THECOOPERUNION

FOR THE ADVANCEMENT OF SCIENCE AND ART



COURSE CATALOG 2022–23 SUPPLEMENT

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COOPER.EDU



LEAVE OF ABSENCE POLICY

I Rationale

Personal, medical, financial or academic circumstances may arise that cause a student to consider interrupting their studies at Cooper Union. A student may take a break from school by either withdrawing from the school (with no intention of returning, Withdrawal from the School), withdrawing from courses for the term (Term Withdrawal) or by taking a Leave of Absence (with the intention of returning, a specification for Leave of Absence (LOA) that is established in the regulations). Taking a break from school needs to be an informed and deliberated decision on the part of the student. There are three kinds of leave, Medical Leave of Absence (MLOA) Discretionary Leave of Absence (DLOA), and Required Leave of Absence (RLOA) available at the Cooper Union.

- Medical leave and withdrawal from a semester being sought on medical grounds require approval from the Office of Student Affairs before advancing to the school/ Dean's office for approval.
- Discretionary leave, military leave, and withdrawal from a semester on non-medical grounds require approval from the student's school/Dean's office.
- Required Leave of Absence (RLOA), is an option available to the Academic Standards Committees of the three degree granting schools to provide students who have not passed essential courses or are unable to make normal progress toward their degree the opportunity to repeat courses and master content required for successful progression in the plan of study. Students who have been required to take a RLOA are asked to review the RLOA policy.

In all cases, a leave of absence will entail adjustments to the academic plan as well as the student's academic, financial aid and billing records. Therefore, when taking a leave of absence from school, the student must consult with their advisor and/or their School's deans office as well as the registrar's, financial aid, and student accounts offices (offices in the HUB) to take appropriate action to their records. International students have an additional responsibility to review regulations regarding their visa status when entertaining a leave of absence and therefore, must consult with the International Students and Scholars Office (also in the HUB). This policy provides specific guidance on the process to advance a petition for a Discretionary Leave of Absence (DLOA).

II Policy Statement

Should a student seek a temporary break from school on the basis of medical considerations, with the intention to return to Cooper Union, a medical leave of absence should be pursued. Students are advised to review the policy and processes established in the Medical Leave of Absence Policy. Medical leave and withdrawal from a term on medical grounds requires approval from the Office of Student Affairs. This process is initiated in conjunction with the Director of Student Care and Support. Student Affairs will verify and confirm the nature of any medical leave and/or withdrawals and communicate with the student's academic school. It is the student's academic school that ultimately approves all leaves and withdrawals. Should a student seek a temporary break from school, not on the basis of medical considerations, with the expressed intent to return to Cooper Union, they can submit a letter to their dean's office requesting a

discretionary leave of absence, accompanied by the Discretionary Leave of Absence Petition a.k.a. DLOA Petition. Discretionary leave, military leave, and term withdrawal on non-medical grounds require informed consent on the part of the student and approval from the student's school/Dean's office. The process of taking a discretionary leave will not be complete until all necessary signatures are secured on the DLOA Petition. Students are encouraged to monitor their email during this process. Each School may maintain standards within their schools for Leave of Absence that will inform eligibility and the school specific approval process. Students should always consult their school advisor and School-based policies for additional considerations and internal standards/limits in the taking of discretionary leave.

A. The DLOA Petition

Should the dean's office determine that the request for the discretionary leave of absence is appropriate, the DLOA Petition will be advanced to the Registrar who will initiate the review by the Registrar's and International Students and Scholars offices to assess any adjustments to the registration and SEVIS records (if the student is on an F1 visa), as well as to the financial aid and billing offices to assess financial aid and subsequent billing implications. Students will then be contacted by each office, as appropriate, to discuss the consequences of taking leave. When contacted, students must follow up to arrange a meeting with the contacting office. Each office will sign off on the DLOA Petition signifying that they have discussed the implications of leave with the student. The student will be asked to acknowledge that they have been informed of how taking a leave will impact their registration status, financial aid and student account and signify that, having been duly informed, they are seeking to pursue the leave by signing off on the DLOA Petition. The registrar's office will then submit the signed DLOA to the Dean's office for final approval. Should the petition for discretionary leave be approved by the student's dean's office the petition form will be advanced to the Registrar's office to update the academic record and initiate billing and financial aid adjustments.

B. Guidance on taking a Leave of Absence

The following guidance regarding "leave of absence" applies to discretionary leave, medical leave, military leave

as well as withdrawal from a semester and "stopping out".

- "Term Withdrawal" and "Stopping Out" will count as a term of leave.
- The petition for leave of absence must be made proactively, ideally before the beginning of the term in which the leave is sought, but no later than close of the add/drop period at the beginning of the term. The close of the add/drop period is indicated on the Academic Calendar.
- A student is limited to four leave of absence terms in the course of completing their undergraduate degree program at Cooper Union. The maximum of four leave of absence terms is the sum of non-consecutive and / or consecutive leave of absence terms.
- In completing the DLOA form, the student is asked to establish the term in which they intend to return to classes. Students seeking to be on leave for more than one term such that they will be on leave for more than 180 days will need to be administratively withdrawn from School. This is an administrative action to comply with federal regulations. In the event the student needs to be withdrawn from School, they will be asked to reinstate their record by completing the Reinstatement Form .
- Students who request consecutive leaves of absence, sequential leaves for more than one term, will need to be complete the Reinstatement Form in order to reactivate their record so that they can return Cooper Union and register into courses.
- The Registrar's office will process leave of absence requests (DLOA and MLOA Petitions) recording the effective data and return date of the leave in the system. Based on these record updates, the registrar sends official communications to students regarding their status, and notifies relevant offices (Student Financial Services, Campus Safety and Security, Advising Offices, etc.) of student status changes.

As students consider their course of action, they are advised that:

- Notifying instructors or no longer attending classes does not supplant or complete the leave process. Students are required to submit a DLOA petition.
- An incomplete DLOA Petition, or one that has not been signed by the student (attesting to Informed Consent) or the dean's office, will result in courses remaining on the record. If the leave is not approved, grades will be assigned and students will be charged for the term.
- In the event the petition for discretionary leave is not approved by the dean's office, students are strongly advised to explore options with their advisor.

These options could include persisting in all courses or selective course withdrawals.

• Each School may maintain standards within their schools for Leave of Absence that will inform eligibility and the school specific approval process. Students should always consult their school advisor and School-based policies for additional considerations and internal standards/limits in the taking of discretionary leave.

Should a student be granted a Leave of Absence or administratively withdrawn from the Cooper Union, they are not enrolled for the term and as such, will not have access to the Cooper Union facilities, including labs or studios. Students on leave or who have withdrawn for the term, are not permitted to live in university housing, attend classes or maintain employment as students at Cooper Union while their leave is in effect.

III Relevant Definitions

- *Discretionary Leave of Absence:* A discretionary leave of absence is a temporary separation that is requested by the student for reasons other than health related circumstances. Students can petition to take a discretionary leave of absence up to the close of the add/drop adjustment period. During this period, courses can be dropped from the record thus, there is no record of course enrollment or grades earned during the leave period. Students seeking to take a Discretionary Leave of Absence must have the intent to return to Cooper Union.
- *The Add/Drop or "Course Adjustment Period:"* During the course adjustment period at the beginning of the term, students have the opportunity to make adjustments to the courses in which they are enrolled for that term by adding or dropping courses. Dropping courses will result in all evidence of course enrollment being removed from the student record. Advisor approval is required, in part to ensure that the student is enrolled full time and progressing in their degree plan; meets financial aid and Cooper Union scholarship requirements; or for F1 students, that they meet the obligations under a student visa. In some cases, students have been provided consideration for part time enrollment, as with an Accommodation Verification Letter, AVL. It is important for these students to work with their advisors to develop a plan to make degree progress. The Add/Drop period is established in the Academic Calendar.
- *Effective Date:* The date in which the leave goes into effect is the effective date of the leave. The effective date should coincide with the start and end dates of the semester during which the leave is to be taken; the DLOA Petition requests the "date of request". The effective date is noted in the system of record by the Registrar if the petition for discretionary leave is approved by the Dean's office, and establishes whether it is appropriate to drop courses from the record, based on the dates of the add/drop period.

- *Registration Status:* The process of signing up for courses is called registering. Students are charged tuition and fees when they register. Students are considered enrolled when they attend classes. A student on a leave of absence is not enrolled in courses and therefore, is not considered to be registered. Therefore, there are certain privileges that are unavailable to the student when on leave including, but not limited to, residing in university housing, accessing university resources, and receiving direct supervision by faculty members.
- *Stop Out:* Students who stop attending courses but do not take formal action to their record by petitioning for a leave of absence or course withdrawal for the term will be considered "stop outs". Because students who stop out have not taken action to their record by notifying their advising office or the registrar, they run the risk of having grades assigned to their record and will be responsible for the tuition expense for the term. Therefore, students who are believed to have stopped out (no attendance or homework/project submissions) will be asked by their dean's office to formally notify the school of their decision not to attend courses by submitting a course withdrawal or institutional withdrawal request. In the event the student takes no action, they will be administratively withdrawn from the term by the Registrar's office

-Stop Out students will have one term to pursue record adjustments. Should they be withdrawn, their withdrawal will count as one of four allowable terms of leave of absence.

• Satisfactory Academic Progress: Withdrawal from courses counts against Satisfactory Academic Progress, SAP. Federal financial aid regulations require that students meet minimum academic requirements to make progress toward degree and remain eligible for financial aid. The Office of Financial Aid has established standards in keeping with federal guidelines to monitor academic progress. These standards are established in the SAP policy including GPA and credit progress requirements.

Definitions of Key Academic Actions

 Administrative withdrawal: A withdrawal from a courses and/or the school, executed by the office of the registrar to comply with federal or institutional policies.
Pertinent to taking a leave of absence, federal regulations establish that a leave of absence cannot exceed 180 days in any 12-month period for financial aid recipients.
To comply with these regulations, students on Leave of Absence for more than 180 days will be administratively withdrawn from Cooper Union by the Registrar and be asked to reinstate their record by applying for reinstatement.

- *Course "drops:"* By dropping a course or courses prior to the end of the add/drop period, all evidence of the course is removed from the student's transcript. This will result in financial aid and tuition billing adjustments. After the first day of classes, students are responsible for Registration Fees.
- *Course withdrawal:* Students have the ability to petition to withdraw from courses after the add/drop period until the close of the withdrawal period. The close of the withdrawal period is determined in accordance with federal regulations, when 60% of the term is completed. The close of the withdrawal period is established in the Academic Calendar. By withdrawing from a course, the student has sought approval to cease attending the course. Because withdrawal from a course is sought after the adjustment period, the course will remain on the academic record. Withdrawal from a course will be reflected by a grade of "W" being assigned to the course indicating it was "attempted" but not completed.
- *Term Withdrawal:* Withdrawal from all courses for the term. A student can petition to withdraw from all courses after the add/drop period. This usually occurs in the case of exigent circumstances. Full withdrawal from courses will result in a federal tuition aid recalculation, and potentially, a re-assessment of the Cooper Union tuition grant in keeping with the refund schedule.

In the event a student withdraws from all courses after the add/drop adjustment period, the termw ill count as one of the four terms of "leave" that are allowable. The students should discuss the need to withdraw from all courses for the term with their advisor. In such cases, students are also strongly encouraged to discuss the impact of full-term withdrawal on their Cooper Union Tuition Grant and potential financial obligations that result from the withdrawals with he financial aid office. Moreover, students should review how withdrawal from all courses after the add/drop adjustment period impacts Satisfactory Academic Progress, or SAP, and financial aid eligibility.

• *Withdrawal from the School:* A student who seeks to withdraw from The Cooper Union is severing their relationship with the school. A student who withdraws from the school is not seeking to return. If, in executing a withdrawal from Cooper Union, the student is seeking to withdraw from all courses after the add/drop period, a federal financial aid recalculation, and potentially, a re-assessment of the Cooper Union tuition grant in keeping with the refund schedule will need to be conducted.

THE IRWIN S. CHANIN SCHOOL OF ARCHITECTURE COURSES

Arch 106-1 Concepts of Physics

An introduction to physics with an emphasis on statics and dynamics. Additional topics include optics, waves and an introduction to structural analysis. *3 credits*.

Arch 111B-1 Architectonics Semester II

Introduction to the study of architecture; investigation of the interrelationships of space, structure and visual composition. Exploration of the syntax of architecture. Models and orthographic drawing. *4 credits. Prerequisite: Arch 111A*

Arch 115A History of Architecture I

INTRODUCTION TO ARCHITECTURE & HISTORY, THEORY, AND CRITICISM The courses of the HTC curriculum provide an introduction to the history of architecture and human settlements with a transcultural perspective, inclusive of diverse canons and traditions. The course sequence addresses architecture's cultural, ideological and material influences and exchanges, as well as the points of rupture throughout history that have determined the development of the field's conceptual frameworks and material instrumentalities. These courses place architectural and urban history and theory in the specific contexts of the various paths of colonization at different moments in history, and will consider the geopolitical influences on principles, concepts, styles and techniques, both within the centers of power and at the peripheries. This course provides a transnational and transcultural introduction to critical concepts in practice and theory of architecture across millennia, focusing on urban and architectural examples from diverse histories, geographies and traditions. These will be read in terms of the cultural, material, sociopolitical, and environmental forces that shape them. The course will focus on the analysis of different modes of architecture discourse as it is developed through buildings. drawings, and texts. 3 credits.

