College of Architecture and Design

In 2008, New Jersey School of Architecture was reconstituted as the College of Architecture and Design (CoAD), encompassing the School of Architecture and the newly-created School of Art + Design. The only college in New Jersey to house architecture and multiple design disciplines under one roof, CoAD is renowned for its innovative integration of digital technology into a comprehensive design curriculum. Benefiting from CoAD's close proximity to the cultural mecca that is the New York City metropolitan area—where a plethora of design firms, manufacturing facilities, art galleries and museums abound—students have an abundance of professional opportunities to flourish as independent artists and consultants or as part of a larger design team.

Under the tutelage of diverse, world-renowned architects and designers, CoAD students assume positions of responsibility and leadership in the architectural profession and in developing areas of opportunity in technology and community design. With an emphasis on research, design, technology and culture, which is reinforced by courses in history, building science, aesthetic, design and social concerns, CoAD offers two undergraduate programs: a four-year pre-professional B.S. in architecture and an accredited five-year program leading to a professional B.Arch degree and licensure, and four graduate degree programs: an M.S. in architecture (MSArch), a Master of Architecture and licensure (MArch); Master of Infrastructure and Planning (MIP) and a Ph.D. in urban systems. With its extensive capacity in computer graphics and studio design, the architecture program builds on the strengths of a technological university while challenging students to prepare for their productive years as practitioners, scholars and researchers.

Programs

- Architecture - B.Arch. (http://catalog.njit.edu/undergraduate/architecture-design/architecture/barch)
- Architecture - B.S. (http://catalog.njit.edu/undergraduate/architecture-design/architecture/bs)
- Digital Design - B.A. (http://catalog.njit.edu/undergraduate/architecture-design/art-design/digital-design-ba)
- Industrial Design - B.S. (http://catalog.njit.edu/undergraduate/architecture-design/art-design/industrial-design-bs)
- Interior Design - B.A. (http://catalog.njit.edu/undergraduate/architecture-design/art-design/interior-design-ba)

BS/MS Program Options (http://catalog.njit.edu/undergraduate/academic-policies-procedures/special-degree-options)

- Architecture - B.Arch. and Management - M.S. (http://catalog.njit.edu/undergraduate/architecture-design/architecture/barch-ms-management)
- Architecture - B.Arch.and Technology - M.B.A. (http://catalog.njit.edu/undergraduate/architecture-design/architecture/barch-mba-technology)
- Architecture - B.Arch. and Infrastructure Planning - M.I.P. (http://catalog.njit.edu/undergraduate/architecture-design/architecture/barch-master-infrastructure-planning)
- Architecture - B.Arch. and Civil Engineering - M.S. (http://catalog.njit.edu/undergraduate/architecture-design/architecture/barch-ms-civil-engineering)
- Architecture - B.S. and Management - M.S. (http://catalog.njit.edu/undergraduate/architecture-design/architecture/bs-ms-management)
- Architecture - B.S. and and Technology - M.B.A. (http://catalog.njit.edu/undergraduate/architecture-design/architecture/bs-mba-technology)
- Architecture - B.S. and Infrastructure Planning - M.I.P. (http://catalog.njit.edu/undergraduate/architecture-design/architecture/bs-master-infrastructure-planning)
- Architecture - B.S. and Civil Engineering - M.S. (http://catalog.njit.edu/undergraduate/architecture-design/architecture/bs-ms-civil-engineering)

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

AD 111. Communication in Art and Design - Traditional Media. 3 credits, 6 contact hours (1;0;5).
This course will explore a range of subjects from object still life to the human figure to landscape and will deal with specific issues of line, value, composition, structure, proportion and perspective. The aim of this course is to achieve a critical approach to hand-eye coordination and ideational sketching, through both direct observation and conceptual diagramming.

AD 112. Communication in Art and Design - Digital Media. 3 credits, 6 contact hours (1;0;5).
This course will help students develop a critical attitude and analytical language to explore 3D and 2D issues involved in the study of design ideas but work will be focused primarily on digital techniques and modes of expression. It will cover drawing basics and digital modeling and extracted drawing techniques and critical analysis of these techiques and other methods of graphic (and architectural) representation.

