular parts of temples. The aim is to help students understand what requirements an Egyptian temple needed to fulfill. Then each student will plan a temple for a chosen deity and explain to peers how it meets the ancient requirements.
Area: Humanities

AS.130.378. Geoarchaeology: Applications of Earth Science to Archaeology. 3 Credits.
Geoarchaeology is a multidisciplinary subfield that applies the tools and techniques of earth science to understand ancient humans and their interactions with environments. This course examines basic topics and concepts, including archaeological site formation, paleo-environmental reconstruction, raw materials and resources, soil science, deposition and erosion of wind and water-borne sediments in different environments such as along rivers, lakes and coastlines, radiocarbon and other chronometric dating methods, and ground-based remote sensing, including ground penetrating radar.
Area: Natural Sciences, Social and Behavioral Sciences

AS.130.420. Seminar in Research Methods in Near Eastern Studies. 3 Credits.
This writing intensive seminar examines the relationship between religion and science in ancient Mesopotamia and the rest of the Near East from the 4th millennium to the Hellenistic period. Using a variety of case studies, and through engagement with scholarly literature pertaining to the topic of the course, students will develop skills in specific research skills such as critical reading, analysis, and interpretation.
Area: Humanities
Writing Intensive
AS.131.678. Geoarchaeology: Applications of Earth Science to Archaeology.
Geoarchaeology is a multidisciplinary subfield that applies the tools and techniques of earth science to understand ancient humans and their interactions with environments. This course examines basic topics and concepts, including archaeological site formation, paleoenvironmental reconstruction, raw materials and resources, soil science, deposition and erosion of wind and water-borne sediments in different environments such as along rivers, lakes and coastlines, radiocarbon and other chronometric dating methods, and ground-based remote sensing, including ground penetrating radar.
Area: Natural Sciences, Social and Behavioral Sciences

Area: Humanities
Writing Intensive

Program in Museums and Society

AS.389.201. Introduction to the Museum: Past and Present. 3 Credits.
This course surveys museums, from their origins to their most contemporary forms, in the context of broader historical, intellectual, and cultural trends including the social movements of the 20th century. Anthropology, art, history, and science museums are considered. Crosslisted with Archaeology, History, History of Art, International Studies and Medicine, Science & Humanities.
Area: Humanities, Social and Behavioral Sciences

AS.389.205. Examining Archaeological Objects. 3 Credits.
We examine the Johns Hopkins Archaeological Museum collection to learn the materials and techniques utilized in the ancient world to produce objects in ceramics, stone, metal, glass, faience, bone and ivory.
Area: Humanities

AS.389.303. World of Things. 3 Credits.
The course introduces and applies new concepts about materials, and materiality to museum objects. It treats the museum as a site for investigating the relationship between people and things.

AS.389.315. Ancient Color: The Technologies and Meanings of Color in Antiquity. 3 Credits.
What role did the colorful surfaces of sculptures, vessels and textiles play in the ancient world? We examine historical texts and recent scholarly and scientific publications on the technologies and meanings of color in antiquity, and use imaging and analytical techniques to study polychromed objects from the Johns Hopkins Archaeological Museum.
Area: Humanities, Social and Behavioral Sciences

AS.389.322. Tigers to Teapots: Collecting, Cataloging, and Hoarding in America. 3 Credits.
The course will examine the collecting behavior of Americans. Students will explore how collectors have defined the holdings of the nation's museums, galleries, and libraries and used objects to shape taste and status in the U.S.
Area: Humanities, Social and Behavioral Sciences

AS.389.340. Critical Issues in Art Conservation. 3 Credits.
The course examines recent controversies in the conservation of major global art works and sites, raising questions concerning the basic theoretical assumptions, practical methods and ethical implications of art conservation. Cross-Listed with History of Art and Anthropology.
Area: Humanities

AS.389.358. Collecting the Contemporary. 3 Credits.
What does it mean to be a collector? Students will visit private collections of contemporary art in Baltimore, learning from collectors and their objects. This course alternates seminar meetings, focused on theories and practices of collecting, with field trips. Cross-listed with History of Art.
Area: Humanities, Social and Behavioral Sciences
Writing Intensive

