

College of Architecture and Design

The College of Architecture and Design is comprised of the nationally known New Jersey School of Architecture and the newly created School of Art + Design. The College brings together under one roof Architects, Planners, Designers, and Artists.

Learning and collaborating with an award-winning faculty, this fosters a vibrant intellectual and creative atmosphere. We prize imagination and adventurous exploration.

There are ample opportunities for cross-pollination of ideas and interdisciplinary interaction. Using a nuanced blend of intuitive exploration and rigorous logic, students in the College of Architecture and Design work today to conceive and present new possibilities to help address tomorrow's challenges.

Programs

- Architecture - M.Arch. (<http://catalog.njit.edu/graduate/architecture-design/architecture/march>)
- Architecture - M.S. (<http://catalog.njit.edu/graduate/architecture-design/architecture/ms>)
- Infrastructure Planning - M.I.P. (<http://catalog.njit.edu/graduate/architecture-design/architecture/infrastructure-planning-masters>)

Double Majors (<http://catalog.njit.edu/graduate/academic-policies-procedures/special-programs>)

- Architecture (professional, or post-professional) - M.Arch. and Infrastructure Planning - M.I.P. (<http://catalog.njit.edu/graduate/architecture-design/architecture/march-mip>)
- Architecture (professional, or post-professional) - M.Arch. and Management - M.S. (<http://catalog.njit.edu/graduate/architecture-design/architecture/march-management-ms>)
- Architecture (professional, or post-professional) - M.Arch. and Civil Engineering - M.S. (<http://catalog.njit.edu/graduate/architecture-design/architecture/march-civil-engineering-ms>)

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

College of Architecture and Design Courses

ARCH 500G. Advanced Architectural Graphics. 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. Architectural Design I. 6 credits, 12 contact hours.

Prerequisite: 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. Taken concurrently with ARCH 555G.

ARCH 502G. Architectural Design 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. Architectural Design III. 6 credits, 12 contact hours.

Prerequisites: ARCH 500G, ARCH 502G, ARCH 529G, ARCH 543G, and ARCH 545G. 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. Architectural Design IV. 6 credits, 12 contact hours.

Prerequisites: ARCH 503G, ARCH 542G, ARCH 544G. ARCH 548G. Corequisite: 547G. Second semester intermediate design studio. 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 Design Options I. 6 credits, 12 contact hours.

Prerequisites: ARCH 504G. Required vertical studio electives; must be taken sequentially. Covers range of advanced design issues in depth: integration of organizational, social, technical, spatial, and aesthetic issues within consistently articulated applied design solutions.

ARCH 506. Advanced Design Options II. 5 credits, 13 contact hours.

Prerequisites: ARCH 504G. Required vertical studio electives; must be taken sequentially. Covers 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 Design Options II. 6 credits, 12 contact hours.

Prerequisites: ARCH 504G. Required vertical studio electives; must be taken sequentially. Covers range of advanced design issues in depth: integration of organizational, social, technical, spatial, and aesthetic issues within consistently articulated applied design solutions.

ARCH 507G. Advanced Design Options III. 6 credits, 13 contact hours.

Prerequisites: ARCH 504G. Required vertical studio electives; must be taken sequentially. Covers range of advanced design issues in depth: integration of organizational, social, technical, spatial, and aesthetic issues within consistently articulated applied design solutions.

ARCH 510. Co-op Work Experience III. 0 credits, 3 contact hours.

Restriction: Approval of the school and permission of the Office of Cooperative Education and Internships. Students gain major-related work experience and reinforcement of their academic program. Students are required to complete and present midterm and final projects and/or reports. A designated faculty member monitors and evaluates the student's work and project.

ARCH 513G. Structures III. 3 credits, 3 contact hours.

Prerequisite: ARCH 512G. Review of methods and procedures for choosing structural systems. Overview of differences among wood, steel and concrete systems. Students are introduced to complex structural behavior, prestressed concrete and new structural technology.

ARCH 527G. Situating Prac:ThrsHds of Arch. 3 credits, 3 contact hours.

Restriction: Enrolment in Masters of Architecture Program or by permission of instructor. Western architectural theory dating from Vitruvius to the present time. Examines critical texts and studies related building and projects.