AD 150. Color and Composition. 3 credits, 5 contact hours (2;3;0).
Introduction to principles of 2D composition with emphasis on color use and color theory. Students are introduced to traditional media (watercolor and collage) and digital raster graphics (painting, image processing, and compositioning). Applications that include interior design, product/industrial design, advertising, web design, and fine arts are discussed. Concepts include grids and hierarchy, color models and mixing, color interaction, human response to color, printing, etc. Creative projects.

AD 161. History of Art and Design I. 3 credits, 3 contact hours (3;0;0).
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.

AD 162. History of Art and Design II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: AD 161. This course explores the major art and design movements and influences of the 20th century post 1930 that set the stage for today's 21st century art and design works that increasingly deal with issues of globalization and technology and ecology. Students will investigate the cultural meaning and historical significance of the art/design product throughout the 20th and 21st century.

AD 201. Human Factors/Ergonomics. 3 credits, 3 contact hours (3;0;0).
Prerequisite: Sophomore level or higher. Through lectures and "hands-on" experiments, this course will challenge the student to explore objects and environments as sensory and psychological experiences that effect human comfort, efficiency, function and emotion. Emphasis will be put on empathizing with the user with particular attention to those individuals with special physical, cognitive or occupational needs.

AD 325. Entrepreneurship for Designers. 3 credits, 3 contact hours (3;0;0).

AD 340. Photography and Imaging. 3 credits, 3 contact hours (3;0;0).
Prerequisites: AD 150 or (ARCH 155, ARCH 156, ARCH 163, ARCH 164) or permission of instructor. Photography is introduced as an artistic medium in a digital context. General photographic principles and techniques will be discussed including digital flash photography, image processing, in/on-camera filters and post-processing filters, camera controls, and compositional elements. Photographic student projects will be required. Students must provide their own DSLR camera for use throughout the semester.

AD 463. Collaborative Design Studio. 5 credits, 13 contact hours (1;0;12).
Prerequisites: (DD 364 or ID 364 or FA 364 or INT 364 or ARCH 364) and PHYS 102. Interdisciplinary and multi-disciplinary design studio where students work both individually and collaboratively on team project(s) that require the integration of different design disciplines.

AD 490. Special Topics. 3 credits, 3 contact hours (3;0;0).
Restriction: As determined by individual section and topic. Group investigation of problems or topics of special interest in art and design including, but not limited to, fine arts, industrial design, interior design, and digital design.

AD 491. Independent Study. 1 credit, 1 contact hour (0;0;1).
Restriction: Permission of instuctor and departmental/school approval. Individual investigation of problems or topics of special interest in art and design including, but not limited to, fine art, industrial design, interior design, and digital design. Subjects may include the overlap between these areas and related areas including art/architectural history and architecture. Provides opportunities to work on a project with individual guidance from an instructor in the School of Art + Design.

AD 492. Independent Study. 2 credits, 2 contact hours (0;0;2).
Restriction: Permission of instuctor and departmental/school approval. Individual investigation of problems or topics of special interest in art and design including, but not limited to, fine art, industrial design, interior design, and digital design. Subjects may include the overlap between these areas and related areas including art/architectural history and architecture. Provides opportunities to work on a project with individual guidance from an instructor in the School of Art + Design.

AD 493. Independent Study. 3 credits, 3 contact hours (0;0;3).
Restriction: Permission of instuctor and departmental/school approval. Individual investigation of problems or topics of special interest in art and design including, but not limited to, fine art, industrial design, interior design, and digital design. Subjects may include the overlap between these areas and related areas including art/architectural history and architecture. Provides opportunities to work on a project with individual guidance from an instructor in the School of Art + Design.

ARCH 155. Modes of Design Communication I. 3 credits, 6 contact hours (0;0;6).
Techniques of graphic presentation introduced as a basic language of architecture. Students work with a broad range of graphic presentation methods. Skills developed in drawing and architectural delineation. Fundamentals of perspective drawing, rendering techniques and format layout examined through an array of projects.

ARCH 156. Modes of Design Communication II. 3 credits, 6 contact hours (2;0;4).
Prerequisite: Arch 161. Introduction to digital tools in the delinieation, fabrication, and representation of contemporary design.

ARCH 161. Intro Design and Digital Media. 6 credits, 13.5 contact hours (1.5;12;0).
This course is an introduction to the fundamental principles and elements of design. Emphasis on design methods, manipulation of form and space, and representation skills using traditional and digital instruments. General design fundamentals and techniques presented in the lecture hour.