Arch 115B History of Architecture I

INTRODUCTION TO HISTORY OF URBAN FORM

The courses of the HTC curriculum provide an introduction to the history of architecture and human settlements with a transcultural perspective, inclusive of diverse canons and traditions. The course sequence addresses architecture's cultural, ideological and material influences and exchanges, as well as the points of rupture throughout history that have determined the development of the field's conceptual frameworks and material instrumentalities. These courses place architectural and urban history and theory in the specific contexts of the various paths of colonization at different moments in history, and will consider the geopolitical influences on principles, concepts, styles and techniques, both within the centers of power and at the peripheries. This course considers cities as sites of exchange and concentration: of population, social interaction, wealth and opportunity as well as isolation, poverty and exploitation. The course proposes the reading of urban form as a tool for systemic analysis, exploring social, political and economic forces through the materiality of the urban settlement. The focus is on constitutive elements: building typologies; circulation and communication networks; economic exchange; mechanisms of control and conquest; and sites of political representation and cultural expression as determinants of urban configurations. With examples drawn from around the globe, cities are considered in their diverse historical manifestations, urban theory will inform the discussion, especially as late 19th and early 20th century examples are analyzed. 3 credits.

Arch 117B Representation II: Observation

This course is an exploration of the visual and conceptual aspects of drawing from direct observation. Focusing on drawing in a variety of media; questions of figuration and abstraction, space and form, perception, and composition will be investigated. *3 credits*.

Arch 121B-1 **Design II** Semester II

Projects comprise elemental architectural programs wherein the student is required to sustain the formal investigations of first year while integrating the complexities of program, context and site. Spatial, structural, material, environmental and visual design are integrated. Emphasis is placed on communicating concepts through drawings and models. *5 credits. Prerequisite Arch 121A*

Arch 122B-1 Structures I Semester II

A qualitative examination of the behavior of structures. Characteristics and development of the stresses generated from the simple to the complex. A study of the materials of construction used in structures. *2 credits. Prerequisite: Arch 122A*

Arch 124B-1 Environments

2 credits.

Arch 125A History of Architecture II

ARCHITECTURE AND GLOBALIZATION

The courses of the HTC curriculum provide an introduction to the history of architecture and human settlements with a transcultural perspective, inclusive of diverse canons and traditions. The course sequence addresses architecture's cultural, ideological and material influences and exchanges, as well as the points of rupture throughout history that have determined the development of the field's conceptual frameworks and material instrumentalities. These courses place architectural and urban history and theory in the specific contexts of the various paths of colonization at different moments in history, and will consider the geopolitical influences on principles, concepts, styles and techniques, both within the centers of power and at the peripheries. This course focuses on concepts, designs and built examples of architecture from the 15th to the 17th centuries at the time when the discipline of architecture formed its identity as a profession; it sets this period in the context of globalization and the emergence of modern capitalism and colonialism. The course will study selected works from across cultural and geopolitical settings, by analyzing their intellectual, political, and social contexts, as well as examining formal, symbolic, technological, and environmental impacts and influences. 3 credits.

Arch 125A History of Architecture II

SOCIO-POLITICAL MOVEMENTS AND MODERN ARCHITECTURE

The courses of the HTC curriculum provide an introduction to the history of architecture and human settlements with a transcultural perspective, inclusive of diverse canons and traditions. The course sequence addresses architecture's cultural, ideological and material influences and exchanges, as well as the points of rupture throughout history that have determined the development of the field's conceptual frameworks and material instrumentalities. These courses place architectural and urban history and theory in the specific contexts of the various paths of colonization at different moments in history, and will consider the geopolitical influences on principles, concepts, styles and techniques, both within the centers of power and at the peripheries. This course examines concepts, designs and built examples of architecture from the 18th to the middle of the 20th century, both within the centers of power and at the peripheries, addressing architectural production (both built and theoretical) since the Industrial Revolution and the rise of the Modern Empire, as well as the Nation State. Architectural theory and built work from this time period will be analyzed, and material choices and structural knowledge examined, in the context of industrial, social, political and philosophical revolutions. 3 credits.

Arch 127B-1 Representation IV: Imaging

This course will focus on the various techniques and methods of producing architectural images including photography, rendering, animation, and pixel manipulation. In addition to exposing students to advanced imaging methods, questions of aesthetics, composition, color theory and optical mechanics will be explored in relation to architectural representation. *3 credits.*

Arch 131B-1 **Design III** Semester II

Study and analysis of historical precedents followed by a sequence of design problems of increasing complexity. Emphasis on the planning of buildings and the interrelation-ships among form, structure, detail and technologies. *5 credits. Prerequisite: Arch 131.*

Arch 132B-1 Structures II Semester II

The study of strength of materials is applied to the quantitative design procedures for wood and steel structures. Students complete individual projects in wood and lowrise steel structures. *2 credits. Prerequisite: Arch 132A.*

Arch 133-1 Intro Urban History & Theories

2 credits.

Arch 134B-1 Environmental Technology Semester II

Environmental and life safety systems as they affect program and building form, including mechanical (heating, cooling, ventilating), water supply and disposal, electrical, lighting, acoustics, vertical transportation, communication, security and fire protection. Principles of sustainability. Passive and active systems. *3 credits. Prerequisite: Arch 134A*

Arch 135B-1 Building Technology Semester II

Materials and methods of architectural construction, lectures, examination and discussion of classic as well as current building techniques. Students assemble full-size. *2 credits. Prerequisite: Arch 135A*

Arch 141B-1 **Design IV** Semester II

Investigation of urban programs and sites requiring the integration of form, structure and space. Examination of the complexities implicit in the resolution of urban problems. Analytic studies and explorations generate specific programs for development of each project. Emphasis given to large-scale integrations and the impact of urban transformations upon existing fabric. *5 credits. Prerequisite: Arch 141A*

Arch 142B-1 Structures III Semester II

The design of reinforced concrete using stress methods and plastic design is combined with individual projects in low-rise concrete structures. Elements of soil mechanics and soil investigations are included (Fall only) in foundations design. 2 credits. Prerequisite: Arch 142A

Arch 143B-1 Construction Management Semester II

Introduction to construction management principles, techniques and methods including scheduling, cost-estimating, planning and controlling construction process. *1 credit. Prerequisite: Arch 143A*

Arch 151B-1 **Thesis** Semester II A synthesis of four years. *6 credits. Prerequisite: Arch 151A*

Arch 154B-1 Professional Practice Semester II

The role of the architect in relation to the community, client, builder, worker and engineer. Societal, ethical, legal and personal obligations. Office organization and administration. *2 credits. Prerequisite: Arch 154A*

Arch 177 Computer Graphics, Image Processing and Vision

Introduction to basic concepts of spatial description and manipulation by computer enables student to use these techniques as an aide in problems of formal spatial drawing with a computer. Examination of the issues of "hand-eye axis" in computerbased drawing and "paint" systems as well as more abstract algorithmic methods of drawing. Image acquisition and transformation by computer, its relation to computer vision and control of robots and machines which build will be another area of emphasis. Survey of a wide variety of applications including typeface design, page layout and make-up, animation and interactive control of video systems. *2 credits*.

Arch 185 Crossings, The Feltman Seminar

This seminar will investigate the principles, aesthetics and methodologies of lighting perception and design. The Feltman Fund, a gift to the school, makes this seminar possible and supports its chairs. *2 credits.*

Arch 193 Experience in Practice

Supervised experience in the practice of architecture or a related discipline in the built environment during the summer break from classes that will enhance the student's knowledge and design skills. A minimum of 8 weeks/300 hours work is required for credit. The work experience must be approved a minimum of 4 weeks prior to the beginning of work. It is expected that the student will be compensated for work as required by law. *May be repeated for credit up to a maximum of 3 credits. 1 credit, Pass/Fail. Prerequisites: Successful completion of all second year requirements.*

Arch 205-20 Advanced Concepts

This course is intended to be an advanced course dealing with the relationship between architectural space and some other discipline in the humanities. The course deals with an interdisciplinary approach toward a new poetic and the phenomenology, psychology and metaphysics of space. 2 credits.

Arch 225-41 Advanced Topics in History, Theory, Criticism of Architecture

Advanced study in history, theory, and criticism of architecture, urbanism, and technology. 2 credits. Prerequisites: Arch 115A, Arch 115B, Arch 125A, Arch 125B

Arch 300 Computer-Aided Design and Descriptive Geometry

Architecture-specific exploration into perception, methods and conventions of the geometric representation of space through the new perspective of computer applications. Introduction to concepts of projections, hinge and projector lines as well as absolute and relative coordinate systems through local deduction by considering parallel, axial, radiant and stereoscopic projections as variations of the same system. Introduction of CAD specificmethods such as Solid, NURBS and Parametric Modeling, hierarchical- and command-based programs. Critical comparison of computer capabilities and architectural tangible scale modeling methods to understand possibilities and limitations of computer-aided design in architecture. Critical exploration of methods and media for representation and design of specific works of architecture. *2 credits.*

Arch 377-01 Advanced Digital Architecture

The discipline of architecture and its relationship to digital technology. Has the nature of creative work changed? Computation as an ever more technical, pragmatic power, useful in predicting, evaluating, and controlling a building's performance or computation as a non-issue, what matters is only the design content. It is critical that we now not only collectively take stock of our new roles in creative processes, but also speculate on what the future of creative work-on what the future creator-looks like. *3 credits.*

Arch 402-1 Thesis Research Tutorial

Individual thesis research conducted under the supervision of an adviser or advisers leading to the preparation of a Thesis Prospectus required for advancement to the third semester of the program. *2 credits.*

Arch 412-1 Grad Research Design Studio II

Individual design projects within general guidelines established by the faculty, each emphasizing the special area(s) of research of the student. *6 credits.*

Arch 482-25 Graduate Seminar in Technologies

Selected topics in the advanced study of technological issues in architectural design, representation, materials, planning, production and construction. Open to undergraduate fourth-and fifth-year architecture students as an elective with permission. *2 credits.*

Arch 485-36 Grad Seminar in History, Theory, and Criticism of Modernism

Selected topics in the advanced study of the theory and criticism of modernism and contemporary architecture, the philosophy and aesthetics of architecture, the mediatization of architecture and broader cultural and historical issues, through the critical readings of texts as well as case studies. Open to undergraduate fourth- and fifth-year architecture students as an elective with permission of the instructor and the dean. 2 credits.

Arch 499-1 Independent Study

The purpose of this Independent Study is to allow students to pursue an independent study orresearch project outside their regular coursework, in order to delve more deeply into a specifictopic of interest. An Independent study may be taken under the supervision of a member of the resident faculty (defined as full-time or proportional-time faculty members) or adjunct faculty members who have taught at the School of Architecture for at least 6 semesters. The faculty member—who becomes the advisor for the independent course—must approve the proposed study and agree to provide continuing supervision of the work. *2 credits.*

ADMINISTRATION, FACULTY

Departures Tulay Atak (faculty) Gerri Davis (faculty) Joan Ockman (faculty) Jennifer Woodson (faculty)

SCHOOL OF ART COURSE UPDATES

Foundation

FA-108 **Foundation Studio** A studio methods and theories course for foundation students with a focus on the development of multiple lines of visual competency helping to prepare students for advanced study. This course works in conjunction with technical labs through a set of offerings in shorter lab/studio seminars. In this sense, the technical or craft learning necessary for visual practice, and the beginning of a personal conceptual or research methodology, merge. Required for first year students. *3 credits.*

SE-150 Foundation Project

This course brings together all first-year students within a seminar. This course consists of a series of presentations that introduce various artistic practices, critical languages, and criticism. This aspect of the course indents to present contrasting historical and contemporary models of creating, seeing, speaking, and thinking about art. *Required for first year students. ½ credit. Pass/Fail.*

Audiovisual

FA 276 Audiovisual II

Semester two of the yearlong AV sequence, this course continues with greater depth and more individualized student projects, the introduction to concepts, production techniques, and histories of artists' moving image work. Students will investigate the origins and evolution of animation, film, video, and sound recording for cinema, with classroom instruction and experimentation in the techniques and production of each. Alongside a historical and theoretical framework, a wide range of practical tools will be introduced, including pre-cinematic image capture, 16mm film and digital cinema production, stop action animation, sound recording, and lighting. *3 credits. One-semester course. May not be repeated. Pre-Requisite: AV I.*

FA-272 Film Workshop (16mm)

Independent projects workshop in Super 8 and 16mm film. As well as working in depth with film, students are encouraged to explore all possibilities of the moving image from expanded projection techniques to kinetic constructions. *3 credits. Pre-Requisite: AV I.*

FA-385B AV Projects: Installation

This advanced course investigates video installation as an evolving contemporary art form that extends the conversation of video art beyond the frame and into hybrid media, site-specific, and multiple channel environments. Presentations, screenings, and readings augment critical thinking about temporal and spatial relationships, narrative structure, viewer perception and the challenges of presenting time-based work in a gallery or museum setting. Students will develop research interests and apply their unique skills sets to short turnaround exercises and more expanded self-directed projects for gallery and non-theatrical contexts. *3 credits. Pre-Requisite: AV II.*

FA-386B AV Projects: The Imagination of Disaster

As Susan Sontag argues in her 1965 essay whose title this course is borrowed from, "Science fiction films are not about science. They are about disaster, which is one of the oldest subjects in art." She goes on to argue that such films present a dispassionate, aestheticized, technological view of disaster, removed from ethical values. As a provocation, this advanced AV course will examine these how these ideas connect to and complicate our disaster-filled technically-imaged media landscape of today. Particular emphasis will be placed on the distinction between images and imagination. Individual student work will be proposed, workshopped, and presented throughout the semester, alongside collective screenings, discussion of readings, one-on-one visits, and group critiques. *3 credits. Pre-Requisite: AV II.*

Drawing

FA-240B Drawing I

The course is designed to explore the phenomena of drawing as basic to the visual language of all disciplines. The fundamental notion of observation and analysis in drawing is investigated. As preparation for work in an advanced level, the course involves further development of drawing skills and techniques, as well as an emphasis on individual aesthetic development. Assignments and group critiques are central to the course. *3 credits per semester. One-semester course. May be repeated once. Pre-Requisite: Basic Drawing. It is a prerequisite to all Advanced Drawing.*

FA-341B Adanced Drawing

Advanced studies in drawing emphasizing the student's conceptual independence from traditional draftsmanship. This course is for students who have an established direction in drawing. 3 credits. One-semester course. Pre-Req: One Semester of Drawing I

FA-343B Adanced Drawing

Offered to students working independently in any medium. Must be self-motivated. There will be group and individual critiques. *3 credits. One-semester course. Pre-Req: One Semester of Drawing I*

FA-345B Adanced Drawing

The course is shaped by the students' work. Complementary lectures will help track the space of Drawing as a practice. Group critiques will be the main component of the class, each student will be asked to show their work a minimum of three times. The art historical lectures will help define the space of Drawing now and will be in conversation with the work presented by the students. A back-and-forth dialogue, discussions, presentations, and artworks will be the organizing principle of the classes.