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 530. Methodologies of Architectural History, Theory and Criticism. 3 credits, 3 contact hours.

Prerequisites: ARCH 382. A seminar examining the salient methodologies of architectural history, theory and criticism. Structured around a series of critical texts, with each set of core readings intended to provide a basis for analyzing and assessing the approach in question.

ARCH 531A. History of Renaissance Architecture. 3 credits, 3 contact hours.

Prerequisites: ARCH 382. An examination of the development of Renaissance architecture and urban design in Italy and elsewhere in Europe. The re-emergence of the classical tradition is considered within the context of social, political and economic developments as well as formal intentions.

ARCH 531B. History of Baroque Architecture. 3 credits, 3 contact hours.

Prerequisites: ARCH 382. An investigation of architectural development from the 17th and 18th centuries in Europe and Latin America, including consideration of stylistic variations, social and political factors, and trends in garden and urban design.

ARCH 531C. History of Modern Architecture. 3 credits, 3 contact hours.

Prerequisites: ARCH 382. A study of major tendencies of architectural theory and practice from the mid-19th to the mid-20th centuries. Formal and stylistic transformation is considered in relation to theoretical intentions as well as social, cultural, and technical developments.

ARCH 531D. History of American Architecture. 3 credits, 3 contact hours.

Prerequisites: ARCH 382. An investigation of the guiding ideals and dominant stylistic trends in American architecture and planning from colonial times to the mid-20th century. Critical shifts in conception and scope of architectural production considered in relation to the prevailing cultural, socio-economic, and technical contexts out of which they evolved.

ARCH 531E. History of Non-Western Architecture. 3 credits, 3 contact hours.

Prerequisites: ARCH 382. An examination of major architectural traditions of China, Japan, Southeastern Asia, India, and the Middle East. Each area is considered with reference to a conceptual, iconographic and stylistic paradigm that evolved from a particular historical context.

ARCH 531F. Thresholds of Architectural Theory. 3 credits, 3 contact hours.

Prerequisites: ARCH 382. A seminar that investigates key thresholds of Western architectural theory, from Vitruvius to Robert Venturi, with emphasis on examining the corresponding critical theoretical texts and related didactic buildings and projects.

ARCH 531H. Aspects of Urban Form. 3 credits, 3 contact hours.

Prerequisites: ARCH 382. An examination of the major forms and patterns of urban development from classical antiquity to the 20th century, considered in relation to the changing conceptions of the city as well as cultural, socio-economic, and political development.

ARCH 533. Case Studies in Architectural Creativity. 3 credits, 3 contact hours.

Prerequisite: ARCH 364. Considers creativity in architecture from psychological, philosophical and autobiographical perspectives. The buildings, writings and lives of contemporary architects are discussed in the context of general theories of creativity. Each student chooses an individual architect noted for creative accomplishments and prepares a case study of his or her life.

ARCH 534. History of Architectural Technology. 3 credits, 3 contact hours.

Prerequisites: ARCH 382. 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.

ARCH 535. History of Architectural Ideas. 3 credits, 3 contact hours.

Prerequisite: ARCH 382. Discusses seminal architectural ideas in the western world from Vitruvius to the present day. Read books written by leading architectural theorists and analyze them in detail.

ARCH 536. Landscape and American Culture. 3 credits, 3 contact hours.

As in architecture, the parallel discipline of landscape architecture involves artistic intention set in conjunction with utilitarian concerns. As such, designs on the land include the integration of the arts and sciences of human culture with nature. Discusses landscape as a manifestation of American culture.

ARCH 537. Advanced Structures. 3 credits, 3 contact hours.

Covers advanced material in structures related to steel and wood design including: steel industrial buildings, rigid frames and earthquake design, wood structures under axial loads, and combined bending and axial loads.

ARCH 538. Sustainable Architecture. 3 credits, 3 contact hours.

Follows two precepts: accepting responsibility for the consequences of design decisions upon human well-being, and the long-term viability of natural systems. Topics include sustainable site design and development, environmentally sensitive building materials, lifecycle cost benefit analysis of building systems, and adaptive reuse.

ARCH 540. Acoustics. 3 credits, 3 contact hours.

