Hillier College of Architecture and Design

The Hillier College offers undergraduate programs in Digital Design, Industrial Design and Interior Design and two undergraduate programs in architecture -- a four-year pre-professional Bachelor of Science in Architecture (B.S.Arch.) and a NAAB accredited five-year professional Bachelor of Architecture (B.Arch.) degree leading to licensure. The College also offers four graduate degree programs: a NAAB accredited professional Master of Architecture leading to licensure (M.Arch.), a post-professional Master of Science in architecture (MS. Arch.), a Master of Urban Design (M.U.D.) and a Ph.D. in Urban Systems.

Hillier College faculty engage in funded research in a variety of areas ranging from nanomaterials to sustainable and resilient design, the later led by the College's Center for Building Knowledge. With their emphasis on technological applications to design, both schools build on the strengths of a Carnegie Classification R1 research university while preparing students to succeed as practitioners, scholars and researchers. Students also benefit from our close proximity to New York City with its unparalleled cultural resources and employment possibilities. And our location in Newark provides students with a close-up view of a city that is rapidly transforming to reclaim the luster its citizens enjoyed in Newark's heyday as a manufacturing powerhouse.

Programs

- Architecture - M.Arch. (https://catalog.njit.edu/graduate/architecture-design/architecture/march/)
- Architecture - M.S. (https://catalog.njit.edu/graduate/architecture-design/architecture/ms/)
- Urban Design (MUD) - M.S. (https://catalog.njit.edu/graduate/architecture-design/architecture/infrastructure-planning-masters/)
- Digital Design - M.F.A (https://catalog.njit.edu/graduate/architecture-design/art-design/fine-arts-in-digital-design-masters/).
- Digital Design - M.S (https://catalog.njit.edu/graduate/architecture-design/art-design/master-of-science-in-digital-design/).

Double Majors **(**https://catalog.njit.edu/graduate/academic-policies-procedures/special-programs/**)**

- Architecture (professional, or post-professional) - M.Arch. and Master of Urban Design (MUD) (https://catalog.njit.edu/graduate/architecture-design/architecture/march-mip-ms/)
- Architecture (professional, or post-professional) - M.Arch. and Management - M.S. (https://catalog.njit.edu/graduate/architecture-design/architecture/march-management-ms/)
- Architecture (professional, or post-professional) - M.Arch. and Civil Engineering - M.S. (https://catalog.njit.edu/graduate/architecture-design/architecture/march-civil-engineering-ms/)

Urban Systems - Ph.D. (https://catalog.njit.edu/graduate/architecture-design/architecture/urban-systems-phd/)

- Animation Essentials (https://catalog.njit.edu/graduate/architecture-design/architecture/animation-essentials-cert/)
- Digital Arts Essentials (https://catalog.njit.edu/graduate/architecture-design/architecture/digital-arts-essentials-cert/)
- Digitally Augmented Architecture (https://catalog.njit.edu/graduate/architecture-design/architecture/digitally-augmented-architecture-cert/)
- Game Design and Interactivity Essentials (https://catalog.njit.edu/graduate/architecture-design/architecture/game-design-and-interactivity-essentials-cert/)
- Real Estate Design and Development (https://catalog.njit.edu/graduate/architecture-design/architecture/real-estate-design-and-development-cert/)
- Sustainable Building Design (https://catalog.njit.edu/graduate/architecture-design/architecture/sustainable-building-design-cert/)
- Sustainable Cities and Urban Ecologies (https://catalog.njit.edu/graduate/architecture-design/architecture/sustainable-cities-and-urban-ecologies-cert/)
- UI/UX Digital Design Essentials (https://catalog.njit.edu/graduate/architecture-design/architecture/ui-ux-digital-design-essentials-cert/)

College of Architecture and Design Courses

ARCH 500G. Tools and Techniques II. 3 credits, 3 contact hours.
Introductory computer science with applications in computer graphics for architecture. Emphasizes programming methodology using a high-level language as the vehicle to illustrate concepts. Basic concepts of computer systems, software engineering, algorithm design, programming languages, and data abstraction, with applications.

ARCH 501G. Architecture Studio I. 6 credits, 12 contact hours.
Restriction: Graduate level standing. Core Studio. Fundamentals of architectural design. Sequence of projects explore two- and three-dimensional design. Choice of form and aesthetics is related to spatial resolution of function and context. Design as a representational medium is emphasized.

ARCH 502G. Architecture Studio II. 6 credits, 12 contact hours.
Prerequisites: ARCH 501G, ARCH 528G, ARCH 541G, ARCH 555G. Core Studio. Extends the knowledge of design, basic concepts and ideas introduced in ARCH 501G. Emphasis is on developing technical drawing, and model-making skills. Also covered are two- and three-dimensional composition. Links to the history and theory sequence are made.

ARCH 503G. Architecture Studio III. 6 credits, 12 contact hours.
Prerequisites: ARCH 500G, ARCH 502G, ARCH 529G. Core Studio, Intermediate design studio. Introduction to structure. Properties of materials both physical and in the abstract. Builds on knowledge gained from construction and structures courses, spatial demands and design possibilities of different structural systems. Design of structure type, model and context, and comparisons of building typology for rational structure. Drawing and its role in design thinking.