The goal of the class is to be able to identify how the pieces work, in which discursive space they exist, how they can be experienced, and read as well as how much they push forward the goals of each student. Open dialogue with respect to the work being shown, and to each other, is required.

3 credits. One-semester course. Pre-Req: One Semester of Drawing I

Electives

RS-201-H Science: Laws of Nature

The course will look into the history and significance of major physicals laws, such as mass and energy conservation, Newton's laws of motion, the laws of thermodynamics, etc., and explore their applications in biological and environmental sciences. The topics covered in the course will include the origins and the physical basis of life; the mechanisms of heredity, genes and the DNA; the evolution of species; Earth's systems and climate change. *3 credits.*

TE-217 Painting Techniques and Materials

This course provides training in the safe handling of painting materials, contemporary applications and techniques in oil- and acrylic-based media. Practices in color mixing, color matching, glazing, uses of supplementary media, creating textures, effects, surfaces and customizing paint from dry pigments will be covered through instructor lead demonstrations and assignments. Students will receive hands-on practice with various techniques by producing original works. In addition, students will be introduced to the origins, history and contemporary evolution of paint as a material. Relevant examples will be presented through various media and field visits. *2 credits.*

TE-304 Techniques in After Effects

This course explores techniques and projects in Adobe After Effects. Students will complete projects that demonstrate their skill and understanding of visual effects and motion graphics. Projects will be faculty and student generated. *2 credits.*

Graphic Design

FA-212 Graphic Design II

The complex relationship between word and image is explored. The study of semiotics, emphasizing the philosophy of communication, provides a rich historical and intellectual base for experimental projects combining verbal and pictorial information. Weekly projects reflect a broad range of disciplines within the field of design. Computer instruction will be provided as it relates to specific projects. *3 credits. One-semester course. Prerequisite: Graphic Design I.*

FA-315B-1 Advanced Design: Book Design

The complex issues unique to book design are explored through studio projects and presentations that emphasize the grid, effective sequencing and typographic form. Computer instruction will be provided as it relates to specific projects. *3 credits. Prerequisites: FA-212 Graphic Design II and FA-215 Typography.*

FA-315B-2 Advanced Design: Advocacy Through Type and Symbols

This course leverages the power of TYPOGRAPHY and symbol to inform and persuade viewers. An investigation into the history, scale, and diversity of publishing formats—from print through digital—from book through social media—offers students an opportunity to consider the most effective means of transmitting messages that they deem timely and relevant. The theme of ADVOCACY, in CONTEXT to how specific typographic, symbolic, and aesthetic formats are chosen, will then be supported by considerations of touchpoint: how the intended recipient is exposed to the message. A full range of communication will be considered—from working for clients to creating a powerful, personal voice. Traditional and contemporary research protocols will also be investigated. *3 credits. Prerequisites: FA-212 Graphic Design II and FA-215 Typography.*

FA-315B-3 Advanced Design: Product Design

Digital products are embedded in all aspects of our lives. Every detail in the products we use today—including the software you're using to read this course description—has been meticulously designed to solve a specific need. Product design is the process of defining a user problem, finding creative solutions for that problem, and validating those solutions with real users. This course explores the essential aspects of the product design process. Students will imagine, create, and iterate on projects that address a specific need in a given market and demonstrate their understanding of core skills like product thinking, interaction design and prototyping, as well as user research and usability testing. *3 credits. Prerequisites: FA-212 Graphic Design II and FA-215 Typography.*

FA-315B-4 Data Science and Design Projects for Social Good

Applications of data visualization, machine learning, and software engineering to projects in the areas of education, equality, justice, health, public safety, economic development or other areas. Projects will be done in collaboration with external partners, and will be focused on solving problems with an emphasis on the greater New York City Area. Students will work with the external partners to specify problems and investigate possible solutions. Students will work between disciplines to develop new machine learning based solutions and work collaboratively to visually convey the insights and results generated.

3 credits. Prerequisites: FA-212 Graphic Design II and FA-215 Typography.

FA-317B Advanced Design: Open Studio

Students will develop a series of personal and unconventional narratives through writing prompts and mix-media studio exercises. The goal is to expand methods and visual techniques when designing or expressing an idea/story. Emphasis will be placed on contemporary graphic design/art practices and developing a personal voice and aesthetic. Visiting lecturers, readings, and individual meetings with the instructor will complement group critiques.

3 credits. Prerequisites: FA-212 Graphic Design II and FA-215 Typography.

Painting

FA-130B Painting

A studio experience with the physical, compositional and conceptual components of pictorial invention and image-making. Readings, assignments and critiques will enhance the development and articulation of an inventive individual approach to the painting discipline in preparation for advanced level work. *3 credits. Prerequisite: FA-130A Painting.*

FA-331B Advanced Painting

This course will work with students in individual and group settings to discuss their work and personal development as an artist, as well as engage students with relevant practical, historical and contemporary discussions around painting. Discussions, critical feedback, suggestions, and prescriptions given to students are sounding boards and/or opportunities for students to further locate their practice and voice as an artist. Students will rely more on their individual studio spaces as sites from creation, research, presentations and meetings with faculty and visitors. In this way, the course might reflect the professional space of the artist studio. Debate around ideas, process and material should be expected as well as respect for each student's personal journey. Lectures, field trips and the presentation of various media and demonstrations can be expected. *3 credits. Prerequisites: FA-130A and B Painting.*

FA-336B Advanced Painting: Everything is Painting

What is painting? What qualifies as, constitutes, and defines a painting? Can everything be painting? In this advanced painting course, students will negotiate these questions as they investigate individual and personal concerns within their studio practices. An expanded understanding of both the medium and discipline of painting will be explored through class readings and discussions, lecture presentations, individual project critiques, guest artists and technicians, and class trips. Artists discussed will range in age, background, discipline, materiality, and ability. Students will develop and strengthen conceptual frameworks underpinning their work alongside expanding their processes, techniques, and methodologies. This is a rigorous, studio-intensive course requiring participants to maintain active working hours outside of class. *3 credits. Prerequisites: FA-130A and B Painting.*

FA-339B Advanced Painting: Katz Guest Artist Series

This course will support students' individually determined painting projects with emphasis on building sustainable studio practices and generating research strategies. We will focus on personal artistic tool-building, through visual theory and material processes, considering each artist's studio as an adaptive instrument for experimentation. Individual and Group critiques will dictate the assignment of readings, projects, and exhibition visits. *3 credits. Prerequisites: FA-130A and B Painting.*

Photography

FA-207 Lens/Screen/Print II

Lens/Screen/Print II is the second half of a two-semester trajectory. This course builds upon the foundations of LSP I with an emphasis on post-production and a critical engagement with lens technology, color theory/management and combined analog/digital workflows. Technical knowledge of the tensions and possibilities found between "digital" and "analog" spaces in relation to critical theory and major philosophical arguments central to lens, screen and print based practices will contribute to student development. Topics include advanced digital editing and printing techniques, analog black-and-white production methods, such as shooting with black-and-white film and darkroom printing, advanced medium-format cameras and scanners, as well as introduction to new technologies and modes of display. A distinction in LSP II is a focus on experimentation, articulation, and acumen. Students are encouraged to begin to develop semi-autonomous ways of working over the course of the semester, this includes supervised independent or collaborative projects. This course will afford students the opportunity to build a coherent body of work in preparation for advanced study. *3 credits. Prerequisites: FA-206 L/S/P I, or Photo I*

FA-362B Advanced Photography: Lighting

This critique-based studio course explores the use of light on location in photography. Topics explored by this course will include the use and modification of available light as well as the use of portable light sources such as flash (both single and multiple), portable battery powered strobes, remote light triggers and other tools.

The emphasis of this course will be on using lighting techniques outside the studio in order to gain an understanding of how light effects the way we interpret our world. *3 credits. Pre/Co-requisites: FA-207 L/S/P II, or Photo I*

FA-364B Photography: Material Histories

This course will be a deep dive into the materials of each student's practice. You make work in plaster. Where does that gypsum come from? How is it mined? Who mines it? What are the otherwise invisible histories of this material from how it came into being as a material for art to how it ends up in your sculpture? How does that contribute to the meaning of artworks that emerge from this material? We will also look at texts and artworks from artists spanning material practices and generations, from Diamond Stingily to Christopher Williams. *3 credits. Pre/Co-requisites: FA-207 L/S/P II, or Photo I*

Printmaking

FA-355B Relief

Students will be instructed in various relief printing techniques, including traditional Japanese water-based woodblock and Western techniques with oil-based inks on wood and linoleum. Use of the hydraulic press will allow large format works to be produced. Hand-printing techniques will be taught as well. Small edition printing in multiple colors will be emphasized. *3 credits. One-semester course. May not be repeated.*

Sculpture

FA-391B-1 Sculpture

This is a sculpture studio course. While all media are welcome, we will approach the course with sculptural concerns. The theme of the class is Narrative and Sculpture with a focus on Relationships to Systems. This class is loosely defining a system as a group of interacting or interrelated elements that act according to a set of rules to form a unified whole. The class is broken into three ways of exploring this theme: Artists intervening within existing systems; Artists reinventing or creating their own systems; Artists displacing or circulating material from one system to another. Together we will look at examples of artists practice which fall within these themes, visit related exhibitions, and host visiting artists. Throughout the class, students will make their own works or projects with these themes in mind. *3 credits*.

FA-391B-2 Sculpture: Retroactive Reasoning

This course will explore intuition and personal reasoning as research toward the production of sculptural projects. It will consist of several prompts posed to students as catalysts for making multi-dimensional artworks. The prompts will be sourced from key theoretical texts, yet initially presented to students with no explanation or historicization. Students will make their works responding to these fragmented topics, drawing most importantly from their own conjectures and interpretations. Prior to each session of critique students will be presented with the theoretical texts that the prompt references. During critique, what will be realized is the relevance of one's own position, elucidated relationships between discourse and media, and the expansiveness of contemporary sculpture. *3 credits.*

FA-392B Sculpture

This course takes a concrete approach to the development of critical discourse about works of art. It exercises the student's ability to analyze the activity of making sculpture in particular and advances the student's understanding of how to proceed in the studio. Problems of structure, materials, meaning, intention, and context are the subject of class discussion. *3 credits.*

FA-393B Sculpture

Class is structured around the student's projects. There is freedom in mediums to be used by each student, with a minimum requirement of showing three times during the semester, more times is encouraged. Critiques will be thorough, and there is an expectation of each student being able to think with, and through, the work in critique. Nothing is final, projects can be re-shown and altered, re-presented, and re-considered. The goal of the class is to be able to identify how the pieces work, in which discursive space they exist, how they can be read and experienced, and how much they embody the goals of each student. Open dialogue with respect to the work being shown, and to each other, is required. *3 credits.*

FA-397B Sculpture

This is a sculpture studio course. While all media are welcome, we will approach the course with sculptural concerns. The theme of the class is Narrative and Sculpture with a focus on Relationships to Systems. This class is loosely defining a system as a group of interacting or interrelated elements that act according to a set of rules to form a unified whole. The class is broken into three ways of exploring this theme: Artists intervening within existing systems; Artist's reinventing or creating their own systems; Artists displacing or circulating material from one system to another. Together we will look at examples of artists practice which fall within these themes, visit related exhibitions, and host visiting artists. Throughout the class, students will make their own works or projects with these themes in mind. *3 credits*.

Studio Electives

FA-327 Computational Studio: Simulated

Human collectivism is set to look dramatically different in the coming decades, in a world where the lines between physical and digital become increasingly blurred. Every asset, process, or person within or related to a collective will be replicated virtually—connected, traced, and analyzed. As a result, concepts like Play, Agency, and Worldmaking are rapidly redefined by a control-oriented, computationally simulated virtual environment. Free, open-source game design and development platforms offer thinkers and makers a new way to reflect on the question, "If I can make a conceptually meaningful world, executed by computer algorithms, rendered by graphics engines, what would it be like, and where would I begin?" This computational studio course will include a gentle introduction to basic modeling, object-oriented programming, video game development, and VFX with Unity, and related production tools such as Blender. Projects may address agency, emergence, generative (parametric) design, artificial intelligence/learning, critical computing, and more. *3 credits.*

FA-384B-2 Projects: Open Studio

Formerly titled "Sculpture", this course proposes a shared context to pursue each individual participant's ongoing art or design studio practice in any area, media or method. Students are expected to be able to present their work-in-progress consistently, to help research the works of other students in the class, and to participate actively in class discussions. *3 credits.*

FA-395B Performance

Performance or the live event has been a continuous element of art practice throughout most of the 20th century. The changing technologies of sound and digital recording devices and their increasing availability have enhanced the possibilities of documentation and allowed artists to consider the mediation and documentation of a live event as an integral part of the work itself. In this course, students will examine the interaction between performance and its documentation through practical, historical and theoretical interrogation. The class proposes to address documentation, not as an inadequate representation nor as a nostalgic marker but as something that operates within a distinct system that can become a vital site of art production. This class takes an interdisciplinary approach to making performance work. The medium of performance and its utilization of photography, video and sound will be explored. Students will read and discuss texts, looking at the work of other artists and making their own work. *3 credits*.