Prerequisites: ARCH 241, ARCH 242, ARCH 342. Architectural acoustics: how we hear, physics of sound and materials, aesthetics of design and the processes of construction. Audible sounds, their interaction, perception of echo and directional hearing are applied to interior and exterior building transmission, room acoustics, and setting acceptable acoustical environments.

ARCH 541. Material Systems in Design. 3 credits, 4 contact hours.

Prerequisite: 4th year undergraduate standing or approval from instructor This seminar will allow students to exam material systems that give design agency to matter as a creative and technical force in the making of architecture. In doing so, it will provide students an opportunity to understand and explore the role material matters play in contemporary architectural theory and praxis. focused on the exploration and understanding of material systems, this course will provide students with the intellectual underpinnings for the re-conceptualization of matter within their own design processes.

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.

Prerequisites: 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 543. Lighting. 3 credits, 3 contact hours.

Prerequisites: ARCH 327 or INT 222. Explores, through modeling and calculation, the means by which architectural form and detail influence the luminous environment. Perceptual responses such as visual comfort and delight are examined. Topics include daylighting footprints, model design and testing, and computer-assisted light level analysis. Areas of investigation include the relationship between daylight and electric light in architecture; the variations of light with time; analysis of seasonal and weather differences; role of task in lighting strategies; and means of control for light quantity and quality.

ARCH 543G. Environmental Control Systems I. 3 credits, 3 contact hours.

An introductory survey of the basic principles of building, environmental control, and service systems as these relate to the building envelope. This course will primarily cover thermal enclosure, climate modification, environmental systems, energy use, and sustainable design. It also introduces the principles of health and safety in the design of buildings.

ARCH 544G. Environmental Control Systems II. 3 credits, 3 contact hours.

This is an intermediate course focusing on the understanding of the principles, performance criteria, and applications of environmental and building service systems including lighting, acoustical, plumbing, electrical, vertical transportations, egress, communication, security, and fire protection systems.

ARCH 545. Case Studies in Architectural Technology. 3 credits, 3 contact hours.

Prerequisite: senior standing. Technological systems involved in the construction and use of buildings. Students conduct in-depth investigation of technology-related problems in architecture and construction. Case study method is used. Construction documents and reports are analyzed. Field visits are required.

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 precedents from the 20th century are used as validating examples.

ARCH 546. Designing and Optimizing the Building Enclosure. 3 credits, 3 contact hours.

Prerequisites: CS 104 and (ARCH 327 or INT 222). Considers the building envelope, the boundary dividing the inside of a structure from the outside environment. Study and design optimal enclosures considering energy exchange, the relationship between energy and light, and life cycle costs.

ARCH 546G. Structures: High Rise and Special Applications. 3 credits, 3 contact hours.

Prerequisite: 545G. This is an advanced course focusing on the integration of all building systems including new materials and methods as they relate to high-rise structures and other specialty building types.

ARCH 547. Special Topics in Computer Applications. 3 credits, 3 contact hours.

Prerequisite: senior standing. Evaluation, utilization, and development of computer programs for analysis, simulation and information management. Programs range from energy analysis, building structures analysis, and mechanical systems design to spatial allocation, graphics and computer-aided design. Different theories of information transformation and delivery used in terms of architectural applications. Course hardware ranges from computer-aided design and drafting systems, through micro and mini, to mainframe computers.

ARCH 547G. 4D Integration. 3 credits, 3 contact hours.

Prerequisite: ARCH 542G, ARCH 544G, ARCH 548G. Corequisite: ARCH 504G. 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: ARCG 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 549. Life Safety Issues in Contemporary Buildings. 3 credits, 3 contact hours.

Prerequisites: ARCH 327 or INT 222. A variety of life safety and comfort situations studied in terms of specific building types. Topics include building evacuation, compartmentalization, fire fighting and suppression, evaluation and testing of new building materials and systems, systems control and management. Special emphasis is on such building types as multi-use, high-density, schools, hospitals, and other institutional categories.

ARCH 552. Real Estate Analysis for Architects. 3 credits, 3 contact hours.

Restriction: completion of the third year. 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.

ARCH 555G. Architectural Graphics. 3 credits, 5 contact hours.