ARCH 504G. Architecture Studio IV. 6 credits, 12 contact hours.
Prerequisite: ARCH 503G. Design of buildings and integration of systems, physical and conceptual. Design methodology generates new information on buildings as coherent assemblies of systems. Also covers analysis and synthesis of form and introduction to applications of computer-assisted design (CAD). Preparation of design portfolio will complete core studio sequence.

ARCH 505G. Advanced Architecture Studio I. 6 credits, 12 contact hours.
Prerequisite: ARCH 504G. Required vertical studio; must be taken sequentially. Covers a range of advanced design issues in depth: integration of organizational, social, technical, spatial, and aesthetic issues within consistently articulated applied design solutions.

ARCH 506G. Advanced Architecture Studio II. 6 credits, 12 contact hours.
Prerequisite: ARCH 505G. Required vertical studio electives; must be taken sequentially. Covers a range of advanced design issues in depth: integration of organizational, social, technical, spatial, and aesthetic issues within consistently articulated applied design solutions.

ARCH 528G. History of Architecture I. 3 credits, 3 contact hours.
Restriction: graduate level standing. Introduction to the history of architecture. Emphasis on classical architecture from antiquity to the modern period. Evolution of the various themes and theories that underlie western architecture is presented chronologically.

ARCH 529G. History of Architecture II. 3 credits, 3 contact hours.
Prerequisite: ARCH 528G. Continuation of ARCH 528G. Introduces concepts of modernism and brings the history of western architecture to the contemporary period.

ARCH 541G. Construction I. 3 credits, 3 contact hours.
This course is an introductory survey of the general principles and application of Sustainable Design, Site Systems, Structural Systems, Environmental Systems, Envelope Systems, Materials and Assembly Systems. This course will primarily focus on low-rise wood and steel structures.

ARCH 542G. Construction II. 3 credits, 3 contact hours.
Prerequisite: ARCH 541G This course is an introductory survey of the interrelationship of the principles and applications of Sustainable Design, Site Design, Structural Systems, Environmental Systems, Envelope Systems and Materials and Assembly Systems. This course will primarily focus on low and medium-rise concrete and masonry structures and is coordinated with a studio design/build experience.

ARCH 543G. Environmental Control Systems I. 3 credits, 3 contact hours.
This course covers the basic principles and applications of passive environmental systems utilizing on-site resources to achieve thermal and visual comfort as well as energy and water conservation. The topics include climate analysis, thermal comfort, thermal envelope, solar shading, passive solar heating, passive cooling, visual comfort, daylighting, and renewables. This course is the first of a two-course sequence in building environmental control systems (543G, 544G) focusing on passive (architectural) solutions, yet active (mechanical/electrical) solutions are covered in the second sequence.

ARCH 544G. Environmental Control Systems II. 3 credits, 3 contact hours.
Prerequisites: ARCH 227 or ARCH 543G. This course provides students a deeper understanding of the relationship between architectural design and active building systems. The topics include heating and cooling systems, electric lighting design, electrical energy systems, acoustical systems, building water supply, plumbing systems, and fire protection. This course is the second of a two-course sequence in building environmental control systems (ARCH 543G, ARCH 544G) focusing on active (mechanical/electrical) solutions.

ARCH 545G. Structures I. 3 credits, 3 contact hours.
This is an intermediate course focusing on the principles of structural behavior in withstanding gravity and lateral forces and on the evolution, range, and appropriate application of structural systems and the criteria for selecting various structural systems in contemporary architecture. Specific architectural procedents from the 20th century are used as validating examples.

ARCH 547G. Synthesis Seminar. 3 credits, 3 contact hours.
Prerequisite: ARCH 505G. Corequisite: ARCH 506G. This is a required, advanced design course that uses in-depth, detailed case studies of various construction types, from small scale to large, from simple to complex, to illustrate the totality of building systems integration. In conjunction with site visits, coursework will employ software to examine construction sequences, building components and shop drawings and their relationship to the design processes.

ARCH 548G. Structures II. 3 credits, 3 contact hours.
Prerequisite: ARCH 545G. This is an advanced course dealing with structural computation that will conclude with rigorous case study investigation of hybrid and complex structural systems.

ARCH 549G. Landscape and Urbanism. 3 credits, 3 contact hours.
This course is about Urbanism, Landscape Architecture and the intersection of the two. Students will learn about landscape design in relation to the human condition and develop an understanding of how the design of the constructed urban environment is directly tied into, and affecting of the global climate and our environmental health. Students will learn about access, topography, surrounding buildings, natural systems, adjacent functions and zoning.

ARCH 555G. Tools and Techniques I. 3 credits, 3 contact hours.
Restrictions: graduate level standing. Documentary, descriptive and denotative media are introduced. Also covers methods of representation, delineation and reproduction. Skills are developed in technical drawing, perspective construction, projections, and format design.

ARCH 569G. Professional Practice I. 3 credits, 3 contact hours.
Familiarization with the larger process of building production, of which architecture is one important part. Focus on the role of the architect in the areas of current building development: an examination of how redefinition or change might improve the process. Lectures deal with all factors of the building process and interviews with the various actors involved in designing, approving, financing and making buildings. Students have various assignments including a major term project.