ADMINISTRATION, FACULTY

AND STAFF

Administration

Zak Nguyen Administrative Manager to the Dean of the School of Art

Leo Allanach Administrative Assistant

Adjunct and Visiting Faculty

Glen Fogel MFA, Milton Avery Graduate School of the Arts, Bard College

Jenny Perlin BA, Brown University

MFA, School of Art Institute of Chicago

Robyn Kanner

Gabriel Valdivia BFA, The Arts Institutes

Franklin Evans BA, Stanford University MA and MFA, University of Iowa MBA, Columbia University

Johnathan Payne BA, Rhodes College MFA, Yale School of Art

Lisa Oppenheim BA, Brown University MFA, Milton Avery Graduate School for the Arts, Bard College

Yasu Shibata BFA, Kyoto Seika University

Savannah Knoop BA, CunyBa MFA, Virginia Commonwealth University Andrew Ross BFA, The Cooper Union

Zhenzhen Qi BS, University of California, Berkeley MPS, New York University

Yang Wang BA, University of Science & Technology, Beijing MPS, New York University

Ryan Garrett BFA, The Cooper Union MFA, University of Southern California

Anna Hostvedt BFA, The Cooper Union

Corinne Jones BFA, School of Visual Arts MFA, Columbia University

Amie Cunat BA, Fordham University MFA, Cornell University

ALBERT NERKEN SCHOOL OF ENGINEERING COURSES

BIOLOGY

Bio 202-1 Biology for Engineers II

This course will provide human biology fundamentals to springboard into research projects at the intersection of biology and engineering. Topics will include anatomy and physiology of musculoskeletal and other major organ systems not covered in Bio 101. *3 credits.*

Bio 250-1 Biotechnology in Environmental Systems

Application of biotechnology to environmental challenges; microbiology; ecology; microplate reader assays; biomaterials; genetic modification of microbes, bioremediation, biosafety biomimicry. *3 credits.*

Bio 364-1 Bioengineering Research Problem

An elective course available to qualified and interested students recommended by the faculty. Students may approach a faculty mentor and apply to carry out independent research or a group project in bioengineering-related fields. Prerequisite: permission of instructor, and approval of ME or ChE department chair. *3 credits.*

CIVIL ENGINEERING:

Undergraduate

CE 151-1 Urban Transportation Planning

Historical background and evolution of current procedures used in the urban transportation planning process. Covered are the historical framework, urban development theories, land use, trip generation, trip distribution models, traffic assignment techniques, modal split and introduction to urban transportation systems. *3 credits.*

CE 220-1 Civil Engineering Fundamentals

Planning, execution and interpretation of drawings and specifications for civil engineering projects. Sample drawings and specifications. Contractual requirements. Sample contracts. Permitting, scheduling and cost estimation. Basic operations of design and construction firms. Interface with other disciplines on civil engineering projects. 3 credits. Prerequisite: EID 101

CE 322-1 Structural Engineering II

Modern methods of structural analysis of indeterminate structures. Discussion of energy methods, force methods and displacement methods. Formulation of elementary matrix stiffness and flexibility methods. Computer applications in structural analysis. *3 credits. Prerequisite: CE 321/121*

CE 331-A Intro to Geotechnical Engineering

Introduction to various indexing tests of soils, clay mineralogy, permeability, seepage and flow nets, stress distribution in soil masses, one dimensional consolidation theory, strength characteristics of soils, application of Mohr's Circle to soil mechanics, stability of slopes. *0 credits. Prerequisites: ESC-201/101, ESC-340.*

CE 331L-1 Intro to Geotechnical Engineering

Introduction to various indexing tests of soils, clay mineralogy, permeability, seepage and flow nets, stress distribution in soil masses, one dimensional consolidation theory, strength characteristics of soils, application of Mohr's Circle to soil mechanic, stability of slopes. *4.5 credits. Prerequisite: ESC-201/101, Pre or Co-Requisite: ESC-340/140*

CE 341-1 Design of Steel Structures

Study of behavior and design of structural steel components and their connections. Understanding and development of design requirements for safety and serviceability, as related to latest structural steel specifications by the American Institute of Steel Construction (A.I.S.C.). Current design emphasizing LRFD, fabrication and construction practices. Composite design. *3 credits. Prerequisite: CE 321/121 Corequisite: CE 322/122*.

CE 343-1 Water Resources Engineering

Problems in conservation and utilization of water. Hydrologic techniques. Surface water and ground water supplies. Water transmission and distribution. Flood control, navigation and irrigation. Introduction to open channel flow and pipe networks.

CE 348-1 Environmental & Sanitary Engineering

Topics include types of environmental pollution and their effects; water quality standards and introduction to laboratory analyses of water quality parameters; sources and estimates of water and wastewater flows; physicochemical unit treatment processes. Integrated lecture and design periods cover water supply network, wastewater collection system and water treatment design projects. *3 credits. Prerequisite: CE/EID-344.*

CE 361-1 Civil Engineering Exp Projects

Exploratory experimental projects inmaterials, hydraulics, soils, environmental or other civilengineering specialties. Projects are conceived, designed and executed by groups of students under faculty supervision. *2 credits*.

CE 364-1 Civil Engineering Design II

Continuation of CE 363. 3 credits. Prerequisite: CE 363

CE 369-1 Civil Engineering Project I.S.

Individual design, research or experimental projects. Open only towell-qualified students. CE/EID 390 Sustainable design minimizes the impact on the environment by site planning and design, energy and water conservation and interior environmental quality. This course will focus on the design of aprototype structure using sun, light, air, renewable materials, geological systems, hydrological systems and greenroofing. Each student will develop a project outlined by the U.S. Green Building Council rating system known as LEED. The six areas that will bedeveloped to design the project are: sustainable sites, water efficiency, energy and atmosphere, material and resources, indoor environmental quality and innovative design process. Classtime is separated into a series of lectures, private consultations and student presentations. *3 credits.*

Graduate

CE 427-1 Prestressed Concrete Structures

Behavior and design of prestressed members in flexure, shear, bond and torsion; continuous beams; columns; prestressed systems; loss of prestress. Emphasis is placed on ultimate strength design and the background of the latest ACI code. *3 credits. Prerequisite: CE 342.*

CE 438-1 Forensic Geotechnical Engineering

Types of damage-architectural, functional and structural. Investigate problems the forensic geotechnical engineer encounters: settlement of structures, damage to soil expansion, lateral movement of buildings, damage due to seismic energy of earthquakes, slope erosion, deterioration due to sulfate attack and frost, seepage. Development of repair recommendations and the presentations of case studies. *3 credits. Prerequisite: CE 331 or 331L.*

CE 446-1 Pollution Prevention

Introduction to the new concept and regulations in the U.S. and Canada of Pollution Prevention or Waste Minimization for managing hazardous pollution and protecting the environment and public health. Methodology of conducting environmental audits and lessons learned from successful pollution prevention programs. Case studies of various programs in industry, etc. 3 credits.

CE 470-1 Urban Security

Analysis and design of building and urban infrastructure systems to protect against terrorism. Threat and risk assessments. Explosive blast loading. Site design and perimeter protection. Protective design criteria for structural and architectural systems. Dynamic structural engineering analysis. Steel and concrete design for blast loading. Prevention of progressive collapse. Envelope and facade design for extreme loading. Retrofit upgrades of existing systems. *3 credits. Prerequisite: CE 322/122 or ME-301/101.*

CE 471-1 Engineering Risk Analysis

The main objective of this course is to introduce students to the basic terminology and tools related to probability theory, statistics, and decision theory in the context of solving civil engineering problems. A secondary objective is to expose students to the many uncertainties inherent in civil engineering and to the tools that are available for modeling and analyzing such uncertainties. Topics to be covered include probabilistic modeling, statistical inference, Bayesian statistics, and decision under uncertainty. *3 credits. Prerequisite: MA 224.*

CE 484-1 Civil Engineering Project Management

This course provides an overview of the guiding principles of civil engineering project management. Five groups of project management processes will be considered: initiating, planning, executing, monitoring and controlling, and closing. The focus will be on developing the core competencies and skill sets required for planning and controlling civil engineering projects and understanding interpersonal issues that drive successful project outcomes. *3 credits.*

CE 499-1 Thesis/Project

Master's candidates are required to conduct, under the guidance of a faculty adviser, an original investigation of a problem in civil engineering, individually or in a group, and to submit a written thesis describing the results of the work. 6 credits.

CHEMISTY

Undergraduate

CH-111-A General Chemistry Laboratory

Methods of quantitative analysis are used to explore chemical reactions and analyze unknowns. Modern chemicalinstrumentation as well as classic wet chemistry analytical techniques are covered. Statistical analysis of the experimental data is used to analyze results. Chemical laboratory safety and industrial chemical regulations are covered, as are the fundamentals of writing a technical report. *1.5 credits. Prerequisite: CH-110.*

CH-160-A Physical Principles of Chemistry

The study of physicochemical properties will be extended and advanced. The laws of thermodynamics, which involve energy, enthalpy, entropy and free energy concepts, will be applied to chemical systems. Other topics include vapor pressures and colligative properties of solutions; The phase rule; kinetics of homogeneous reactions; electrolytic conductance and electrochemistry. *3 credits. Prerequisites: CH-110, MA-111.*

CH-232-1 Organic Chemistry II

Extension of Ch 231 to systematic study of aliphatic and aromatic compounds, with emphasis on functional behavior and interpretation of mechanisms and bond types, polyfunctional compounds, carbohydrates and heterocyclic compound. *3 credits. Prerequisites: CH-231; CH-233.*

CH-232.1-1 Principles of Organic Chemistry II

Selection of topics from CH 232. This class meets with CH 232 for the first ten (10) weeks. 2 credits. Prerequisite: CH-231; Co-requisite: CH-223.

CH-233-A Organic Chemistry Laboratory

Laboratory work will cover subject matter studied in Ch 231 and Ch 232, including synthesis and type reactions and identification of organic compounds. *2 credits. Prerequisites: CH-111, CH-231; Pre- or co-req CH-232/232.1.*

CH-362-1 Physical Chemistry II

Continuation of Ch 261 with emphasis on electrochemistry, chemical kinetics and solid-state chemistry. Selected topics. 2 credits. Prerequisite: CH-361.

CH-380-1 Selected Topics in Chemistry: Organometallic

Study of topics related to specialized areas as well as advanced fundamentals. 2 credits.

CH-391-1 Research Problem I I.S.

An elective course available to any qualified and interested student irrespective of year or major. Students may approach a faculty member and apply to carry out independent research on problems of mutual interest, in pure or applied chemistry. Topics may range from the completely practical to the highly theoretical, and each student is encouraged to do creative work on his or her own with faculty guidance. *3 credits.*

CH-392-1 Research Problem II I.S.

This is intended to allow students to continue ongoing research. [See CH 391]. 3 credits.

CH-393-1 Research Problem III I.S.

This is intended to allow students to continue ongoing research. 3 credits.

CHEMICAL ENGINEERING

Undergraduate

CHE-232-1 Chemical Engineering Thermodynamics I

First law of thermodynamics for closed systems; perfect gases, 2- and 3-phase systems of one component; transient and steady state analyses using the first law of thermodynamics for open systems; second law of thermo-dynamics; introduction to concepts of entropy. Gibbs free energy and Helmholtz free energy; derivation and application of equations describing the auxiliiary thermodynamic functions and conditions of equilibrium in imperfect gases. *3 credits. Prerequisite: CH-160 or CHE-221/170.*

CHE-332-1 Chemical Reaction Engineering

After consideration of chemical reaction kinetics and thermodynamics, the course focuses on the design relationships for batch, semi-batch, plug-flow and mixed reactors. The application of these design relationships is explored in ideal, isothermal, non-isothermal, adiabatic reactors. Homogeneous, heterogeneous and biological systems are discussed including the effect of transport phenomena on reaction rates and reactor design. *3 credits. Prerequisites: CHE-341 CHE-140 ESC-140 or ESC-340; CHE-221 CHE-170 or ESC-170.*

CHE-342-1 Heat and Mass Transfer

Introduction to heat and mass transfer.Steady-state and unsteady-state heat transfer. Steady-state and unsteady statemass transfer.Interphase transport and transfer coefficients. Convective heat and mass transfer.Internal and external forced convection. Heat transfer equipment.Natural convection. Boiling and condensation. Radiation heat transfer. *4 credits. Prerequisites: ESC-340/140 or CHE-341/140.*

CHE-352-1 Process Simulation & Math Tech for Chemical Engineering

In this course numerical methods will be applied to chemical engineering problems in mass and energy balances, thermodynamics, fluid flow, heat transfer, separations, and chemical reactor analysis. Topics include: computer calculations and round-off error algorithms and convergence, finding roots by bisection or Newton's method, curve fitting and interpolation/extrapolation, numerical integration and differentiation, numerical solution of initial value problems, stiffness, matrices and determinants, matrix properties, special matrices, methods of solution for systems of linear equations by matrices, eigenvalues, eigenvectors, solving systems of non-linear equations, and applications to unit operations. We shall use series methods and numerical methods applied to various chemical engineering models, including the following specific methods: Euler's method, Runge-Kutta methods, the Finite difference method, and Newton-Raphson for vector systems. *3 credits. Prerequisite: CHE-341 or CHE-140.*

CHE-372-A Chemical Engineering Lab II

This laboratory course emphasizes the application of fundamentals and engineering to processing and unit operations. The experiments range from traditional engineering applications to new technologies and are designed to provide hands-on experiences that complement the theories and principles discussed in the classroom. Preparation of detailed project reports and oral presentations are important components of this course. *2 credits. Prerequisites: CHE-332, CHE-342; or co-req CHE 351/142.*

CHE-382-A Process Evaluation & Design II

This is a continuation of ChE 381 and is the "capstone design course" in chemical engineering. All aspects of chemical engineering are integrated in the design of a chemical process plant. The design process consists of flowsheet development, equipment selection and sizing, utility requirements, instrumentation and control, economic analysis and formulation of safety procedures. The plant design is carried out in class and includes the use of professional simulation packages. The AIChE project is included in this course. *4 credits. Prerequisite: CHE 381 or 161.1.*

CHE-391-1 Research Problem I I.S.