ARCH 163. Introduction to Design I. 5 credits, 12 contact hours (0;0;12).
Introduction to an array of basic principles and elements of design. Emphasis on design methods, sensitivity to context, manipulation of form and space, and representation skills. General design fundamentals presented in the lecture hour.

ARCH 164. Introduction to Design II. 5 credits, 12 contact hours (0;0;12).
Prerequisite: ARCH 161 A continuation of ARCH 161.

ARCH 223. Construction I. 3 credits, 3 contact hours (3;0;0).
This course is an introduction to construction processes, focusing on wood, steel, masonry, concrete materials and their related assemblies.

ARCH 227. Environmental Control Systems I. 3 credits, 3 contact hours (3;0;0).
This course introduces passive environmental design emphasizing sun, wind, daylight, heat flow, insulation/mass, visual comfort, thermal comfort, shading, climate, natural ventilation. The course uses ecotect software for thermal analysis.

ARCH 229. Structures I. 3 credits, 3 contact hours (3;0;0).
This course begins with the history of building structures, continues by introducing structural behavior, forces and responses in structural systems, and concludes with an introduction to static structural analysis.

ARCH 251. History of Architecture I. 3 credits, 3 contact hours (3;0;0).
Prerequisite: HUM 101. Introduces architectural history, theory and design, providing a conceptual framework for looking at the built environment. This course introduces key architectural concepts beginning with the earliest examples of human occupation, the shaping of space, and the transformation of natural landscape. Its geographic scope is global and its chronological scope ranges from prehistory to the middle ages.

ARCH 252. History of Architecture II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: ARCH 251. This survey of the social, political, technological, functional, and aesthetic concerns of architectue, urban forms, and built and natural landscapes is a continuation of ARCH 251. It covers the period from the 15th century to 1900 in Europe, the Americas, the Middle East, and Asia. Among its emphases are the impact and significance of absolutism, colonialism, nationalism, humanism, the enlightenment, industrialization and modernity.

ARCH 263. Architecture Studio I. 5 credits, 12 contact hours (0;0;12).
Prerequisite: ARCH 164. Utilizing knowledge and skills gained in Introduction to Design I and II, students learn about architectural design. Examination of the technological, social and environmental issues as they relate to architectural design. Lecture hour used to explore in-depth aspects of architecture.

ARCH 264. Architecture Studio II. 5 credits, 12 contact hours (0;0;12).
Prerequisite: ARCH 263. A continuation of ARCH 263. Lecture hour used to explore in-depth aspects of architectural design.

ARCH 282. Structural Principles. 3 credits, 3 contact hours (3;0;0).
Introduces structural statics through timber and steel design. Influences of materials and structural system choice analyzed relative to their impact on building design. Responsibilities of the architect during the structural design phase are introduced.

ARCH 283. Special Topics. 3 credits, 3 contact hours (3;0;0).
Investigation of problem of special interest in architecture.

ARCH 301. Digital Modeling and Fabrication. 3 credits, 3 contact hours (3;0;0).
The seminar in Digital Modeling and Fabrication is a 3-credit course for upper level 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. CNC hardware available as of Spring 2010 includes two (2) Universal Laser Cutters, each with 18" x 32" beds; two (2) Z-Corporation Z-310 3 dimensional printers; and a Precix 9100 Industrial CNC Router with a 48" x 96" bed. Students model and fabricate full scale assemblies individually and in teams and contribute to a final exhibition of student work. Familiarity with various software tools available at the College of Architecture and Design is encouraged but not required. Admission to the course to students in their second year of study by discretion of instructor.

ARCH 310. Co-op Work Experience I. 3 credits, 3 contact hours (0;0;3).
Restriction: completion of the third year studio class, 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. A designated faculty member monitors and evaluates the student's work and project. Requirements include mandatory participation in seminars and completion of a report and/or project. Apply in third year.

ARCH 312. Environmental Education I. 3 credits, 5 contact hours (2;3;0).
Prerequisite: ARCH 264. Involves architecture students in working with grade school or high school students in the solution of a joint environmental design project. Participants first work toward developing their own understanding and sensitivity of the manmade environment. Emphasis on learner-directed and discovery-guided inquiry, and educational methods to increase awareness of the physical settings created for human activities. Projects developed in nearby schools which focus on the interaction of individuals and small groups with the environment.