Restriction: 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. Taken concurrently with ARCH 501G.

ARCH 556. Systems Approach to Design and Construction. 3 credits, 3 contact hours.

Restriction: completion of the third year. Lectures, case studies and student projects on understanding human aspiration and needs through design. Topics include land, finance, management, technology, and labor.

ARCH 557. Problems in Modern Housing. 3 credits, 3 contact hours.

Prerequisite: ARCH 382 Historical approach places housing in its social, economic, and political context. Attempts to provide decent, affordable and well-designed housing for broad segments of society are examined. Dwelling is examined through analysis of proto-typical design solutions in urban environments.

ARCH 558. Professional Architectural Practice. 3 credits, 3 contact hours.

Prerequisite: ARCH 364. A forum for examination of the structure and practices of the profession of architecture. The formal and informal relationships between architects, and between architects and clients, government officials, and consultants are studied. Basic principles of office management for the small and large architectural firm are introduced.

ARCH 559. Social Issues in Housing. 3 credits, 3 contact hours.

Lecture/seminar explores the historical, economic, social, technological, and political basis for current American housing policy and practice. Examines government, community-based and private sector attempts, both failed and successful, at providing decent, affordable, and well-designed housing for broad segments of society. Student teams analyze and discuss, in a series of classroom debates, the housing and planning implications of controversial social problems from homelessness and racial segregation to caring for the elderly and people with HIV/AIDS with an emphasis on the role of the architect.

ARCH 561. Integrated Studio Seminar. 3 credits, 3 contact hours.

Prerequisite: ARCH 463. Corequisite: ARCH 564. Held in design studio each week, the lab consists of presentations by the instructor on relevant technical, building code, and life safety-issues as well as student exercises applying these principles to their integrated design studio project or to existing buildings.

ARCH 563. Options Studio III. 5 credits, 12 contact hours.

Prerequisites: ARCH 464, ARCH 423, ARCH 327 and ARCH 429. Studio methodology allows students to select from various building programs, the nature of design dealing with technology, environment and the social order.

ARCH 564. Comprehensive Studio II. 5 credits, 12 contact hours.

Prerequisite: ARCH 463 Corequisite: ARCH 565 This Studio focuses on the student's ability to produce a comprehensive architectural project based on a building program and site that includes development of programmed spaces demonstrating an understanding of structural and environmental systems, building envelop systems, life-safety provisions, wall sections and building assemblies and the principles of sustainability. Lecture hour coordinates with studio subject matter. Course materials purchase required.

ARCH 565. Comprehensive Studio Lab. 1 credit, 1 contact hour.

Prerequisite: ARCH 464 Corequisite: ARCH 563 or ARCH 564 Held in design studio each week the lab consists of presentations by the instructor on relevant technical and life safety issues and student exercises applying these principles to their current design studio project or to existing buildings.

ARCH 566. Advanced Architectural Design Studio. 5 credits, 12 contact hours.

Prerequisite: ARCH 564. This is an advanced architectural design studio, post Comprehensive Studio, studying contemporary design theories, design methods and construction technologies. Emphasis is placed upon independent design research as it relates to the broad range of architectural practice. Exploratory and experimental architectural projects are the focus of the course.

ARCH 569G. Building and Development. 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 571. Everyday Life in the Public Realm. 3 credits, 3 contact hours.

A significant portion of everyday life takes place in the public realm of streets, sidewalks, parks, transit stations, government buildings, commercial establishments, and cultural institutions. Focuses on recent descriptions and critiques of public space and proposals for change.

ARCH 572. Architecture and Social Change. 3 credits, 3 contact hours.

Restriction: senior standing. Architectural form is analyzed in relation to political, economic and technological change, and change in social values. Buildings and other designed environments such as parks, streets and neighborhoods are studied relative to the social processes and institutions that generate and transform them. The role of the design professions in initiating or supporting change also is considered.

ARCH 573. Technologies for Community and Urban Design. 3 credits, 3 contact hours.

Restriction: senior standing. Advanced and traditional technologies analyzed with regard to their role in community and city design, construction and reconstruction. Emphasis on technological systems influencing location, configuration and use. Examples are infrastructures, communication systems and construction technologies. Develops skills in using methods to evaluate alternative technologies relative to their social, economic and physical promise, problems and feasibility.