An elective course available to qualified and interested students recommended by the faculty. Students may select problems of particular interest in some aspect of theoretical or applied chemical engineering. Topics range from highly theoretical to completely practical, and each student is encouraged to do creative work on his or her own with faculty guidance. *3 credits.*

CHE-392-1 Research Problem II I.S.

Continuation of ChE 391. 3 credits. Prerequisite: CHE-391.

CHE-393-A **Research Problem III I.S.** Continuation of ChE 392. *3 credits. Prerequisite: CHE-392.*

CHE-394-1 **Research Problem IV I.S.** Continuation of ChE 393. *3 credits. Prerequisite: CHE-393.*

Graduate

CHE-418-1 Carbon Dioxide Removal Tech

Survey of the field of Carbon Dioxide Removal (CDR) technologies. Review of models that estimate carbon removal amounts to meet international climate goals. Basics of existing adsorption technology and design of industrial CDR plants. Evaluation of biomass-based CDR solutions: afforestation, biochar, and Bioenergy with Carbon Capture and Storage (BECCS). *3 credits.*

CHE-447-1 Sustainability/Pollution Prevention

The first part of this course discusses in detail a methodology for defining and assessing the sustainability of an entity. The course then proceeds with more traditional topics in pollution prevention for chemical processes, outlining concepts on the macroscale (life-cycle assessment) and mesoscale (pollution prevention for unit operations). By the end of this course, you should be able to use a fuzzy-logic based methodology to define and assess sustainability, perform a sensitivity analysis which identifies the most critical components of sustainability for a given corporation, perform a life-cycle assessment on a product or a process, identify and apply chemical process design methods for waste minimalization, energy efficiency and minimal environmental impact and design, size and cost a simple waste-treatment process. *3 credits.*

CHE-474-1 Drug Formulation & Delivery Systems

The fundamentals of drug formulation and drug delivery sstems in the context of current therapeutics on the market. Specific topics include traditional drug formulation, mechanisms and kinetics of pharmaceutical stability, controlled-release devices, transdermal delivery, intravenous delivery, oral drug delivery, pulmonary delivery, targeted drug delivery, and gene therapy. The course is designed to cover specific drug delivery topics that are expanded upon with student driven discussions of primary literature assigned by the professor. *3 credits. Prerequisites: Ch 231 or permission of instructor.*

CHE-499-1 Thesis/Project

Master's candidates are required to conduct, under the guidance of a faculty adviser, an original investigation of a problem in chemical engineering, individually or in a group, and to submit a written thesis describing the results of the work. *6 credits.*

ELECTRICAL ENGINEERING

Undergraduate

ECE 150-1 Digital Logic Design

Theoretical and practical issues concerning design with combinational and sequential logic circuits, and programmable logic devices. Number systems, Boolean algebra, representation and simplification of Boolean functions, universal logic families. Finite-state machines, state tables and state diagrams, flip-flops, counters, registers. Adders, decoders, comparators, multiplexers, memories and applications. Programmable devices: PLA, PLD, etc. Principles of analog circuits are presented in the context of real world problems, such as "glitches," power and ground bounce, contact bounce, tri-state logic and bus interfacing, timing circuits, asynchronous versus synchronous circuit components. Characterization of electronic and logical properties of digital circuits. Course work involves individual and team projects in which: digital circuits are designed and prototypes are constructed and tested on breadboards; designs involving programmable logic devices are developed using CAD tools. The projects, approximately 50 percent of the course grade, are used to assess technical writing, oral presentation, teamwork and project management skills. *3 credits*.

ECE 160-1 Programming for Electrical Engineering

Programming in C in a Linux environment, with an emphasis on software development methodology. Data types, expressions, control flow, pointers, subroutines, numerical and text processing, data structures and algorithms. Introduction to computer architecture and operating systems. Introduction to object-oriented programming in C++, and classification of programming languages. *3 credits.*

ECE 210-A MATLAB Seminar: Signals & Systems

A weekly hands-on, interactive seminar that introduces students to MATLAB, in general, and the Signal Processing Toolbox in particular.Students explore scientific computation and scientific visualization with MATLAB. Concepts of signal processing and system analysis that are presented in ECE 111 or other introductory courses on the subject are reinforced through a variety of demonstrations and exercises. It is strongly encouraged for students taking a first course in signals and systems, or for students expecting to use MATLAB in projects or courses. *0 credits. Prerequisite: MA-113; Co-req ECE 211.*

ECE 211-1 Signal Processing

This course presents a unified approach to signals and systems. Signal-space concepts for representation and approximation: inner product, orthogonal expansions, projection, Lp-norms, eigenanalysis, least-square problems, SVD. Phasors, comple baseband, line spectra. Sampling, aliasing and imaging. Analog and digital LTI systems in the time, frequency and transform domains: convolution, frequency response, transfer functions. Fourier, Laplace and z-transforms. FIR and IIR digital filters. Block diagrams, stability, feedback, initial conditions, transient modes, damping factor, Bode plots. Analog and digital state-space, transition and transfer function matrices. Random signals and vectors: correlation matrices, Gaussian vectors and signals, white noise, stationarity, ergodicity, power spectral density, ARMA models. Extensive use of MATLAB. *3 credits. Prerequisite: MA-113; or co-reg ECE 210.*

ECE 241-1 Electronics I

Semiconductor physics: band theory, carrier distributions and transport mechanisms. PN-junctions, PN junction devices. Diode circuits. BJTs: current relationships, operating region.Biasing circuits, DC Analysis; small-signal models, AC analysis. BJT amplifier configurations. *3 credits. Prerequisites: ECE 240 or ECE 140.*

ECE 251-A Computer Architecture

Basic structure of computers based on the von Neumann model. Generic one-bus, two-bus and three-bus architectures. Stack based design. Tri-state logic and interfacing to a bus. Aspects of bus timing and maximum running speeds. Instruction sets: 1, 1½, 2, 3 and more operand instructions. Operand addressing modes including case studies. Computer subsystems: (a) memory: dynamic and static RAM, refresh cycles, asynchronous data transfers; (b) I/O: interrupts vs. polling, ISRs and program controlled I/O. The control unit microprogramming vs. hardwired controllers. Horizontal vs. vertical microinstructions. The execution of a program; instruction fetch and execution sequences; PC, IR and other special registers. Computer peripherals and secondary storage. Course work involves the building of advanced digital circuits using VLSI programmable chips provided in a kit of parts. Introduction to parallel and pipelined architectures. Non-refundable material fee: \$40. *3 credits. Prerequisite: ECE 150.*

ECE 264-1 Data Structures & Algorithms I

An introduction to fundamental data structures and algorithms, with an emphasis on practical implementation issues and good programming methodology. Topics include lists, stacks, queues, trees, hash tables and sorting algorithms. Also, an introduction to analysis of algorithms with big-O notation. Assignments include programming projects and problem sets. *2 credits. Prerequisites: Cs-102 Or Ece 160.*

ECE 302-1 Probability Models & Stochastic Process

Topics in probability, random variables and stochastic processes applied to the fields of electrical and computer engineering. *3 credits. Prerequisites: MA-224 or 224.1, ECE 300 or 310.*

ECE 303-1 Communication Networks

Analysis and design of communication networks. Network protocols, architecture, security, privacy, routing and congestion control, Internet, local area networks, wireless networks, multimedia services. Physical layer, multiple access techniques, transport layer. Introduction to probabilistic and stochastic analytic techniques for communication networks. *3 credits. Prerequisites: ECE 150 and MA-224/224.1.*

ECE 335-1 Engineering Electromagnetics

This course emphasizes time-varyingfields, with topics presented fromelectrostatics and magnetostatics asnecessary. Maxwell's equations, constitutive relations, phasor vectorfields, wave and Helmholtz equations, potentials, boundary conditions. Planewaves in lossless and lossy materials, polarization, incidence. Transmission lines: transient analysis, TDR, phasoranalysis, standing wave diagrams, Smith chart, impedance matching. Guided waves: TEM, TE and TMmodes, dispersion, evanescence, cavity resonators. Microwave network analysis and device characterization with scattering parameters. Antennas, antenna arrays and Fourier optics. Additional topics from microwaves and optics will be covered as time allows. Students use a vector network analyzer to perform measurements at high frequencies. *4 credits. Prerequisites: MA-223, PH-213, ECE 211, ECE 240.*

ECE 345-1 Integrated Circuit Engineering

Feedback theory, frequency compensation. Integrated circuit fabrication and technology. Device modeling, thermal effects. VLSI CAD design tools. Circuit layout, extraction and simulation. Design and analysis of multistage MOS operational amplifiers, OTA architectures. Nonlinear circuits, comparators. Analog switches. Digital phase-locked loops. Sample and hold circuits. Data converter architecture. Switched capacitor circuits. Bandgap reference circuits. MOST digital circuit design and layout, hierarchical approaches. Final design project is a mixed analog/digital circuit (e.g., FlashA/D converter, phase-locked loop), which is sent for fabrication. *3 credits. Prerequisites: ECE 342/142*.

ECE 366-1 Software Engineering and Large Systems Design

The development stages of large, robust, expandable software systems developed as part of a team. Topics include project management, capturing requirements, system design, UML, program design, testing, delivery and maintenance. The class will develop a large project as a team using Java throughout the semester. Tools, libraries and techniques necessary for the project will be covered in class, e.g., Eclipse, Javadoc, XML, SOAP, servlets, threads and processes, Swing, JUnit, mySQL, JDBC, etc. The specific resources might change from semester to semester. *3 credits. Prerequisite: ECE 365/165.*

ECE 394-A Junior Electrical Engineering Projects II

Principles learned in ECE 393 are applied to the design, construction and characterization of electrical and computer engineering projects of significant complexity. Assignments typically involve both analog and digital design, and students are free to pursue any solution that satisfies the engineering requirements and meets with the instructor's approval. Formal and informal lectures are given on safety, circuit operation and design, and construction techniques ; participation in design reviews and technical reports. Non-refundable materials fee: \$40. 3 credits. Prerequisite: ECE 393/193

ECE 396-A Senior Electrical Engineering Project II

This course concludes the senior project begun in ECE 395. Students submit two complete theses, one in short form and the other in long form, and give at least two presentations, one short and one long. The initial goal is to a achieve a functioning system Afterwards, students undertake the completion of the prototyping cycle, which may involve improving the circuit implementation (such as by employing PCBs populated with surface mount chips), adding a user-friendly interface, obtaining precise performance evaluations, or developing demonstrations and a user's manual. Advanced students are strongly encouraged to complete their project early and commence a master's thesis. *3 credits. Prerequisite: ECE 395/195.*

Graduate

ECE 411-1 Topics in Signal Processing

Advanced topics in signal processing selected according to student and instructor interest. *3 credits. Prerequisite: ECE 310.*

ECE 413-1 Music & Engineering

Spectral representation and analysis of music. Analog and digital music signals, instruments and synthesizers, analog circuits and digital processing. Description of musical quality and perception, introduction to acoustics, stereo and special effects. Computer interfacing with MIDI and laboratory experiments. *3 credits. Prerequisite: ECE 211/111, ECE 150.*

ECE 416-1 Adaptive Algorithms

Matrix analysis: eigenanalysis, SVD, QR, LU, Cholesky factorization. Wiener filters, linear prediction, lattice filters. SGD, LMS, NLMS, RLS, QRD-RLS. Kalman filters including square-root forms and extensions to nonlinear systems (EKF, UKF, particle filters). Performance analysis and robustness. Optimization problems, KKT conditions. Signal manifold estimation, adaptive subspace (GROUSE). Multiple discriminant analysis, FKT. Neural networks as adaptive nonlinear systems, representation theorem, back-propagation. A major focus of the course is configuring algorithms to fit specific applications. *3 credits. Prerequisite: CE 211.*

ECE 421-1 Advanced Control System Design

Design of control systems using two degrees of freedom and PID compensators. Ackermann's formula,H-infinity control theory and applications. Analysis and design for nonlinear systems using describing function, state-variables, Lyapunov's stability criterion and Popov's method. Introduction to optimal control theory (dynamic programming). Design problems and extensive use of MATLAB. *3 credits. Prerequisite: ECE 211 or ME-351.*

ECE 437-1 Fourier Optics

This course will provide an introduction to optical propagation and diffraction using a scalar wave approach and Fourier theory of imaging. Topics introduced will include pupil function, point spread function and line spread function, optical transfer function, image formation with coherent and incoherent light, holography and diffractive optical elements. *3 credits. Prerequisite: Ph 214, Ma 223, Ma 240, Ece 211 Or Me 251.*

ECE 442-1 Communication Electronics

Circuit design for advanced communications applications. Design of high-frequency amplifiers,oscillatorsand mixers using large signal analysis.Effects of noise and non-linearities are examined from the diode and transistor level to board level. Communication subsystems of interest include phase locked loops, modulators and demodulators (AM, PM FM), and signalprocessors for multiple access systems (TDMA, FDMA, CDMA). Course workincludes computer-aided simulationand design projects. *3 credits. Prerequisite: ECE 300, ECE 342/142; or co-req ECE 335.*

ECE 444-1 Bio Instrumentation & Sensing

The basic human vital signs and some related elementary physiology viewed from an engineering standpoint with special emphasis placed upon current electronic measurement methods. Electrocardiographic and electromyographic signals. Safety problems related to electrical isolation. Guarded, fully isolated, modulated carrier operational amplifiers and microvolt-level amplification. Solid-state 'grain of wheat' pressure sensors, microelectrodes, thermal probes, ultrasonic transducers and other biosignal sensors. Course work includes instrumentation and sensing projects. *3 credits. Prerequisite: ECE 211/111, ECE 342/142.*

ECE 448-1 Power Electronics

Principles of power electronics. Operating characteristics of Bipolar Junction Transistors, IGBTs, MOSFETs and Thyristors, power converters, basic switching circuits, AC/DC, DC/DC, DC/AC converters and their applications. Students are required to design, construct, diagnose and test power electronics converters. *3 credits. Prerequisite: ECE 241.*

ECE 462-IS Computer Graphics

Graphical primitives, windows, clipping and viewports. Two- and three-dimensional geometric transformations and translations; rotation, pan and zoom. Hidden line and surface removal. Region filling and shading. The architecture of high-performance graphical engines. Representing lighting, shading and textures. Rendering.Rotation. GUIs. Animation. Course work includes design projects. *3 credits. Prerequisite: ECE 264/164.*

ECE 466-1 Compilers

The theory, design and implementation of a practical compiler. Finiteautomata, LL and LR parsing, attribute grammars, syntax-directed translation, symbol tables and scopes, type systems and representations, abstractsyntax trees, intermediate representation, basic blocks, data And control flow optimizations, assembly language generation including register and instruction selection. Students apply tools such as Flex and Bison to writing a functional compiler for a subset of a real programming language such as C. *3 credits. Prerequisite: ECE 251, ECE 365.*

ECE 467-1 Natural Language Processing

This course focuses on computational applications involving the processingof written or spoken human languages.Content may vary from year to year.Theoretical subtopics will likely include word statistics, formal and natural language grammars,computational linguistics, hidden Markov models, And various machine learning methods. Applications covered will likely include information retrieval,Information extraction, text categorization, question answering, summarization, machine translation and Speech recognition. Course work includes programming projects and tests. *3 credits. Prerequisite: ECE 264*.