ARCH 579G. Professional Practice II. 3 credits, 3 contact hours.
Restriction: completion of M.Arch. core sequence. Review of the formal, informal, legal, and ethical obligations of the professional architect. Traditional relationships among the architect, clients, engineers and other participants in the design and building industry are studied. Principles of office management and problems of liability are introduced. Also fulfills core requirement of dual degree option for M.Arch./Master of Science in Management.

ARCH 601. Urban Design Studio I. 6 credits, 12 contact hours.
Collaborative work on realistic urban projects by teams of students with different professional backgrounds under the supervision of interdisciplinary faculty. A project manager coordinates and ensures that working conditions in practice are simulated in the studio. Projects include analytical, financial and design components and emphasize planning strategies and the coordinating function of the design process. Studio products are presented orally in reviews and documented in written and illustrated reports.

ARCH 602. Urban Design Studio II. 6 credits, 12 contact hours.
Collaborative work on realistic urban projects by teams of students with different professional backgrounds under the supervision of interdisciplinary faculty. A project manager coordinates and ensures that working conditions in practice are simulated in the studio. Projects include analytical, financial and design components and emphasize planning strategies and the coordinating function of the design process. Studio products are presented orally in reviews and documented in written and illustrated reports.

ARCH 621. Net Zero Building Design. 3 credits, 3 contact hours.
This course explores principles and technologies governing net-zero building design to achieve the outstanding performance that goes beyond minimum green requirements. Case studies of existing high-performance green buildings around the world will be analyzed in terms of their design, system integration, renewables, and environmental performance, which will be accompanied by lectures about the principles and tools applied to the projects. The use of existing net-zero energy standards will be also discussed. Using the techniques and tools learned in this class, students will practice how to design/redesign a net-zero energy building, which will form the final project of the class.

ARCH 622. Life Cycle Assessment and Design. 3 credits, 3 contact hours.
Prerequisites: ARCH 500G and ARCH 555G or equivalent (or ARCH 396, or INT 364, or ID 364). This course tracks Life Cycle concepts as first applied to inanimate objects and systems by the U.S. military in the mid 20th Century through their development as an important part of the modern global environmental movement. It also provides opportunities for architecture and design students to integrate data driven design decisions through methodologies and tools that translate formal Life Cycle Assessment into their own design workflows.

ARCH 623. Building Energy Modeling for Sustainable Design. 3 credits, 3 contact hours.
This course introduces the students to Building Energy Modeling (BEM) and energy optimization techniques using the EnergyPlus whole-building energy simulation program to develop student competency with whole-building energy simulation. Students will practice whole-building energy simulation, including the hourly modeling of dynamic thermal envelope loads and system simulations; and explore various green and sustainable design strategies and systems to optimize the envelope and system performance of their projects. This will allow them to be better prepared for interdisciplinary collaboration and integrated design practice for energy efficiency.

ARCH 625. Passive House and Beyond. 3 credits, 3 contact hours.
This course explores leading edge green building programs designed for highly efficient buildings and regenerative design, including Passive House, Living Building Challenge, and Enterprise Green Communities Certification Plus. Each program’s requirements and application for single family, multifamily and commercial building typologies will be investigated through in-depth case studies and presentations. A cross-program comparison will analyze overlaps, gaps, strengths and weaknesses of the programs - and challenge students to discern where their own sustainability values lie.

ARCH 626. Building Dynamics. 3 credits, 3 contact hours.
This course focuses on theories and practice of adaptive architectural solutions. It will examine architecture in relation to the latest research in biology, material science, embedded systems and robotics. Students will research technologies, review case studies, and design adaptive proposals for architecture. In general, they will consider the role architecture as a discipline plays in climate challenges we are facing today. This class is interested in the territory where new technological and scientific advances, and architecture meet. It explores the importance of new technologies in contemporary design and their implications on architectural attitudes.

ARCH 630. Critical Theories in Architecture. 3 credits, 3 contact hours.
Prerequisites: ARCH 528G, ARCH 529G. This seminar is structured around notable readings on architectural history, theory and criticism to provide students with a sound basis for critical analysis and assessment. It is recommended for students who select history and theory as their area of concentration.

ARCH 634. Urban Theory and the Contemporary City. 3 credits, 3 contact hours.
Prerequisites: ARCH 528G, ARCH 529G. Survey of the development of building methods and materials. Impact of structural and environmental technology on architectural form and the design process. The role of technology in contemporary architectural theory and practice including the modern movement is emphasized. Recommended for students who select building science as their area of concentration.

ARCH 636. History and Theory of Urban Planning and Design. 3 credits, 3 contact hours.
The course examines methods for conducting historically driven, interdisciplinary research on the built environment (with a focus on cities and suburbs) through the lens of architecture, landscape, geography, and material culture. Methodology is studied to inform the production of urban history and to frame historical perspectives on contemporary urban issues. Historiography and critical theory are key aspects of the study of urban history's methodologies. In addition to traditional historical methodologies, the course examines emerging digital humanities methodologies.

ARCH 645. Case Studies in Architectural Technology. 3 credits, 3 contact hours.
Restriction: completion of core sequence. Case-study method used for in-depth investigation of the relationship among various technological systems in a building and technologically-related problems in architecture and construction.