ARCH 316. Computer Applications to Architecture. 3 credits, 3 contact hours (3;0;0).
Introduces both philosophical and technical approaches to the use of the computer in architectural design and analysis. Explores the use of existing computer programs for a variety of applications to achtitectural design and programming, including but not limited to spatial allocation, energy analysis, life cycle costing, problem analysis, computer simulation, digital fabrication, virtual assembly and aggregation, rendering. Particular focus of course may vary from semester to semester.

ARCH 317. Advanced Architectural Graphics. 3 credits, 3 contact hours (3;0;0).
Prerequisite: ARCH 264. Gives students advanced techniques for architectural expression in traditional media. A basic knowledge of drawing methods, media, materials and projection techniques is assumed.

ARCH 323. Construction II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: ARCH 223. This course surveys enclosure joints and assemblies, including roofing, insulation, doors, windows, glass and hybrid systems. It also focuses on interior and exterior finishes and their construction methodology and documentation, including Building Information Modeling (BIM).

ARCH 327. Environmental Control Systems II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: ARCH 227. This course focuses on active mechanical systems related to environmental controls including HVAC, plumbing, electrical and alternative energy systems. Additional areas covered include, elevators, electric lighting and acoustics. The course continues the use of ecotect software as an analytical tool.

ARCH 329. Structures II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: ARCH 229. This course examines lateral forces, foundations, stability, deflection, long spans and special case structural systems. Methodology involves advanced static structural analysis.

ARCH 331. Landscape Architecture. 3 credits, 3 contact hours (3;0;0).
An overview of the opportunities and constraints of landscape designs. Emphasis on developing a practical understanding of the potentials of earth, water and plants in architecture. Students given an overview of social and ecological determinants of relations between land and buildings.

ARCH 332. Architecture: Image and Word I. 3 credits, 3 contact hours (3;0;0).
This course will present films on Architecture in which architects are speaking about and showing their own work. What we think is true about architecture is often wrong. Single images tend to abstract and greatly simplify why and how great architecture is created. Rarely are buildings seen in their content. Rarely are climatic, cultural and technical issues of design illustrated. AS a result, we often speculate about architecture based upon superficial or incomplete information.

ARCH 333. Architecture: Image and Word II. 3 credits, 5 contact hours (2;3;0).
This course will present films on Architecture in which architects are speaking about and showing their own work. Theoreticians provide "facts" to create a unified theory of design, which may lie outside the realm of historical reality, or the intention of the architect. The culture of architectural education and the nature of the design studio results in second hand knowledge, and design myth. Surveys of modern architecture leave a fragmentary memory of great works of architecture.

ARCH 334. Color Theory/Electronic Color. 3 credits, 3 contact hours (3;0;0).
The multiple-media course includes lectures with supplemental readings, videos, in-class analysis and laboratory work, and homework requiring a variety of media including watercolor and computer graphics - all of which address a range of issues including interaction of color, psychology of color, design for color deficient vision, color mixing and color palettes, color reproduction, color models, color composition in art and architecture, and others. Digital applications are integrated throughout.

ARCH 335. Digital Tectonics. 3 credits, 3 contact hours (3;0;0).
This course uses 3D modeling tools to investigate the relationship of digital models to physical construction. The term digital tectonics refers to an idea regarding the qualities of works of contemporary architecture that seem to be influenced by the use of digital tools. In this course, students are asked to investigate this hypothesis by testing structure, skin, assemblage, form and space making methodologies that are aided by digital tools and rationalized through digital operations.

ARCH 337. Building Information Modeling. 3 credits, 3 contact hours (3;0;0).
This course explores both technical and philosophical approaches to the use of the computer in architectural analysis, design development, information management, and document delivery. Autodesk Building Systems and Autodesk Revit Building will be used for 3D modeling and 2D documentation employing a systems-approach framework for spatial allocation, energy analysis, and structural considerations. The workings of the foundational information databases of the respective software will be thoroughly explored. Projects requirements will include building program resolution, solar analysis, asset scheduling, document layout, and design visualization. Proficiency with Autodesk Autocad (2D) and understanding of general CAD principles are required prerequisites.