ECE 471-1 Sel Topics in Machine Learning

Advanced topics in machine learning, selected according to student and instructor interest. *3 credits. Prerequisites: Ma 223, Ma 224; Co-req ECE 211(1845) ME-251 or CHE-352.*

ECE 476-1 Data Science for Social Good

Applications of machine learning, data science and software engineering to projects in the areas of education, equality, justice, health, public safety, economic development or other areas.Projects will be done in collaboration with external partners, and will be focused on solving problems with an emphasis on the greater New York City Area. Students will work with external partners to specify problems and investigate possible solutions. Students will work between disciplines to develop new machine learning based solutions. Additionally, students will work collaboratively to visually convey the insights and results generated. *3 credits. Prerequisite: ECE 467 or 469 or 471 or 472 or 474 or 475; Prior course in ML or AI, and permission of instructor.*

ECE 499-1 Thesis/Project

Master's candidates are required to conduct, under the guidance of a faculty adviser, an original investigation of a problem in electrical and computer engineering, individually or in a group, and to submit a written thesis describing the results of the work. *6 credits.*

INTERDISCIPLINARY ENGINEERING

Undergraduate

EID-103-1 Principles of Design

This course is designed to introduce students from all disciplines to the concepts of rational design. It is open to first-year students and sophomores. In the first part of the course students will learn by hands-on experience the importance of giving attention at the design stage to consideration of accessibility, repair, replacement, choice of materials, recycling, safety, etc. Students will develop the ability To make observations and record them insuitable form for further analysis of the design process. From this, concepts of 'good' design will be developed, and students will be introduced to The formal design axioms and principles. This will lead to the second part of thecourse which will consist of acomprehensive, realistic design problem. Creativity, intuition and cultivation of engineering 'commonsense' will be fostered within the framework of design principles and axioms. The course will constitute a direct introduction to the disciplines in their interdisciplinary context. *3 credits. Prerequisite: EID-101*

EID-116-1 Musical Instrument Design

Theory and use of musical scales, including just intonation and Equal temperament systems. Musical harmony and basic ear training. Human hearing and the subjective measures of sound: pitch, loudness and timbre. Acoustic analysis of design and operating principles of traditional instruments, including members of the percussion, string and wind families. Prototyping and testing of original musical instrument concepts. *3 credits.*

EID-326-1 Biomechanics

An in-depth treatment of orthopedic biomechanics, including free body analysis applied to the musculoskeletal system, applied statics, dynamics and kinematics. Clinical problems relating to biomechanics. Lubrication theory applied to hard and soft tissues. Mechanical testing of tissue, including both static tests and dynamics tests. Tensor treatment of kinematic motions. Extensive reference to current literature. Muscle function, evaluation and testing. Exploration of the concepts of development of muscular power, work and fatigue. 3 credits. Prerequisites: ESC 200 or ME 200 and permission of instructor

EID-353-1 Mechatronics

Topics include computer architecture, PIC processor overview, Dynamic modeling, sensors, data acquisition, digital PID control theory, and utilization of assembly language to code the controller. Students will design, build and test a controller board and present a final prototype of a control system. Engineeringeconomics will be introduces and integrated into the final project. *3 credits. Prerequisite: ME-351 or ECE 211 or CHE-361.*

EID-364-1 Interdisiplanry Engineering Researrch Problem I.S.

An elective course, available to qualified upper division students. Students may approach a faculty mentor and apply to carry out independent or group projects in interdisciplinary fields. *3 credits.*

EID-370-1 Engineering Management

An exploration of the theories and techniques of management beginning with the classical models of management and continuing through to Japanese and American contemporary models. The course is specifically directed to those circumstances and techniques appropriate to the management of engineering. Lecture, discussion and case studies will be used. *3 credits.*

Graduate

EID-447-1 Sustainability/Pollution Prevention

The first part of this course discusses in detail a methodology for defining and assessing the sustainability of an entity. The course then proceeds with more traditional topics in pollution prevention for chemical processes, outlining concepts on the macrscale (life-cycle assessment) and mesoscale (pollution prevention for unit operations). By the end of this course, you should be able to use a fuzzy-logic based methodology to define and assess sustainability, perform a sensitivity analysis which identifies the most critical components of sustainability for a given corporation, perform a life-cycle assessment on a product or a process, identify and apply chemical process design methods for waste minimalization, energy efficiency and minimal environmental impact and design, size and cost a simple waste-treatment process. *3 credits.*

ENGINEERING SCIENCES

Undergraduate

ESC-000.2-1 Engineering Professional Development Seminar

The Engineering Professional Seminars and Workshops offer students an introduction to the profession of engineering as well as deal with their development as students. The Cooper Union's CONNECT program is an integral part of these courses and provides intensive training in Effective communications skills. A wide range of topics is covered in addition to communications skills including ethics, environmental awareness, life-longlearning, career development, Conflict resolution, entrepreneurship, marketing, work-place issues, team dynamics, professional licensure and organizational psychology. *0 credits.*

ESC-000.4-1 Engineering Professional Development Seminar

The Engineering Professional Seminars and Workshops offer students an introduction to the profession of engineering as well as deal with their development as students. The Cooper Union's CONNECT program is an integral part of these courses and provides intensive training in Effective communications skills. A wide range of topics is covered in addition to communications skills including ethics, environmental awareness, life-longlearning, career development, Conflict resolution, entrepreneurship, marketing, work-place issues, team dynamics, professional licensure and organizational psychology. *0 credits.*

ESC-201-C Mechanics of Materials

Introduction to solid mechanics; analysis of stress and deformation. Extension; flexure; torsion. Axisymmetric problems, beam theory elastic stability, yield and failure theory. *3 credits. Prerequisite: ESC-200 or ME-200.*

ESC-221-A Basic Principles of Electrical Engineering

Survey of Electrical Engineering for the non-major. 2 credits. Prerequisite: MA 113.

ESC-251-1 Systems Engineering

An introductory course to the mathematical modeling of systems. Topics include mechanical elements and systems, electric circuits and analogous systems, fluid elements and systems, analysis of systems using transfer functions, state space equations, analog simulation and digital simulation. Also covered are block diagrams, Laplace transforms, and linear system analysis. Computer projects will be assigned that will use MATLAB software. *3 credits. Prerequisite: MA 240.*

ESC-330-A Engineering Thermodynamics I

Rigorous development of the basic principles of classical thermodynamics. Zeroth, first and second aws of thermo-dynamics and their applications to open and closed systems. Analysis of thermodynamic processes, properties of real substances and thermodynamic diagrams. *3 credits.*

MATH

Undergraduate

MA-110-1 Intro to Linear Algebra

Vectors in two- and three-dimensions, vector algebra, inner product, cross product and applications. Analytic geometry in three dimensions: lines, planes, spheres. Matrix algebra; solution of system of linear equations, determinants, inverses, complex numbers. 2 credits.

MA-111-1 Calculus I

Functions, limit of functions, continuity. volume, improper integrals, work, arc length, surface area, centroid. Polar coordinates. Parametric curves in two and three dimensions: velocity, speed and accelerations. Partial derivatives and the chain rule, properties of the gradient. Maxima and minima. Sequences and series: convergence of sequences and series, Taylor and Maclaurin series, power series. *4 credits*.

MA-113-A Calculus II

Applications of definite integrals. 4 credits. Prerequisite: MA-111; or Co-req: MA-110.

MA-223-A Vector Calculus

Double and triple integrals and their applications. Vector fields. Gradient, divergence and curl. Line and surface integrals. Theorems of Green, Gauss and Stokes. Path independence of line integrals. *2 credits. Prerequisite: MA-110 MA-113.*

MA-224-A Probability

Sample spaces. Random variables. Probability. Distribution and density functions. Expectation.Mean and variance. Moments and generating function. Central limit theorem. 2 credits. Prerequisite: MA-113; Required concurrent or previous courses, MA-223.

MA-240-A Ordinary & Partial Differential Equation

Ordinary differential equations of the first order. Linear equations of higher order with constant coefficients. Power series solutions. Laplace transformation. Fourier series. Partial differential equations: method of separations of variables, applications to vibration and heat flow. *3 credits. Prerequisite: MA-113*

MA-345-1 Functions of a Complex Variable

Topological properties of complex plane, complex analytic functions, Cauchy-Riemann equations, line integrals, Cauchy's integral theorem and formula. Taylor series, uniform convergence, residues, analyticcontinuation, conformal mappings and applications. *3 credits. Prerequisite MA-223.*

MA-347-1 Modern Algebra

Sets and mappings, the integers: well ordering, induction residue class arithmetic, Euler-Fermat theorems. Permutation groups: cyclicde compositions. transpositions, conjugate classes of permutations. Abstract groups: morphisms, subgroups, cyclic groups, coset decompositions. Factor and isomorphism theorems. Direct products of groups. Sylow's theorems. *3 credits. Prerequisite MA-326.*

MA-352-1 Discrete Mathematics

Relations. Mathematical structures. Number theory.Algorithms. Complexity of algorithms. Cryptology. Recurrence relations. Graph theory. A shortest-pathalgorithm. Planar graphs. Trees. Amaximal flow algorithm. Finite-stateautomata. Languages and grammars. Turing machines. The Church-Turingthesis. Unsolvable problems. *3 credits. Prerequisite MA-110.*

MA-370-1 Selected Topics in Math

This is a seminar course involving discussion of topics in pure or applied mathematics that will be chosen by mutual agreement between the students and the instructor. Students will work independently on projects that may be of special interest to them. *3 credits. Prerequisite MA-326.*

MA-371-1 Selected Topics in Math II

This course is intended to allow undergraduate students to continue MA 370 with related topics. *3 credits. Prerequisite MA-370.*

MECHANICAL ENGINEERING

Undergraduate

ME-103-1 Statics

This foundation course develops a sound problem-solving methodology based on engineering applications involving forces acting on non-accelerating structures. Topics include equivalent system of forces; equilibrium; moments and couples; centroids and distributed forces; forces in structures (trusses, frames, machines); friction forces. 2 credits. Co-reg ME-104.

ME-104-A Measurements Laboratory

The course, taken concurrently with Statics, includes laboratory modules that focus on the measurement of force from both mechanical and electrical signals. Students develop laboratory and technical communication skills. *1 credit.*

ME-211-A Design & Prototyping

A mechanical engineering hands-on workshop geared towards the understanding and practice of basicengineering design and fabricationtools.Topics include hand tools, simple machining, mold making, casting,materials, fasteners, adhesives, andfinishes. 3-D digitizing, solid modeling,rapid prototyping and computer interfacing will also be presented. Team projects will familiarize The students with typical tools and processes employed in realizing a design concept, from sketch to functional prototype. Each student Will participate in and contribute to The team-learning and creation process. 2 credits. Prerequisite: EID-101.

ME-301-A Mechanical Vibrations

Mechanical systems with single and multiple degrees of freedom; longitudinal, torsional and lateral vibrations; free and forced oscillations; vibration testing, dynamic stability, vibration isolation, design criteria. Computer-aided design assignments and vibration project. *3 credits. Prerequisites: ME-200, MA-240.*

ME-311-1 Mechanical Design

Mechanical design of basic transmission elements; design optimization by blending fundamental principles and engineering judgment; design criteria for the various frictional machine elements. Design projects provide authentic involvement in problems from industry; design projects make use of computer, experimental and modeling techniques. *3 credits. Prerequisite: ME-310/336.*

ME-313-1 Industrial Design

The collaborative relationship between art, engineering and industrial design, academically and professionally, is a pivotal relationship in the development of new ideas. This course serves as an introduction to the world of industrial design and its wide-ranging applications. The students will learn about the history of design and design concepts and methodology through lectures, discussions, and small projects; and will explore, develop, and execute a term design as part of a class project as the course progresses. The main goals of this course are to develop a better understanding of the perspective of an industrial designer and to gain experience in the practice of industrial design. *3 credits. Prerequisite: ME-211/155.*

ME-342-A Heat Transfer: Fundamentals & Design App

Study of incompressible potential flow around bodies of aerodynamic interest, by the use of equations of motion, method of singularities and conformal transformation. Investigation of experimental results and techniques; free convection. Introduction to radiation heat transfer and multimode problems. Open-ended design projects will include application to fins, heat exchangers, tube banks and radiation enclosures and will make use of computer-aided design techniques. *3 credits. Prerequisite: ESC-340/140.*

ME-353-1 Mechatronics

Topics include computer architecture, PIC processor overview, dynamic modeling, sensors, data acquisition, digital PID control theory, and utilization of assembly language to code the controller. Students will design, build and test a controller board and present a final prototype of a control system. Engineering economics will be introduced and integrated into the final project. *3 credits. Prerequisites: ME-351 or ECE 211 or CHE-361.*

ME-360-A Engineering Experimentation

Selection, calibration and use of subsystems for the measurement of mechanical, thermal/ fluid and electrical phenomena. Laboratory work includes investigations of heat exchangers, fluid systems and internal combustion engines. Emphasis is placed on data collection and statistical reduction, computational methods and written and oral presentation skills. *3 credits.*

ME-363-1 Sel Tpcs Me: Building Envr Tec

This course will deal with current technological developments in various fields of mechanical engineering. Projects and design will be emphasized. *x credits*.