ARCH 646. Designing and Optimizing the Building Enclosure. 3 credits, 3 contact hours.
Restriction: completion of core sequence. Considers the "building envelope," the boundary dividing the inside of a structure from the outside environment. Students study and design optimal enclosures considering energy exchange, the relationship between energy and lighting, and life cycle costs.

ARCH 647. Visualizing Urbanism. 3 credits, 3 contact hours.
Restriction: completion of core sequence. Evaluation and use of computer graphics hardware and software for architectural applications. Focus is on computers as tools, operating systems and methods of data manipulation. Two- and three-dimensional modeling software are discussed, and assignments using such software are given to provide understanding of the modeling of built environments.

ARCH 649. Life Safety Issues in Contemporary Buildings. 3 credits, 3 contact hours.
Restriction: completion of core sequence. A variety of life safety and comfort situations are studied in different building types. Topics include building evacuation, compartmentalizing, fire fighting and suppression, evaluation and testing of new building materials and systems, systems control and management. Special attention is placed on multi-use, high-density buildings.

ARCH 650. Economy Of Building. 3 credits, 3 contact hours.
Restriction: completion of core sequence or equivalent. Economic consequences of design decisions. Topics include: relationship among economy, efficiency and quality; life-cycle cost of design; improving the economy of building processes and products through innovation; and environmental concerns. This course is required for the dual degree M.Arch./Master of Science in Management program. It can also be used as an elective in the M.Arch. program.

ARCH 651. Public and Private Development. 3 credits, 3 contact hours.
Restriction: completion of core sequence. Introduction to the economic, financial and political aspects of real estate and their effect on architectural decision-making. Topics include: needs assessment, real estate appraisal, financial instruments, regulations and real estate, design as value-adding, and the effect of tax policies on real estate development. This course is required for the dual degree M.Arch./Master of Science in Management program. It can also be used as an elective in the M.Arch. program.

ARCH 652. Architectural Project Management. 3 credits, 3 contact hours.
Prerequisite: ARCH 579G. Restriction: completion of core sequence. Management of architectural projects: project costs, timing, personnel, documentation, professional ethics and resource management. This course is required for the dual degree M.Arch./Master of Science in Management program. It may be used as an elective in the M.Arch. program.

ARCH 654. Land Remediation and Community Revitalization. 3 credits, 3 contact hours.
This course introduces students to the process of transforming legacy industrial and vacant commercial properties into community assets. Viewing land remediation and redevelopment through the lens of the triple bottom line, the students will explore ways in which transformation of these properties can improve environmental conditions, catalyze economic development, and create more socially equitable and resilient communities. Students will interact with local government officials, real estate developers, environmental consultants, attorneys, and community planners. Course topics will include: environmental laws and regulations, real estate development, cleaning up contaminated properties, community engagement, environmental justice, gentrification, and transformative land uses.

ARCH 655. Land Use Planning. 3 credits, 3 contact hours.
Spatial relations of human behavior patterns to land use: methods of employment and population studies are evaluated; location and spatial requirements are related to land use plans; and concepts of urban renewal and recreational planning are investigated by case studies. Same as TRAN 655 and CE 655.

ARCH 660. Direct Study In Arch II. 3 credits, 3 contact hours.

ARCH 661. Directed Studies of Architecture. 3 credits, 3 contact hours.
Restriction: completion of core, two elective courses, and approval from the graduate advisor. Independent, in-depth research on an analytical, theoretical or technical area of architecture. Student prepares formal research proposal with permission of faculty advisor and approval of graduate advisor. Required as pre-thesis research. See also course description for MARC 701.

ARCH 662. Special Topics in Architecture. 3 credits, 3 contact hours.
Topics vary each semester. Refer to the School of Architecture bulletin during university registration periods for a list of current topics and possible prerequisites.

ARCH 663. Introduction to Sustainable Architecture. 3 credits, 3 contact hours.
Prerequisite: ARCH 543G or ARCH 227. Environment design of buildings. The five characteristics of green buildings: sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality. The US Green Building Council's Green Building Rating System, review of several major buildings of exemplary design.

ARCH 672. Architecture and Social Change. 3 credits, 3 contact hours.
Prerequisite: graduate level standing. Analysis of architectural form with respect to political, economic and technological change. The built environment is studied in relation to society and culture. The role of design professions in initiating or supporting change is also considered.

ARCH 677. Geographic Information Systems. 3 credits, 3 contact hours.
Geographical/Land Information System (GIS/LIS) is a computerized system capable of storing, manipulating and using spatial data describing location and significant properties of the earth's surface. GIS is an interdisciplinary technology used for studying and managing land uses, land resource assessment, environmental monitoring and hazard/toxic waste control, etc. Introduces this emerging technology and its applications.

ARCH 679. Envisioning Newark. 3 credits, 3 contact hours.
This seminar combines classroom discussion based on historical, analytical and literary texts; field visits to Newark's districts and neighborhoods; and meetings with leaders in government, business, art, education, and community-based organizations. The objective is to introduce students to the redevelopment process underway in Newark, and to use the city as a springboard for a broader investigation of the theory and practice of urban development.