ARCH 361. Project Based Seminar I. 3 credits, 3 contact hours (3;0;0).
Prerequistes: Junior Status The Project Based Seminar is the first of two seminars required for completion of the Bachelor of Science in Architecture degree. The sequence of seminars teams advanced students from varying academic backgrounds to take on real-life projects in an experiential learning setting. As part of final deliverables, student teams make presentations and submit hardcopy proposals to interested constituencies.

ARCH 363. Architecture Studio III. 5 credits, 12 contact hours (0;0;12).
Prerequisite: ARCH 264, ARCH 223, ARCH 227 and ARCH 229. This course is a continuation of ARCH 264. Lecture hour explores the nature of technology, environment, and social order as they relate to studio work. Course materials purchase required.

ARCH 364. Architecture Studio IV. 5 credits, 13 contact hours (0;0;13).
Prerequisites: ARCH 363. A continuation of ARCH 363. Lecture hour explores in depth the nature of technology, environment, and social order as they relate to studio work. Students will be required to purchase course materials.

ARCH 381. History of Architecture III. 3 credits, 3 contact hours (3;0;0).
Prerequisite: ARCH 252. A continuation of ARCH 252, this course surveys global developments in architecture, urban planning, and landscape design in the first half of the 20th century. It examines the continued architectural impact of industrialization and modernization and the geo-political consequences of World War I and World War II on the built environment. The focus is on the development and diffusion of modernism and its relationship to such key concepts as universalism, regionalism, historicism, and utopia.

ARCH 382. History of Architecture IV. 3 credits, 3 contact hours (3;0;0).
Prerequisite: ARCH 381. The last in the sequence of history surveys, this course examines global developments in modern and contemporary architecture and urbanism after World War II and into the 21st century. Social uprisings, economic recessions, post-colonialism, modernization in the developing world, mass production and mass consumption, environmentalism, sustainability, and the computer revolution of the information age provide the historical and cultural framework for the course. The course pays particular attention to early extensions and critiques of modernism, the emergence of postmodernism and current efforts to reevaluate modernism's legacy.

ARCH 408. Advanced Landscape Architecture. 3 credits, 3 contact hours (3;0;0).
Introduces the design, construction and management of contemporary landscape projects through case studies, field trips, and personal contact with prominent practicing landscape architects. A historical perspective of landscape architecture is used as a context for discussion.

ARCH 410. Co-op Work Experience II. 3 credits, 3 contact hours (0;0;3).
Prerequisites: ARCH 310 or approval of the school and permission of the Office of Cooperative Education and Internships. Provides major-related work experience. A designated faculty member monitors and evaluates the student's work and project. Requirements include mandatory participation in seminars and completion of a report and/or project.

ARCH 419. Architectural Photography. 3 credits, 4 contact hours (2;2;0).
This course is designed for architecture students in using photography to better visualize form in space in a 2-D format, lighting, color, and composition. The course goal is developing their unique expressive abilities in seeing through the camera. Discussions emphasize correlating historical movements in architecture and the visual arts in photography, using relevant text selections, slide presentations, and museum visits for reinforcement.

ARCH 423. Construction III. 3 credits, 3 contact hours (3;0;0).
Prerequisite: ARCH 323. This course focuses on non-normative systems, hybrid and integrated assemblies and new materials. An emphasis is placed on systems integration, materials selection, specifications and construction documents associated with the comprehensive design of buildings using Building Information Modeling (BIM).

ARCH 429. Structures III. 3 credits, 3 contact hours (3;0;0).
Prerequisite: ARCH 329. This course focuses on wood systems analysis, steel systems analysis, indeterminate systems and integrated structural systems. Methodology involves finite member analysis.

ARCH 432. P3 Post Presentation Processing. 3 credits, 5 contact hours (2;3;0).
The project is deemed Architecture, with a capital A, but there remains nagging questions: What would the project be like if viewed stereoscopically? If it were rendered as a 360 degree panoramic view, what would the space be like? If it was accurately superimposed into the site (lighting, color, texture, camera angle), does the design improve when in the context? Would rendering styles using "natural media" be more descriptive? What would the architecture be like at night?.

ARCH 461. Project Based Seminar II. 3 credits, 3 contact hours (3;0;0).
Prerequisites:Junior status The Project Based Seminar II is the second of two seminars required for completion of the Bachelor of Science in Architecture degree. The sequence of seminars teams advanced students from varying academic backgrounds to take on real-life projects in an experiential learning setting. As part of final deliverables, student teams make presentations and submit hardcopy proposals to interested constituencies.