ME-365-1 Mechanical Engineering Research Prob I.S.

An elective course available to qualified students. Students may elect to consult with an ME faculty member and apply to carry out independent research on problems of mutual interest in theoretical or applied mechanical engineering. *3 credits.*

ME-394-1 Capstone Senior ME Design

The application of open-ended design work to the synthesis of engineering devices and systems for the satisfaction of a specified need.Consideration of market requirements, production costs, safety and esthetics.Projects are carried out in small groups. *3 credits. Prerequisite: ME-393.*

Graduate

ME-405-1 Automotive Engineering Fundamentals

An introductory course in modern automotive design, covering aspects ofprime movers, aerodynamics, brakes,tires, steering, transmission,suspension and handling, chassis and advanced hybrid powertrain concepts.Simulations and physical prototyping optimization, fabrication and testing of various vehicle subsystems in a team-based learning environment. *3 credits. Prerequisite: ESC-251, ESC-330.*

ME-407-1 Computational Fluid Dynamics

The need for and applications of computational fluid dynamics (CFD). Introduction to CFD analysis and commercially available codes.Governing equations and numerical solution methodologies for basic fluidflow systems. Geometric modeling and grid generation. *3 credits. Prerequisite: ESC-340 or CHE-341*.

ME-499-1 Thesis/Project

Master's candidates are required to conduct, under the guidance of a faculty adviser, an original investigation of a problem in mechanical engineering, individually or in a group, and to submit a written thesis describing the results of the work. *6 credits.*

PHYSICS

Undergraduate

PH-112-A Physics I: Mechanics

Static equilibrium, kinematics, Newton's Laws, non-inertial frames of reference, system of particles, work and energy, linear and angular momentum, rigid body motion, conservation laws, oscillation. *4 credits. Prerequisites: MA 110, MA 111; Pre- or Co-req MA 113.*

PH-214-A Physics III: Optics & Modern

Geometric and physical optics. Special theory of relativity. The quantum theory of light. The quantum theory of matter. Atomic structure. Nuclear structure and radioactivity. *3 credits. Prerequisite: PH-213*

PH-360-1 Special Projects in Physics

Special projects in experimental ortheoretical physics. 3 credits.

Graduate

PH-429-IS Chaos & Nonlinear Dynamics

A simple mathematical formalism explains how a nonlinear system with no random element may be intrinsically unpredictable even when its governing equations are known. The mathematics of chaos (including fractals) will be presented, with applications drawn from nonlinear oscillators in biology, chemistry and electronics, mechanical and structural stability, geophysics, astrophysics and fluid dynamics, as well as from models used in climate science, economics and epidemics. *3 credits. Prerequisites: PH-214, MA-113, either CS-102 or ECE 160.*

PH-432-1 Cosmology

Introduction to Cosmology, physics and composition of our Universe, our place in the universe, the large-scale distribution of galaxies and scientific developments, the cosmic web, voids and clusters of galaxies, distance measurements, Robertson-Walker metric, proper distance, Universe evolution, dark matter, dark energy, cosmic microwave background, link between observations, simulations and theoretical models, data analysis for Cosmology, Hubble constant and tensions, velocities, the virial theorem, gravitational instability, physics of baryon acoustic oscillations, cosmological parameters, survey design. 2 credits. Prerequisite: PH-213

VERTICALLY INTEGRATED

PROJECTS

VIP-38x-A Vi Projects: Smart Cities

Multidisciplinary course supporting student and/or faculty-initiated projects guided by faculty mentorship and professional research.Undergraduate students that join VIP teams earn one credit each semester for their participation in design/discovery effort. *1 credit.*

VIP-38x-B Vi Projects: Solar Decathlon

Multidisciplinary course supporting student and/or faculty-initiated projects guided by faculty mentorship and professional research.Undergraduate students that join VIP teams earn one credit each semester for their participation in design/discovery effort. *1 credit.*

VIP-38x-C Vi Projects: Motorsports

Multidisciplinary course supporting student and/or faculty-initiated projects guided by faculty mentorship and professional research.Undergraduate students that join VIP teams earn one credit each semester for their participation in design/discovery effort. *1 credit.*

VIP-38x-D Vi Projects: Frontrs of Bioeng

Multidisciplinary course supporting student and/or faculty-initiated projects guided by faculty mentorship and professional research.Undergraduate students that join VIP teams earn one credit each semester for their participation in design/discovery effort. *1 credit.*

VIP-38x-E Vi Projects: Vehicles

Multidisciplinary course supporting student and/or faculty-initiated projects guided by faculty mentorship and professional research.Undergraduate students that join VIP teams earn one credit each semester for their participation in design/discovery effort. *1 credit.*

VIP-48x-A Vi Projects: Smart Cities

Multidisciplinary course supporting student and/or faculty-initiated projects guided by faculty mentorship and professional research.For undergraduates: junior standing and must have completed 2 semesters of prior undergraduate VIP course work. *1 credit.*

VIP-48x-B Vi Projects: Solar Decathlon

Multidisciplinary course supporting student and/or faculty-initiated projects guided by faculty mentorship and professional research. For undergraduates: junior standing and must have completed 2 semesters of prior undergraduate VIP course work. *1 credit.*

VIP-48x-C Vi Projects: Motorsports

Multidisciplinary course supporting student and/or faculty-initiated projects guided by faculty mentorship and professional research.For undergraduates: junior standing and must have completed 2 semesters of prior undergraduate VIP course work. *1 credit.*

VIP-48x-D Vi Projects: Frontrs of Bioeng

Multidisciplinary course supporting student and/or faculty-initiated projects guided by faculty mentorship and professional research.For undergraduates: junior standing and must have completed 2 semesters of prior undergraduate VIP course work. *1 credit.*

VIP-48x-E Vi Projects: Vehicles

Multidisciplinary course supporting student and/or faculty-initiated projects guided by faculty mentorship and professional research.For undergraduates: junior standing and

must have completed 2 semesters of prior undergraduate VIP course work. 1 credit

ADMINISTRATION, FACULTY

AND STAFF

New Full-time Faculty

Brittany Corn-Agostini (PHY) Jeong Eun Ahn (CE) Hejintao Huang (CE)

New Faculty Titles

Sam Keene: Professor of Electrical Engineering, John and Mary Manuck Distinguished Professor of Design

Dirk Martin Luchtenberg (Associate Professor of Mechanical Engineering)

New Department Chairs

Mili Shah, Chair of Mathematics

Ben Davis, Eleanor and Stanley Ensminger Chair of Chemical Engineering

Cosmas Tzavelis, George Fox Chair of Civil Engineering

New Staff and Administrators

Robyn Fitzsimmons, Departmental Staff Assistant

Donald Etheridge, Purchasing and Finance Assistant

Benjamin Garrett, Physics and Civil Engineering Lab Technician

New Emeritus Professors

Professor Irv Brazinsky Professor Paul Bailyn Professor Stan Wei Professor Toby Cumberbatch Professor Richard Stock Professor Leonid Vulakh Professor Vito Guido

Departures

Daniel Lepek (faculty) Joseph Cataldo (faculty) Vito Guido (faculty) Christian Carter (staff) Cherisse Thomas (staff) Maria Jimenez (staff) Elizabeth Leon (staff) Kok Ren Choy (staff) Luis Vega (staff)

FACULTY OF HUMANITIES AND SOCIAL SCIENCES COURSES

HSS-2-A Texts and Contexts: Old Worlds

A study of texts and topics from 1500 to 1800. Sections read common texts and some selections by individual instructors, with emphasis on literary expression and cultural context. Requirements include written analysis and class discussion. *3 credits.*

HSS-4-A The Modern Context

A study of an important figure or topic from the modern period whose influence extends into contemporary culture. The figures and subjects are chosen from a broad range of disciplines (including literature, history, politics, technology and art history, among others). Through concentration on a single figure or focused topic students are encouraged to develop a deep awareness of works of great significance and to understand them in the context of modernity. Guided independent writing projects and oral presentations give students an appreciation for what constitutes research in the humanities and social sciences. *3 credits*.

HTA-102-A Modern to Contemporary

This two-semester art history core course, developed as part of the Foundation year for students in the School of Art but open to all students, is organized around a set of themes running through the history of modernity from the 18th century to the present. Within specific themes, significant works, figures and movements in art/design will be presented chronologically. Students will be able to identify and critically evaluate significant works, figures and movements in art/design in the modern period; be able to describe the main social and political contexts for the changes in art/design over the last two hundred years; and engage, in writing and class discussion, with theoretical perspectives on art/design production. The course will involve museum visits. Grading will be based on class participation, papers, and exams. *3 credits. Prerequisite: HTA-101(453).*

HTA-231-1 History of Industrial Design

3 credits.

HTA-271-1 The Hellenistic Age

Following the campaigns of Alexander, the Greeks spread across the Middle East as far as Egypt, Central Asia and India, where they encountered many cultures vastly different from their own. The result was the creation of a diverse, multicultural world, connected by shared elements such as the use of the Greek language, but in which every individual region and society was unique. This diversity is especially evident in the art produced in this period, where we see the Greek obsession with human form, preferably nude, mixing with older artistic traditions in Egypt and Mesopotamia that relied on hierarchy and repetition to perform their functions. In Italy the Romans adopted aspects of Greek art as a means of disrupting their rather stodgy political ideology, with mixed results, whereas in India Greek motifs, popular for reasons as yet unknown, were pressed into the service of Buddhism. In this course we shall examine the art of this dynamic period from ca. 300 to 30 BCE. It is organized geographically, beginning in the Greek mainland and moving across the Middle East, North Africa and Europe to Iran, Central Asia and India. We will focus especially on themes of interaction—how do old and new artistic traditions combine?—and identity—what did these combinations mean to the people who made and used them?—as well as on the roles of power and resistance. 2 credits.

HTA-273-1 Topcs in History of Photography

Writing by the critics, historians and photographers that have influenced creation and reception of photography throughout its history. Issues include definitions and redefinitions of art, documentary debates and revisionist canons and histories. *2 credits.*

HTA-296-1 The Portrait

This course will re-examine the genre of portraiture beginning in the mid-19th century when photography enters discourse as an alternate medium to painting and sculpture. Starting with Nadar's studio practice we will trace new subjects that emerge during modernity. Likewise, we will investigate marginalized subjects that are newly represented during the 20th century in the works by James Van der Zee, Dorethea Lange, Gordon Parks and the social documentary movement. Contemporary figures in both photography and painting such as Andy Warhol, Alice Neel, Robert Mapplethorpe and Cindy Sherman will be examined. The course will question the reemergence of painting in contemporary practices by figures such as Kehinde Wiley, Martin Wong, Jordan Casteel and Kerry James Marshall. We will conduct a case study of the recent acclaimed exhibition "Posing Modernity: The Black Model from Manet and Matisse to Today" at the Wallach Gallery. *2 credits.*

HTA-297-1 History of Printmaking

Explores the history of printmaking and its various processes from the 15th century to the present with an eye to the unique contribution of this graphic art to the history of visual language in both popular and fine art. While major printmakers (e.g., Durer, Rembrandt, Daumier, the Nabis, the German Expressionists, Jasper Johns) will be addressed, attention will also be given to the practical and popular use of prints through the centuries. *2 credits.*

HTA-298-1 History of Graphic Design

A study of important avant-garde and graphic design movements starting with the Industrial Revolution through the 20th century including:Futurism, Dada, Constructivism, De Stijl, the influence of the Bauhaus and the New Typography, the rise of the modern movement in America, pre and post-war design in Switzerland and Italy, the International Typographic Style, the New York School, corporate identity, postmodernism and more. We'll examine the evolving design styles and the role of the pioneer designer in society, with an emphasis on notable works, subjects and themes; and their cultural, political and social connections. Course includes slide lectures, readings, discussions, looking at original materials (posters, advertisements, booklets, etc.), individual research assignments and written essays. 2 credits.

HTA-308-1 Women's Art and Feminisms

This course focuses on women and art; and intends to propose a reconstruction of some little known but major women's contributions to art, to history, and/or to the women's liberation movements. Organized by medium, as well as chronologically, this course proposes to identify major modes of expressions used by women historically (and until today), and discusses them in their cultural, technological, theoretical, and socio-historical contexts of origin (including feminisms). The course starts with deconstructing historical representations or misrepresentations of women in visual arts, and discusses them alongside the visibility of art by women artists or lack thereof in history. The recent efforts by the art market and institutions, lately including more women's art in exhibitions and collections, will be discussed, and questioned. Because the artworks of individuals who self-identify as women are often found in non-traditional media for the fine arts, our case studies bring us to consider works in the form of: public speaking, publishing, poster-making, and other agit-prop such as: tee-shirts, buttons, stickers, etc., as well as performance art, public action, and video art. Then, because women artists often worked collectively and collaboratively, a special attention is given to works by collectives such as: New York Radical Women, Redstockings, Les Insoumuses, Salsa Soul Sisters, Guerrilla Girls, Grand Fury, WAC, and more recently: Black Lives Matter, #MeToo movements internationally. While learning about women in visual arts, we also discuss how their practice engages or

not with trends identified as part of the development of feminism. Concepts such as "First Wave," "Second Wave," "Radical Feminism," "Anti-Feminism," "White Feminism," "Black Feminism," "Womanism," "Post-Feminism," and "Neo-Feminism" are also clarified and allow to approach the intersectionality of feminisms with race and BIPOC, as well as LGBTQ communities historically. Then the more recent discussions regarding non-binary gender identities are evaluated as a challenge as well as an opportunity for feminism. 2 credits.