ARCH 680. Graduate Co-op Work Experience I. 1 credit, 1 contact hour.
Restriction: completion of core sequence, permission from graduate advisor and Division of Career Development Services. Students gain work experience and reinforcement of their academic programs. An architecture faculty Co-op advisor monitors and evaluates student work and project. Co-op work experiences may be acceptable equivalents for apprenticeships mandated by the New Jersey State Board of Architects and for eligibility to take the architecture licensing examination. This course is required for participation in the Housing Scholars Program. Course does not fulfill degree requirements.

ARCH 681. Co-Op Work Experience II. 1 credit, 1 contact hour.
Restriction: completion of core sequence, permission of graduate advisor and Division of Career Development Services. Used for extended Summer-Fall (ARCH 681) or Spring-Summer (ARCH 682) work experience. Does not fulfill degree requirements.

ARCH 682. Co-Op Work Experience III. 1 credit, 1 contact hour.
Restriction: completion of core sequence, permission of graduate advisor and Division of Career Development Services. Used for extended Summer-Fall (ARCH 681) or Spring-Summer (ARCH 682) work experience. Does not fulfill degree requirements.

ARCH 683. Graduate Coop Work Exper IV. 0 credits, 3 contact hours.

ARCH 684. Topics of Sustainable Urbanism. 3 credits, 3 contact hours.
Cities are growing at an unprecedented speed. Cities currently account for about 70 percent of global carbon emissions and over 60 percent of resource use. We have to develop a vision for more sustainable cities and new protocols and processes to implement more sustainable visions for urban areas. This course will provide an inside into the challenges we face (growing number of slum dwellers, inadequate infrastructure and services); it will provide an overview of goals and existing frameworks and speculate on solutions to address sustainability urban issues.

ARCH 688. The Augmented City. 3 credits, 3 contact hours.
Digital technology disrupted city life. The use of ICTs (Information Communication Technologies) has radically changed the way we inhabit and operate in the urban space. This course provides a history of how information technology is used to influence and support social structures and an inside in how ICTs are used as a catalytic tool for expanding, augmenting and altering social interactions.

ARCH 689. AI / VR in Architecture. 3 credits, 3 contact hours.
The recent progress in data science allows us to understand the correlations between artistic expressions and their implicit qualities in more quantifiable formats and leads us to explore creativity through a symbiotic relationship between human and machine intelligence. This course will introduce various analytical means to assess the performance and quality of spatial designs. Using various computational design tools, students will use environmental to aesthetic parameters to explore the use of Artificial Intelligence (AI) and Virtual Reality (VR).

ARCH 701B. Master's Thesis. 3.5 credits, 3.5 contact hours.
Master’s students registering for the first time in Master’s Thesis must take simultaneously the INTD 799 (Responsible Conduct of Research) course.

ARCH 701C. Masters Thesis. 6 credits, 0 contact hours.
Master’s students registering for the first time in Master’s Thesis must take simultaneously the INTD 799 (Responsible Conduct of Research) course.

ARCH 770. Development of the American City. 3 credits, 3 contact hours.
Restriction: Enrollment in the Urban Systems PhD program or permission of the instructor.Introduction to research in urban history, focusing on the American city. Key texts that deal with the development of the American city will be studied in depth, with particular emphasis on the approaches, methodologies, and sources. Each student will conduct bibliographic research on a city or urban sector from a defined perspective.

ARCH 771. Pathology of Urban Systems. 3 credits, 3 contact hours.
Restriction: Enrollment in the Urban System PhD program or permission of the instructor. Definition of pathology of urban systems as large-scale disasters that have resulted in major destruction of the urban fabric and called for radical re-planning projects. Investigation of historic case studies. The aftermath of natural and man-made disasters including war; contemporary case studies.

DD 601. Graphic Design and Color Theory. 3 credits, 4 contact hours.
Introduction to principles of graphic design and 2D composition with additional emphasis on color use and color theory. Introduction to computer graphics as applied to design. Students are introduced to traditional media (watercolor and collage) and digital raster graphics (painting, image processing, and compositing). Applications from the physical and digital worlds (e.g. architecture, interior design, animation/motion pictures, game design, product/industrial design, advertising, web design, and painting) are discussed. Concepts include ordering systems and hierarchy, color models and mixing, color interaction, physical and psychological response to color, typography, printing, etc. Emphasis on synthesizing knowledge and skills through creative projects.

DD 602. 3D Modelling and Composition. 3 credits, 6 contact hours.
The course introduces students to the language and conventions of describing space, shape, form, and order using digital media to represent three-dimensional physical and virtual worlds and objects. Through a series of discrete creative exercises, students will be exposed to a variety of software applications, processes, and concepts utilized in design and design communication. This course will help students develop a critical attitude and analytical language to explore 3D basic design principles in a digital milieu.

DD 603. Video and Animation. 3 credits, 3 contact hours.
Prerequisites: None. The course will introduce students to design and narrative in motion based media. While highly technical in nature, coursework will focus on narrative development and design decision making in four dimensions.

DD 610. History of Art And Design I. 3 credits, 3 contact hours.
This course surveys the major monuments and trends in the history of painting, sculpture, design and architecture from the Italian Renaissance to the beginning of the twentieth century. The focus is on global developments with an emphasis on key artworks and artists examined in relation to the social, economic, and political climates which produced them. Important artistic innovations, techniques and methods are considered. Though arranged according to historical chronology, lecture content is driven by thematic and contextual issues such as humanism, absolutism, colonialism, the Enlightenment, and industrialization.