ARCH 574. Case Studies in Community and Urban Design. 3 credits, 3 contact hours.

Restriction: senior standing. In-depth investigation of specific real-world problems of urban or community design carried out using case method approach. Current practices in the U.S. and other countries studied using interviews with designers, developers, community groups and government agencies. Site visits, reports and other documents provide important sources of information. Final report with supporting documentation required.

ARCH 576. The Architecture of Utopia. 3 credits, 3 contact hours.

Restriction: senior standing. Seminar for the review of utopian projects that have attempted to embody and strengthen social ideas through transformations in the structuring of space. Architectural implications of different literary and philosophical utopias analyzed with an emphasis on those experimental proposals which were realized, in whole or in part, in built form.

ARCH 579G. Professional Architectural Practice. 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 583. ST.: 3 credits, 3 contact hours.

Group investigation of problem of special interest in architecture.

ARCH 588. Architoons. 3 credits, 3 contact hours.

Prerequisite: ARCH 364. Through the medium of film, applies literary devices to architectural contexts, including caricature, parody, lampoon, satire and farce. Studies historical and contemporary animations and short films for their treatment of meaning, story line and sequence, timing, environmental and psychological mood, atmosphere and emotion. Using 3-D modeling and animation software, each student produces an animated short subject illustrating an architectural principle or providing a humorous look at architectural history and theory.

ARCH 591. Independent Study. 1 credit, 1 contact hour.**ARCH 592. Independent Study. 2 credits, 2 contact hours.****ARCH 593. Independent Study. 3 credits, 3 contact hours.****ARCH 619. Architectural Photography. 3 credits, 3 contact hours.**

Prerequisites: ARCH 501G, ARCH 502G, ARCH 503G. Photography for architectural presentations and portfolios. Lectures include orientation on light and space, slide presentations, and the use of text to reinforce photographic material. Demonstrations include basic darkroom techniques, and methods to encourage experimentation in photography.

ARCH 630. Methodology of Architectural History, Theory and Criticism. 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 631A. History of Renaissance Architecture. 3 credits, 3 contact hours.

Prerequisites: ARCH 528G, ARCH 529G. Development of architecture and urban design in Italy and elsewhere in Europe during the Renaissance: re-emergence of the classical Greek and Roman architectural tradition; social, political and economic developments; formal intentions and transformations in the 16th and 17th centuries.

ARCH 631B. History of Baroque Architecture. 3 credits, 3 contact hours.

Prerequisites: ARCH 528G, ARCH 529G. The emergence of baroque architecture and urban design in Rome in the 17th century; analysis of the works of Bernini, Borromini, Cortona and their contemporaries and successors through 1750. Development of baroque architecture elsewhere in Italy and Europe; late baroque and rococo; the advent of neo-classicism.

ARCH 631C. History of Modern Architecture. 3 credits, 3 contact hours.

Prerequisites: ARCH 528G, ARCH 529G. Major tendencies in architectural theory and practice from the mid-19th to the mid-20th centuries. Formal and stylistic transformation considered in relation to theory, social, cultural, and technical developments.

ARCH 631D. History of American Architecture. 3 credits, 3 contact hours.

Prerequisites: ARCH 528G, ARCH 529G. Aesthetic, social, cultural and technical developments in American architecture and planning, from colonial times to the mid-20th century.

ARCH 631E. History of Non-Western Architecture. 3 credits, 3 contact hours.

Prerequisites: ARCH 528G, ARCH 529G. Examination of major architectural traditions and styles of China, Japan, Southeast Asia, India and the Middle East.

ARCH 634. History of Architectural Technology. 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. Methods of Urban History. 3 credits, 3 contact hours.

Prerequisites: Graduate status The seminar 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 637. Teaching Sem:Arch Pedagogies. 3 credits, 3 contact hours.

Prerequisites: Graduate status This course is a graduate seminar that introduces students to key issues in contemporary pedagogy, understood as the art, craft, theory and practice of teaching. The course examines principles and constructs of teaching and education, as well as their pragmatics and practicalities. The main focus of the course is architectural education with discussions informed by diverse issues such as technology and the information revolution and multiculturalism and globalism.