HTA-313-P Seminar Art History: Globalization

A seminar based on a special topic in the study of art history. The seminar may be repeated for credit with the permission of the dean of the Faculty of Humanities and Social Sciences. Recent topics: Picasso. *2 credits.*

HTA-320-1 Porcelain and Chinoiserie Politics

This course explores Europe's obsession with porcelain and the "Chinese taste" in the eighteenth century and its complex after lives today. The class will delve into the problematics of Chinoiserie, a vague stylistic term used to describe a "neutral, harmless" style of decoration shaped by European fantasies of "the East." Fueled by the early arrival of Chinese porcelain in the sixteenth century, Chinoiserie was by the eighteenth century rampant in the art, architecture, and decorative arts of Europe. Far from being neutral, this style was polemical from the outset. The class will focus primarily in the eighteenth century, as we look at historical examples of porcelain, luxury, and commerce, reading these against the grain with the aid of theoretical writings. Analyzing the stylistic, historical and ideological dimensions of Chinoiserie, we will consider how this term can be reframed in order to construct a critical framework that takes into account issues of race, gender, sexuality, and class. *2 credits*.

HTA-335-1 Art & Arch Ancient Near East

From the temples of the land of Sumer to the tower of Babylon, this course provides an overview of the civilizations of ancient Mesopotamia (modern-day Iraq) and Iran, as well as surrounding regions, from the Neolithic period to the 1st millennium B.C.E. – some 10,000 years. We will study the architecture and artifacts excavated at major sites in the fertile crescent including Jericho, Uruk, Ur, Nineveh and many others. In addition, we will discuss major landmarks in the history of civilization such as the development of agriculture, the beginning of urban settlement, the invention of writing, and the discovery of metallurgy, and their impact on the manufacture of art and artifacts and their iconography. *2 credits.*

HTA-342-1 Exhibition As Medium

This course explores key moments in the history and theory of art exhibitions, from the experimental shows organized by Futurist and Dada artists in the early twentieth century to the present. Rather than focusing on the objects on display, as in an art history survey, we will discuss how the mode of display, the venue, the language, and other curatorial choices help shape the experience of an art exhibition. We will also explore the economy, politics, geography, and institutional framework of art shows as an integral part in the construction of meaning. Special emphasis will be placed on artists who, starting in the 1960s, have used exhibitions as their medium. *2 credits*.

HTA-99-1 Independent Study History Theory Art

2 credits.

HUM-308-1 Creative Writing

Starting with exercises and word games, then moving to, e.g., the objective poem, collage and concrete poetry, metrics, translations. As well as writing, students are expected to read widel in poetry and fiction. Attendance at a poetry or prose reading is required. Grade based on class performance and portfolio of work. *3 credits. Prerequisite: HSS-1 HSS-2 HSS-3 HSS-4*.

HUM-311-1 New Media

This course considers what makes media "new" and why those characteristics are relevant in contemporary society. We will consider how older media have been adapted to incorporate new media technologies and strategies, how video games and the Internet have changed our expectations of media experiences, the impact of new media on artistic practice, the importance of new media in contemporary cultural economy, and related topics. *3 credits. Prerequisite: HSS Core.*

HUM-337-1 Philosphy & Contemporary Art

It is not easy to express the 'meaning' of art. Even less, certainly, in the era of postmodernity, when not only the splintering of perspectives prevents from seeing a single line, but the artist, along with the search for meaning, definitively renounces the idea of defining what art should be, merely expressing the 'appearance of an instant.' Hence that fragmented nature concerning both the works and the reading of the art of our time. As Adorno writes in his Aesthetic Theory, it is precisely through a fragmentary form, through a 'synthesis of the diffuse' which renounces the idea of consonance, that art can express the reality of our time. Still, it is not possible to escape this need to express the inexpressible, even knowing that thought can only approach the essence of things, never achieving it. But it is precisely through this, as a negative presentation, that such an invisible essence can sometimes be understood. *3 credits. Prerequisite: HSS Core.*

HUM-355-1 Race & Gender in Literature

In this course we will engage different contexts in which women have been and are communicating their responses to the social, political, religious, and engendered conditions of their respective nations. Our themes include the politics of canon formation, the challenges of language, "Third World" and Western feminism. Thus, we consider the larger traditions into which women's writings have been absorbed, or which their writings resist, or change. We will explore the following questions: Can we probe the traditional value of mothers and wives with the gender roles and behavioral expectations that go with them, without banishing them from the realm of political resistance or without reifying them? What rhetorical or narrative methods are used to express gendered realities where acts of writing do not always equate with authority, truth, or stability? How are politics inscribed on the gendered and racialized body? What narrative styles are deployed to articulate gendered participation in the national fabric? While we engage primarily in literature, we will also consider music and visual art. The works we will explore include Sojourner Truth, Jamaica Kincaid, Assia Djebar, Betool Khedairi, among others. *3 credits. Prerequisite: HSS Core.*

HUM-358-1 Studies in Cinema

A seminar based on a special topic in the study of cinema. The seminar may be repeated for credit with the permission of the dean of the Faculty of Humanities and Social Sciences. *3 credits. Prerequisite: HSS Core.*

HUM-361-1 Modern Philos: Knowledge & Mind

Investigates questions revolving around mind and body, knowledge of the world and nature, self-knowledge, truth and deception, and knowledge of others, examining texts from the early modern period of the 17th century through 19th- and early 20th-century philosophical revolts against the European Enlightenment. Particular focus is given to ways of understanding the history of modern epistemology and science in relation to global and contemporary perspectives. *3 credits. Prerequisite: HSS Core.*

HUM-373-E Sem Hum: Global South Rev

Seminar giving close attention to special topics in the humanities. The seminar may be repeated for credit with the permission of the dean of the Faculty of Humanities and Social Sciences. *3 credits. Prerequisite: HSS Core.*

HUM-377-1 Translation: Practice and Paradigm

This course is an introduction to the practice of literary translation and at the same time to translation as a way of thinking about language and the world. Our focus will be on practice, and the course will include a major workshop component. In the first half of the semester, students will present case studies of published translations; in the second half, they will pursue original translation projects. Readings will include some classics of translation theory (from Friederich Schleiermacher to Gayatri Spivak); we will also study some "extreme" cases of texts that move between languages (Patrick Chamoiseau, Theresa Hak Kyung Cha, Ivan Blatn). Finally, we will reflect on whether what we learn from literary translation can be meaningfully applied to questions in art or architecture. *3 credits.*

HUM-99-1 Independent Study (Humanities)

2 credits. Prerequisite: HSS Core.

SS-306-1 Spacing Out--Zooming In

The idea of social distancing (spatial arrangements) is not new. We enlist it in our everyday lives in considering how we orient ourselves with others and how we arrange structures or features of our environment. In essence spacing helps define who we are individually and collectively. These seem second nature to us while in actuality being learned through the frames of culture and socialization. Recent events, most prominently, the Corona Virus Pandemic and Black Lives Matter has shined a light on this hidden dimension of social and structural life and made us reconsider how it has been engaged, and going forward how we need to refashion it so as to sustain things we want-keeping and making social connections—and also reduce or avoid things and people we don't- isolation and exclusion. More fundamentally, social distancing heightens awareness of things previously considered inconsequential or perhaps 'natural'. The current crisis helps/makes us see/makes visible what and who was not viewed as essential or important and recasts them as such. We will look at how various parts of society are already developing policies that refashion design and behavior using social behavior and technology. The fundamental concern or interest of sociology is community. How do we balance individual and group forces and desires within community. The course will utilize a sociological frame while enlisting readings from a variety of disciplines and perspectives e.g. notions of space and place from Eastern and Western traditions and cultures, from architecture, the digital world, landscaping. We will evaluate these and students will have the opportunity to offer suggestions for a specific area or venue of interest to them. Since this course is enlisting scenarios that are occurring in real time, the relevance seems apparent but the goal will be to offer a frame that persists beyond the immediate concern that perhaps precipitated renewed interest and importance in persistent questions. 3 credits. Prerequisite: HSS Core.

SS-320-1 Immigrants in Place

In this course, students will critically interrogate majority aesthetic norms by studying a multiplicity of spaces occupied by immigrants in New York City. Students will be invited to critique the colonial heritage of spatial aesthetics in the West, placed in opposition to various immigrant experiences, considering immigration and immigrant groups in their varied historical, socio-economic, and political contexts. Students will take on individual research projects around specific New York City immigrant groups, beginning with the group's context and ultimately observing the group's aesthetics as projected internally and externally. Through reading, discussion, and workshops, students will become immersed in a chosen immigrant group's spaces in New York City and will use this knowledge to challenge majority spatial aesthetic norms. While ostensibly relevant to both art and architecture students, this course has much deeper appeal across the college regardless of discipline. We are living and studying in this city of immigrants, including Cooper students, many of whom are themselves first- or second-generation. The work raises personal cultural questions such as how one's own immigrant group perhaps influenced her/his/their path of study,how different such groups value art, architecture, and engineering, if critical perspectives on imperialism can alter the perception of one's own work, and so on-all this lending to a richer debate over cultural norms in the West. 3 credits. Prerequisite: HSS Core.

SS-334-1 Microeconomics

The relationship between economic theory and public policy, focusing on the central axioms of modern economics in the light of recent problems in energy employment and inflation. *3 credits. Prerequisite: HSS Core.*

SS-350-1 Colonial Cities

Colonial cities were major centers of trade, commerce and manufacturing, attracting money and immigrants from across the world. By focusing on the ways in which they shaped industrialization, urbanization and culture production, we will learn about technology and modern work practices, developments in housing, infrastructure and urban planning, new ideas of political resistance and artistic expressions of discontent that originated in these cities. In doing so, we will highlight the prominent role of colonial cities in shaping modern cosmopolitan life as well as the lasting legacies of colonial rule. *3 credits. Prerequisite: HSS Core.*

SS-358-1 Social History of Food

A study of the transformations in food production and consumption, 1492 to the present. The course examines the passage of "new world" foods into Europe and Asia, the rise of commercial agriculture in the colonies, especially sugar, the rise of national cuisines, the advent of restaurant culture and the perils of fast and industrial food. *3 credits. Prerequisite: HSS Core.*

SS-372-1 Global Issues

This course will examine current issues of global significance and their implications for policy and decision-making. We shall consider such trends as the tensions between resource competition and authority; the emergence of a global economy; the environment and sustainable development; demographic change; and the emergence of new security issues, including societal and environmental stress. *3 credits. Prerequisite: HSS Core.*

SS-382-1 Game Theory

Since its introduction in 1943 by John von Neumann and Oskar Morgenstern, the general theory of games has been instrumental to our understanding of various social behaviors. With key contributions of such renowned scholars as John Nash, Robert Arrow, Thomas Schelling and John Harsanyi, among other Nobel Laureates, game theory has quickly gained a large following among students of economics, evolutionary biology and even political science. Though at times seemingly abstract, game theory has shown us that it has practical value with applications in firm-level management and strategic decisions making in military campaigns. The course has two dimensions: the first is to explore the theoretical basis of games; the second is to consider the application of these concepts in economics and political science. *3 credits. Prerequisite: HSS Core.*

SS-99-1 Independent Study (Social Sciences)

2 credits. Prerequisite: HSS Core.

ADMINISTRATION, FACULTY

New Full-time Faculty

Lex Lancaster, Assistant Professor of Art History

Ninad Pandit, Assistant Professor of History

Victory Peterson II, Assistant Professor of Humanities

New Adjunct Faculty

Hicham Awad, Adjunct Instructor and Writing Associate

E Barnick, Adjunct Instructor

Flora Brandl, Adjunct Instructor

David Gersten, Distinguished Professor Adjunct

Ariel Goldberg, Adjunct Instructor

Leila Anne Harris, Adjunct Assistant Professor

Anne Hewitt, Adjunct Assistant Professor

Sofia Lago, Adjunct Assistant Professor

Theresa Lin, Adjunct Instructor; Writing Associate

Khalad Malas, Adjunct Instructor

Caroline Merrifield, Adjunct Assistant Professor

Constanza Salazar, Adjunct Assistant Professor

Emmanuel A. Velayos Larrabure, Adjunct Assistant Professor

New Staff and Administrators

René Sandy Diaz

New Emeritus Professors

Professor Dore Ashton Professor Peter Buckley Professor Anne Griffin Professor Brian Swann

Departures

Cynthia Hartling (staff) Emily Barth (faculty) Edner Bataille (faculty) Anges Berecz (faculty) Viviana Bucarelli (faculty) Jessica Denzer (faculty) Madeleine Elfenbein (faculty) Paul Franz (faculty) Kay Gabriel (faculty) Anne Griffin (faculty) Julian Gonzalez De Leon Heiblum (faculty) Alexander Langstaff (faculty) Sarah Lowengard (faculty) Stephanie Makowski (faculty) Melanie Marino (faculty) Dina Odnopozova (faculty) Rose Oluronke Ojo-Ajayi (faculty) Mitra Panaipour (faculty)

Kathleen Pullum (faculty) Harold Ramdass (faculty) Sarah Richter (faculty) Ricardo Rivera (faculty) Emily Spratt (faculty) Nicholas Tampio (faculty) Elizabeth Weckhurst (faculty) James Wylie (faculty) Paul Zimmerman (faculty) Guido Zuliani (faculty)