DD 611. History of Art and Design - Survey II. 3 credits, 3 contact hours.
This foundation history course surveys the principle aesthetic/functional themes and theories of the twentieth century. Students will explore how various individuals have used art and design to develop products that enriched society culturally and/or that resolved particular societal needs. The course will begin with how optics revolutionized painting, sculpture, architecture, film, etc, and explore how the modern movement broke with or reinterpreted the past through a series of flashbacks.

DD 621. Character and Facial Modeling for Animators. 3 credits, 3 contact hours.
Prerequisites: Basic background in in the use and application of digital media in design. The course will introduce students to the language and conventions of manipulating tools and techniques to develop and create 3 dimensional character design.

DD 622. Visual Storytelling and Storyboarding. 3 credits, 3 contact hours.
Prerequisites: DD 601, DD 602. Storyboarding is the preparation of a conceptual and thematic graphic plan to tell a story using animations, video games, interactive media and experiences, advertisements, music videos, or graphic novels. This course will cover the fundamentals of visual storytelling and the various applications possible in a visual narrative. Techniques for art direction are covered including the use of storyboards, concept art, and animatics to communicate. Students will translate a written narrative into a visual experience in this project-based class with the use of camera framing, camera angles, gesture, and expression. Issues of lighting, color, and mood will be included resulting in a student developed full-story pitch.

DD 623. Acting for Animators. 3 credits, 3 contact hours.
Prerequisites: Basic background in in the use and application of digital media in design. Introduction to the historical contexts of acting. Survey of acting techniques and principles and their relationship to successful visual storytelling. Topics covered include movement, empathy and dialogue. Application of acting to two-and three-dimensional animation. Students will study examples from animation as well as film and theater. Required projects include both in-class acting exercises as well as storyboard creation and directed computer graphics character animation.

DD 624. Digital Audio. 3 credits, 3 contact hours.
A studio class that provides a baseline understanding of sound design within an animated video and video game environment. Course includes an introduction to sampling, field recording, sound effects, production techniques, mixing, and general sound design for the purpose of integrating and managing the integration of audio in motion pictures, television, video games, and any other sound-supported media. Analytical and creative projects are required.

DD 625. Environment Design. 3 credits, 3 contact hours.
Prerequisites: Basic background in in the use and application of digital media in design. Corequisites: . The course will introduce students to the language and conventions of manipulating tools and techniques to develop and create simulated environments.

DD 631. History of Game Play and Interactivity. 3 credits, 3 contact hours.
A guided exploration through the world of games. Students will experiment, play, and analyze various aspects of games - from early traditional games to current generation electronically-mediated games; from individual games to collaborative online games. Game types will be analyzed with particular attention paid to the virtual environments in which these games take place. The expressive and persuasive aspects of games will also be explored. Students will learn underlying principles behind various game development technologies from traditional to digital format. Assignments will ask students to analyze the structure of various games and prepare them for creative final projects. The latter half of the semester will be focused mainly on individual student research toward a creative final project.

DD 634. Physical Computing for Designers – Interaction Design. 3 credits, 3 contact hours.
Prerequisites: Basic background in in the use and application of digital media in design. Design course focusing on two-and three-dimensional visual communication of data, including interactive and scripted/animated communication as well as still-image utilization. Applications may include website creation, information kiosks, exhibit design, educational videos, scientific visualization, and other graphics-intensive projects.

DD 640. User Interface/User Experience in Digital Design. 3 credits, 3 contact hours.
Application of theories, research methods, ethics, and design processes of UI/UX (user interface/user experience) design. Students will research, develop, and test basic UI/UX designs. Design strategies will be discussed as they apply to physical, virtual, and hybrid prototype solutions.

DD 650. Extended Reality Design Studio. 6 credits, 12 contact hours.
Prerequisites: DD 601, DD 602, DD 603. Introduction to XR platforms and techniques as they support UI/UX (user interface/user experience) design, gaming and interactivity, and animation. Students will explore design possibilities and opportunities in XR from a range of Digital Design specializations including, Animation, Gaming and Interactivity, and UI/UX. They will use VR, AR, MR platforms to collaborate and consider complementary digital design specializations.

DD 651. Animation Design Studio I. 6 credits, 12 contact hours.
Prerequisites: DD 650. Core Studio. Extends the knowledge of design, basic concepts and ideas around time, perception and user experience introduced in DD 650. Emphasis is on developing skills and creative content using specialized 2D animation tools and techniques.

DD 652. Animation Design Studio II. 6 credits, 12 contact hours.
Prerequisite: DD 651. Core Studio. Further develops the design ideas introduced in DD 651. Conceptual focus is on representation and simulation of objects, organisms, and physical phenomena in time and space. Emphasis is on developing skills and creative content using specialized 3D animation tools and techniques including the use of motion capture.

DD 653. Game Design and Interactivity Design Studio I. 6 credits, 12 contact hours.
Prerequisite: DD 650. Core Studio. Extends the knowledge of design, basic concepts and ideas around time, perception and user experience introduced in DD 650. Emphasis is on developing skills and creative content using specialized game and interactivity design tools and techniques. The expressive power of games are explored and tested through a series of narrative and analytical exercises. Essential media elements are recombined to produce hybrid participatory forms.