AS.389.373. Encountering American Art. 4 Credits.
Students investigate the Baltimore Museum of Art's American art collection and its presentation to the public alongside current scholarship on American art to develop strategies for a new permanent collection display that aligns with the museum's commitment to artistic excellence and social equity. M&S Practicum. Co-taught with BMA curator Virginia Anderson.
Area: Humanities, Social and Behavioral Sciences

AS.389.377. Black Artists in American Art Museums: Correcting the Canon. 3 Credits.
Students are invited to examine critically the history of Black artists exhibiting within American museums. With the help of BMA staff, class will develop interpretation for an installation to accompany a major retrospective of artist Jack Whitten that considers the "canon" of art history as a site of ongoing negotiation between taste-makers, artists, dealers, and critics, as well as art institutions that include the market and the museum. Students will take advantage of archives at the BMA, the Library of Congress and Howard University. Students will help select the artworks and themes for the show; research individuals participants in the social networks that facilitated the success of some artists over others; and research the biographies of individual artworks - some that have entered the canon and some that should. M&S Practicum. CBL Course. Cross-listed with Africana Studies.
Area: Humanities, Social and Behavioral Sciences

AS.389.384. Object Encounters at the Baltimore Museum of Art. 3 Credits.
Using the Baltimore Museum of Art as a laboratory, students examine canonical narratives in art museums and iterate new approaches to objects in museums that build equity, interrogate privilege, decolonise, visualise and offer alternative stories. Class meets at the museum every other week.
Area: Humanities, Social and Behavioral Sciences

AS.389.405. Visualizing Africa. 3 Credits.
Examines the history of African art in the Euro-American world, focusing on the ways that Western institutions have used African artworks to construct narratives about Africa and its billion residents.
Area: Humanities, Social and Behavioral Sciences
Writing Intensive

AS.389.420. Curatorial Seminar. 4 Credits.
In collaboration with a local museum, conceptualize and develop an exhibition, potentially including but not limited to: checklists, exhibition texts, interpretive strategies, and programming. Exhibition theme varies year to year. Concepts, ethics and practicalities of curation are key concerns. Research visits to regional museums and private collections are relevant.
Area: Humanities, Social and Behavioral Sciences
Writing Intensive
Study of Women, Gender, & Sexuality
AS.363.400. Feminist Modernisms. 3 Credits.
Prize Teaching Fellowship seminar. Triangulating feminist psychoanalysis and theories of embodiment and subjectivity with art criticism and case studies of artistic practice (primarily painting), this course comparatively investigates the routes modernism takes after the Second World War and decolonization (1945/1947). We will be interested in specific postcolonial and postwar contexts where modernism in the domain of the visual arts was mounted as a feminist project. Each week will pair readings that establish conceptual frameworks with close analyses of works by specific artists, including those represented by the Library’s Special Collections and the Baltimore Museum of Art. Texts include Freud, Spivak, Butler, Irigaray, Kristeva, and Mahmood.
Area: Humanities
Writing Intensive

Systems Engineering
EN.645.651. Integrating Humans and Technology. 3 Credits.
This class provides a hands-on introduction to human and cognitive systems engineering. Students will learn and apply user-centered research and innovation methods that are used to discover, document and integrate human capabilities, limitations and needs into the systems engineering process, improving the likelihood that the resulting systems are intuitive, efficient, effective and useful. Topics include needs elicitation, workflow analysis, functional allocation, decision making, prototyping, and performance measurement.
Prerequisite(s): EN.645.662 Introduction to Systems Engineering
OR EN.655.662 Introduction to Healthcare Systems Engineering
OR EN.675.600 Systems Engineering for Space

Writing Seminars
AS.220.407. The Illustrated Short Story. 4 Credits.
A collaboration of The Writing Seminars and The Center for Visual Arts Students will study JHU’s Homewood House, residence of the Carroll family, choosing a room as the site of a story or a series of prose poems. To illustrate their work and produce an artist book, students will learn camera handling and Photoshop.
Area: Humanities
For current faculty and contact information go to http://www.jhu.edu/artwork/faculty.htm