ARCH 463. Option Studio 1. 5 credits, 12 contact hours (0;0;12).
Studio methodology allows the students to select from various building programs, the nature of design dealing with technology, environment and the social order. Lecture hour coordinates with studio subject matter. Course materials purchase required.

ARCH 464. Option Studio II. 5 credits, 12 contact hours (0;0;12).
Prerequisite: ARCH 364. Studio methodology allows students to select from various building programs, the nature of design dealing with technology, environment and the social order.

ARCH 472. Architectural Programming and Project Development. 3 credits, 3 contact hours (3;0;0).
Prerequisite: ARCH 264. Covers the essentials for programming a building and understanding the full scope of project development that precedes and follows the programming phase. Identify major stakeholders in the building design and production process and examine their roles. Lectures and assignments include: user requirements and client values, methods of pro forma analysis for project development and approval, and how the development process changes over time.

ARCH 483. ST:. 3 credits, 3 contact hours (3;0;0).
Group investigation of problem of special interest in architecture.

ARCH 491. Independent Study. 1 credit, 1 contact hour (0;0;1).

ARCH 493. Independent Study. 3 credits, 3 contact hours (0;0;3).

DD 275. History of Games. 3 credits, 5 contact hours (2;3;0).
Prerequisites: AD 111, AD 112 and AD 162 or ARCH 163, ARCH 263 and ARCH 251. 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.

DD 284. Video and Animation. 3 credits, 3 contact hours (3;0;0).
Prerequisites: AD 112 and AD 150 or equivalent with instructor's and program permission. Laboratory course exploring concepts of linear, motion-based two-dimensional media and includes motion graphics, live action filming, particle systems, digital video editing and digital video compression. Projects include the design and production of multiple projects addressing both technical and creative decision making.

DD 301. Acting Fundamentals for Animators. 3 credits, 3 contact hours (3;0;0).
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 303. Foundations of Sound and Music. 3 credits, 3 contact hours (3;0;0).
A multimedia course to give an understanding of music theory and musicology. Survey of the history of music and musical movements, and the use of music in motion pictures, digital media, and interactive entertainment. An introduction to instrumentation, music notation, music theory world musicology, and ear training as well as the relationship between music and culture. Visual and audio components are included. Digital Design majors only, others by permit.

DD 320. Computational Design. 3 credits, 3 contact hours (3;0;0).
Prerequisite: AD 112, AD 150; or ARCH 155, ARCH 156; or instructor approved equivalents. The course explores methods for algorithmically modeling spatial structures. Through a sequence of scripting exercises in application-specific programming environments, the course further explores rule-based generation of spatial forms and the underlying mathematical principles. Applications of digital fabrication and physical computing are also explored.

DD 321. Interactive and Reactive Environments. 3 credits, 3 contact hours (3;0;0).
Prerequisites: AD 112, AD 150 and DD 284, or ARCH 155, ARCH 156, ARCH 263 andARCH 264, or instructor permission. This course will investigate contemporary attitudes toward digital public spaces, from mainstream media facades, interactive art installations, and mobile applications to guerrilla-like techniques such as tactical media, activist gaming, and electronic civil disobedience. Based on their research of relevant precedents, students will design a 2D and/or 3D interactive environment.

DD 334. Simulated Environments. 3 credits, 3 contact hours (3;0;0).
Prerequisites: DD 275 and DD 284. Digital Design majors only, all others with permission of the department. This course will explore the application of desktop, non-immersive virtual reality to the representation of architecture. Course exercises and projects are designed to uncover both advantages and limitations of this emerging technology, on both practical and theoretical levels. The major focus of the course will be personal evaluation of these tools in the design of both object-specific and the spatial in architectural problem solving. The collaborative nature of the toolkit will inform design decisions vis-a-vis observation of participant behavior and open discussion with interactive critics.

DD 363. Digital Design Studio I. 5 credits, 13 contact hours (1;12;0).
Prerequisites: AD 111, AD 112, AD 150, AD 161, AD 162, DD 284. CO/Prerequisites: DD 275, ARCH 251. Three-dimensional design in a digital milieu. Project-based applications focusing on the design and digital representation of architectural or environmental settings for games, theater, advertisements, books, or similar contexts. Course includes modeling with different geometries (e.g. NURBS, polygonal) and advanced techniques in rendering with lighting and materials as well as issues of production design.