DD 654. Game Design and Interactivity Studio II. 6 credits, 12 contact hours.
Prerequisite: DD 653. Core Studio. Further develops the design ideas introduced in DD 653. Focus is on building, testing and publishing game and interactive content for a broad spectrum of users and applications. Teamwork, planning, and workflow management are essential to bring creative ideas into reality. This studio combines many of the skills and concepts developed in earlier courses and studios.

DD 655. User Interface/User Experience Digital Design Studio I. 6 credits, 12 contact hours.
Prerequisite: DD 650. Core Studio. Extends the knowledge of design, basic concepts and ideas around time, perception and user experience introduced in DD 650. Emphasis is on developing skills and creative content using specialized UI/UX design tools and techniques for use in mediating between digital and physical media.

DD 656. User Interface/User Experience Digital Design Studio II. 6 credits, 12 contact hours.
Prerequisite: DD 655. Core Studio. Focus is on building and evaluating various physical and digital user interface prototypes to meet a broad spectrum of market sensitive users and applications. This studio combines many of the skills and concepts developed in earlier courses and studios with a greater emphasis on individual projects and approaches to improve E-Commerce User Experience.

DD 657. Digital Design Independent Project Studio. 6 credits, 12 contact hours.
Prerequisite: DD 650. Advanced Studio. The Digital Design Independent Project Studio requires students to propose a topic for a final studio project concentrating on topic chosen in conjunction with the studio instructor and any other subject specialist in their digital design concentration.

MARC 701A. Master's Thesis. 1.5 credit, 3 contact hours.
Prerequisites: ARCH 506G, ARCH 661, and approval from graduate advisor. Alternative to ARCH 507G. Under the supervision of a faculty advisor, independent study of issues in the student's area of concentration developed during ARCH 661. Master’s students registering for the first time in Master’s Thesis must take simultaneously the INTD 799 (Responsible Conduct of Research) course.

MARC 701B. Master's Thesis. 3 credits, 3 contact hours.
Prerequisites: ARCH 506G, ARCH 661, and approval from graduate advisor. Alternative to ARCH 507G. Under the supervision of a faculty advisor, independent study of issues in the student's area of concentration developed during ARCH 661. Master’s students registering for the first time in Master’s Thesis must take simultaneously the INTD 799 (Responsible Conduct of Research) course.

MARC 701C. Master's Thesis. 6 credits, 3 contact hours.
Prerequisites: ARCH 506G, ARCH 661, and approval from graduate advisor. Alternative to ARCH 507G. Under the supervision of a faculty advisor, independent study of issues in the student's area of concentration developed during ARCH 661. Master’s students registering for the first time in Master’s Thesis must take simultaneously the INTD 799 (Responsible Conduct of Research) course.

MIP 612. Introduction to Environmental Policy Studies. 3 credits, 3 contact hours.
Introduction to six areas essential to a comprehensive understanding of environmental policy: concepts of environmental policy; tools (law, economics, planning, science, engineering, ethics) for environmental policy; the U.S. perspective (NEPA, clean air and water acts, CERCLA, etc.); the international perspective (Club of Rome models, 1972 UNEP, 1992 Rio, etc.); industrial perspective (pollution prevention/life cycle engineering, privatization, etc.); and the local perspective (New Jersey DEP, NGOs, local industry, shoreline, etc.). Same as EPS 612.

MIP 618. Public and Private Financing of Urban Areas. 3 credits, 3 contact hours.
Ties government's budget, tax, policy, allocation of resources between public and private sectors, with the structure, development, and growth needs of urban metropolitan areas. Focuses on problems of poverty, transportation, land-use, economic base, relation between central cities and suburban areas, and alternative engineering and economic solutions. Same as FIN 618 and TRAN 604.

MIP 631. History and Theory of Infrastructure. 3 credits, 3 contact hours.
The historical role of infrastructure in the formation of cities and the relation of planning theories to urban culture. Case studies are used to develop effective ways of learning urban design; method and substance are equally emphasized. Concentration on the social, economic, political, technological and topographic factors that affect urban form; analysis of urban design schemata and their relation to patterns of use; and the critical appraisal of planning ideologies and strategies. Same as ARCH 631H.

MIP 673. Infrastructure Planning in Practice. 3 credits, 3 contact hours.
Infrastructure planning principles, methods and tools. Through selected examples, acquaintance with infrastructure planning theories and models, quantitative methods of research and analysis, information management, decision making, and implementation techniques. Same as ARCH 673.

MIP 674. Infrastructure and Architecture. 3 credits, 3 contact hours.
Examination of areas of overlap and continuity between architecture, landscape architecture, urban design, building science and infrastructure. Topics include the typology, programming and design of public facilities; the housing fabric; the relation between built form, urban space and infrastructure. Same as ARCH 674.

MIP 675. Elements of Infrastructure Planning. 3 credits, 3 contact hours.
Introductory survey of the basic principles, operation and design of physical infrastructure systems including roads, public transportation, community facilities, public open space, surface drainage, and electric, gas, water, waste disposal, and telecommunications services. Same as ARCH 675.