ARCH 640. Acoustics. 3 credits, 3 contact hours.

Restriction: completion of core sequence or equivalent. Architectural acoustics: how we hear, physics of sound and materials, aesthetics of design and the processes of construction. Audible sounds, their interaction, perception of echo and directional hearing are applied to interior and exterior building transmission, room acoustics, and setting acceptable acoustical environments.

ARCH 641. Experiments in Structural Form. 3 credits, 3 contact hours.

Restriction: completion of core sequence or equivalent. Architectural form through model design, construction and testing of minimum structures, including elements of soap film study, orthogonal and diagonal grids, design of tension grids through deflection loading, photoelastic models and calculation. Also compares geometric systems, patterning and proportion, symmetry, asymmetry, relative size, nesting, linearity and spiral orders, rectilinear patterns, and randomness in architectural structure and form.

ARCH 642. Digital Modeling & Fabrication. 3 credits, 3 contact hours.

Prerequisites: ARCH 501G This is a 3-credit seminar course for graduate students exploring advanced 3-dimensional computer modeling techniques and data export for assembly and fabrication to various computer numerically controlled (CNC) hardware available at the School of Architecture. Specifically, students engage in NURBS and solid modeling using Rhinoceros 3D and export data through various Rhino plug-ins including RhinoCAM, which writes G- and M- Codes for 2 and 3D milling operations.

ARCH 643. Lighting. 3 credits, 4 contact hours.

Prerequisites: ARCH 501G and ARCH 502G. Through modeling and calculation, influence of the luminous environment on architectural form and detail. Perceptions of visual comfort and daylight are examined. Topics include daylighting footprints, model design and testing, and computer-assisted, light-level analysis. Relationship between daylight and artificial light in architecture, variations of light with time, analysis of seasonal and weather differences, role of task in lighting strategies, and means of control for light quantity and quality.

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. Special Topics in Computer Applications. 3 credits, 5 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. Real Estate Analysis for Architects. 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 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 664. Indoor Environmental Quality in Sustainable Design Buildings. 3 credits, 3 contact hours.

Prerequisite: ARCH 543G or ARCH 227. Supportive ambient conditions, including thermal comfort and acceptable indoor air quality, visual comfort, and appropriate acoustical quality, overall physical and psychological well-being for workplace quality, performance and productivity.

ARCH 665. Sustainable Design of Energy Efficient Buildings. 3 credits, 3 contact hours.

Prerequisite: ARCH 543G or ARCH 227. Evaluation of heating and cooling loads, impact on fuel consumption, energy software analysis for design and efficiency. Technology of passive solar design and building integrated photovoltaics.

ARCH 666. Sustainable Design with Efficient Materials and Resources. 3 credits, 3 contact hours.

Prerequisite: ARCH 543G or ARCH 227. Environmentally sensitive site design; issues of wildlife habitat, erosion, ground water recharge, and threats to water quality of surface water bodies and aquifers. Water reclamation, materials and energy conservation, waste reduction and recycling.

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 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 MIP 675.

ARCH 676. The Architecture of Utopia. 3 credits, 3 contact hours.

Restriction: graduate level standing. Seminar looks at several ideas of utopia from literature and philosophy and how they embody transformations in the structure of space, and their architectural implications.

ARCH 678. Graduate Problems in Modern Housing. 3 credits, 3 contact hours.

Restriction: graduate level standing. Students learn to analyze political, technical and economic aspects of contemporary housing policy and practice. Attempts to provide well-designed, affordable housing responsive to the needs of large numbers of people are examined. Examples of housing from the mid-19th century to the present day are outlined.

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. 3 credits, 3 contact hours.

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. 3 credits, 3 contact hours.

Restriction: completion of core sequence, permission of graduate advisor and Division of Career Development Services. Used for extended summer-fall (681) or spring-summer (682) work experience. Does not fulfill degree requirements.

ARCH 682. Co-Op Work Experience III. 0 credits, 0 contact hours.

Restriction: completion of core sequence, permission of graduate advisor and Division of Career Development Services. Used for extended summer-fall (681) or spring-summer (682) work experience. Does not fulfill degree requirements.

ARCH 683. Graduate Coop Work Exper IV. 0 credits, 3 contact hours.**ARCH 686. Research Methods for Environmental Design. 3 credits, 3 contact hours.**

Introduction to methods of inquiry useful to professionals planning and designing buildings, communities and cities. Skills developed in problem definition and phenomena: measurement, modeling, testing and evaluation. Open to undergraduates with permission of instructor.

ARCH 701B. Master's Thesis. 3.5 credits, 3.5 contact hours.**ARCH 701C. Masters Thesis. 6 credits, 0 contact hours.****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.

MARC 701. Master'S Thesis. 0 credits, 0 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.

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.

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.

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.

MIP 601. Interdisciplinary Infrastructure Studio I. 6 credits, 13 contact hours.

Collaborative work on realistic infrastructure 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.

MIP 602. Interdisciplinary Infrastructure Studio II. 6 credits, 13 contact hours.

A comprehensive planning and design project emphasizing infrastructure technologies and information management. CAD and other computer applications are used to produce computer-generated graphics and multi-media presentations. Although subjects and approaches will vary, the work of the studio is intended to develop the students' ability to deal with all facets of infrastructure planning regardless of previous academic background. The final products must include a full written and illustrated report on the project and the research on which it is based.

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 652. Geographic Information Systems. 3 credits, 3 contact hours.

Prerequisite: course or working knowledge of CADD or permission of instructor. 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. Same as CE 602 and Tran 602.

MIP 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.

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.

This course introduces the morphological and cultural evolution of the US metropolis, historical and economic, political, geographic, contemporary perspectives. The emphasis is on the intersection of social, and environmental conditions that gave rise to distinct urban areas and that have influenced urban populations for over three centuries. A chronological overview of the settlement, growth, decline and revitalization of American 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 areas 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 drawn 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 Track Director. This designation covers courses for Urban Systems students prescribed by a supervising faculty member (who is not the student's thesis advisor). 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. Student may not register for this course more than once with the same supervising faculty member.

USYS 726. Independent Study II. 3 credits, 3 contact hours.

Prerequisites: Permission of Track Director. This designation covers courses for Urban Systems students prescribed by a supervising faculty member (who is not the student's thesis advisor). 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. Student may not register for this course more than once with the same supervising faculty member.

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.

USYS 790B. Dissertation Research. 3 credits, 3 contact hours.

Required of all students for the degree of Doctor of Philosophy. A minimum of 24 credits is required. Approval of dissertation advisor is necessary for registration. Students must register for at least 3 credits of dissertation per semester until 24 credits are reached and then for 3 credits each semester until a written dissertation is approved.

USYS 790C. Dissertation Research. 6 credits, 6 contact hours.

Required of all students for the degree of Doctor of Philosophy. A minimum of 24 credits is required. Approval of dissertation advisor is necessary for registration. Students must register for at least 3 credits of dissertation per semester until 24 credits are reached and then for 3 credits each semester thereafter until a written dissertation is approved.

USYS 790D. Dissertation Research. 9 credits, 9 contact hours.

Required of all students for the degree of Doctor of Philosophy. A minimum of 24 credits is required. Approval of dissertation advisor is necessary for registration. Students must register for at least 3 credits of dissertation per semester until 24 credits are reached and then for 3 credits each semester thereafter until a written dissertation is approved.

USYS 790E. Dissertation Research. 12 credits, 12 contact hours.

Required of all students for the degree of Doctor of Philosophy. A minimum of 24 credits is required. Approval of dissertation advisor is necessary for registration. Students must register for at least 3 credits of dissertation per semester until 24 credits are reached and then for 3 credits each semester thereafter until a written dissertation is approved.

USYS 792. Dissertation Research. 3 credits, 3 contact hours.

Prerequisites: Permission of Track Director. For students admitted to the Doctor of Philosophy Program in Urban Systems who have not yet passed the qualifying examination. Research is carried out under the supervision of designed Urban Systems faculty. If the student's research activity culminates in doctoral research in the same area, up to a maximum of 6 credits may be applied to the 24 credits required under USYS 790.