USYS 702. Evolution American Metropolis. 3 credits, 3 contact hours.
Prerequisites: Doctoral standing, or graduate standing and permission of instructor. This course introduces the morphological and cultural evolution of the global metropolis, from historical and economic, political, geographic, and contemporary perspectives. The emphasis is on the intersection of social and environmental conditions that gave rise to distinct urban areas that have influenced urban populations throughout history. A chronological overview of the settlement, growth, decline and revitalization of global cities is combined with detailed case studies.

USYS 711. The Good City:Env Des& Qual. 3 credits, 3 contact hours.
Prerequisites: Enrolment in Urban Systems Program or by permission of instructor. This course introduces urban systems doctoral students to the various ways in which architects, urban designers, and planners have sought and continue to seek to improve the quality of everyday life in urban and suburban environments through the design of the built environment, both at the scale of neighborhoods and communities and at the scale of buildings. The emphasis is on manipulation of built form, transportation, and public space as responses to perceived problems. Key topic area are housing and neighborhoods, public space, transportation, schools, and hospitals.

USYS 721. Aspects of Urban Form. 3 credits, 3 contact hours.
Prerequisites: Enrollment in Urban Systems PhD Program or by permission of instructor. This seminar course investigates formal aspects of cities, ranging from streets to squares, parks, monuments, residential fabrics, infrastructure, and the overall image. The case studies are draw from historic and contemporary cities and cover a wide geographical area. The inclusion of ?Western? and ?non-Western? examples allows for a cross-cultural perspective. While the physicality of urban elements constitutes the starting point, they will be examined in reference to the political, social cultural, and economic issues and situated in their historic contexts.

USYS 725. Independent Study I. 3 credits, 3 contact hours.
Prerequisites: Permission of Program Director. This designation covers courses for Urban Systems students prescribed by a supervising faculty member. This special course covers areas of study in which one or more students may be interested, but which isn't of sufficiently broad interest to warrant a regular course offering. Students may not register for this course more than once.

USYS 726. Independent Study II. 3 credits, 3 contact hours.
Prerequisites: Permission of Program Director. This designation covers courses for Urban Systems students prescribed by a supervising faculty member. This special course covers areas of study in which one or more students may be interested, but which isn't of sufficiently broad interest to warrant a regular course offering. Students may not register for this course more than once. Students should only register for USYS 726 if they have taken USYS 725 in a prior semester.

USYS 788. Special Topics in Urban Systems. 3 credits, 3 contact hours.
Special-area given when suitable interest develops. Advance notice of forthcoming topics in Urban Systems will be given.

USYS 790. Dissertation Research. 0 credits, 0 contact hours.

USYS 790A. Dissertation Research. 1 credit, 1 contact hour.
For students admitted to the Doctor of Philosophy Program in Urban Systems who have successfully defended the dissertation proposal. A minimum of 10 credits is required in 790. Approval of dissertation advisor is necessary for registration. Students must register for at least 3 credits of dissertation research per semester until 9 credits are reached and then for 1 credit each semester until a written dissertation is approved.

USYS 790B. Dissertation Research. 3 credits, 3 contact hours.
For students admitted to the Doctor of Philosophy Program in Urban Systems who have successfully defended the dissertation proposal. A minimum of 10 credits is required in 790. Approval of dissertation advisor is necessary for registration. Students must register for at least 3 credits of dissertation research per semester until 9 credits are reached and then for 1 credit each semester until a written dissertation is approved.

USYS 790C. Dissertation Research. 6 credits, 6 contact hours.
For students admitted to the Doctor of Philosophy Program in Urban Systems who have successfully defended the dissertation proposal. A minimum of 10 credits is required in 790. Approval of dissertation advisor is necessary for registration. Students must register for at least 3 credits of dissertation research per semester until 9 credits are reached and then for 1 credit each semester until a written dissertation is approved.

USYS 790D. Dissertation Research. 9 credits, 9 contact hours.
For students admitted to the Doctor of Philosophy Program in Urban Systems who have successfully defended the dissertation proposal. A minimum of 10 credits is required in 790. Approval of dissertation advisor is necessary for registration. Students must register for at least 3 credits of dissertation research per semester until 9 credits are reached and then for 1 credit each semester until a written dissertation is approved.

USYS 790E. Dissertation Research. 12 credits, 12 contact hours.
For students admitted to the Doctor of Philosophy Program in Urban Systems who have successfully defended the dissertation proposal. A minimum of 10 credits is required in 790. Approval of dissertation advisor is necessary for registration. Students must register for at least 3 credits of dissertation research per semester until 9 credits are reached and then for 1 credit each semester until a written dissertation is approved.

USYS 791. Colloquium. 1 credit, 1 contact hour.
Prerequisites: Permission of Program Director. Required of all students admitted to the Doctor of Philosophy Program in Urban Systems. A minimum of 2 credits is required. This course discusses and reviews degree requirements and current research activities in the subject area of Urban Systems.

USYS 792. Pre-Doctoral Research. 3 credits, 3 contact hours.
Prerequisites: Permission of Program Director. For students admitted to the Doctor of Philosophy Program in Urban Systems who have not yet successfully defended the dissertation proposal. A minimum of 6 credits is required. Research is carried out under the supervision of designed Urban Systems faculty.