DD 364. Digital Design Studio II. 5 credits, 12 contact hours (0;0;12).
Prerequisites: ARCH 251, DD 275, DD 363, IT 201. Design studio 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 403. Digital Sound and Music. 3 credits, 3 contact hours (3;0;0).
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, and general sound design for the purpose of integrating and managing the integration of audio in motion pictures, television, and video games. Analytical and creative projects are required.

DD 415. Web/Exhibit Development. 3 credits, 3 contact hours (3;0;0).
Prerequisites: AD 150, DD 284, IT 201. Instructor may waive or accept alternate prerequisite(s) based on individual student preparation. Overview of multimedia exhibit design dealing with issues of graphic identity human-computer interactions, and information visualization as tools for comprehension, enhanced communication, and effective decision-making. Exhibit types include educational symposia, museum/gallery shows, and online environments. Analyses and creative project(s) are required.

DD 442. Visual and Special Effects in Movies. 3 credits, 3 contact hours (3;0;0).
The creating of narrative-dependent moving images pushes the boundaries of entertainment technology. This class investigates the progress of visual and special effects as viewing moved from the Kinetoscope to 4K digital projection. The use of mirrors, cameras, and other analog devices along with information technology enabled effects including computer generated imagery are studies. Analytical and creative projects are required.

DD 443. 2-Dimensional Character Design. 3 credits, 3 contact hours (3;0;0).
Prerequisites: AD 111, DD 275 and DD 284 This course focuses on the design of charaters for 2-Dimensional media such as graphic novels, 2D video games, model sheets for 3D creation, concept art and so on. Students will create both humanoid and creature-based charaters by using a variety of skillsets, including basic anatomy, illustrating age, acting (through characters), prop and costume design, etc. Students will also learn pre-production tools such as reference gathering, concept sketches and mood boards.

DD 444. 3-Dimensional Character Devel. 3 credits, 3 contact hours (3;0;0).
Prerequisites: AD 111, DD 275, DD 284 and DD 301 In-depth exploration of 3D character design, modeling and animation for video games and cinematographic production. Conceptual and technical/production topics are considered. Precedent studies are required from sources including illustration, gaming and video/animation disciplines as well as theatrical and cinematographic choreography including fashion designers and make-up artists. 3D modeling, UV unwrapping, texturing and rigging as well as pipeline production processes are also included.

DD 449. Imaginary Worlds: Architecture in Motion Pictures. 3 credits, 3 contact hours (3;0;0).
Prerequisites: AD 112, AD 161, AD 162 and ARCH 382. DD cohort designation for DD majors only. Like childhood photographs in family albums, movies are part of our collective memories and become a unique way of "remembering" an era or place even one that has never existed or could exist. The study of imaginary worlds in motion pictures provides students with opportunities to gain an awareness of architecture and study it from different perspectives. Movies studied will be limited to those that postulate new, or unique, environments rather than those films that faithfully document reality. Discussions will focus on architectural issues raised by the movies studied as well as those found in critical essays.

DD 464. Digital Design Studio III. 5 credits, 12 contact hours (0;12;0).
Prerequisite: DD 364. Continuation of Digital Design Studio II with projects of greater complexity requiring the selection and use of multiple media (including time-based media) in the preparation and completion of creative work. Independent research and production by each student is required for all projects. Production of both passive and interactive projects will be part of the studio program.

ID 203. Past, Present and Future of Design. 3 credits, 3 contact hours (3;0;0).
Restriction: Sophomore level or higher. Intensive survey course marking pivotal design paradigm shifts from ancient cultures through the industrial revolution, the present day and projecting into the future, this course focuses on the human activity called design. Case studies of selected cultures and designers will expose the student to the forces, history, methods, styles and meanings that shape the human ecology.

ID 216. Modeling and Prototyping. 3 credits, 3 contact hours (3;0;0).
Restriction: Sophomore level or higher. Corequisite: ID 263. Introduction to the drafting skills, techniques and methods needed to communicate a design for fabrication as well as the materials, tools and techniques to make full size working prototypes. The drafting component of the course will cover orthographic, isometric, line weight, dimensioning and specifications. Building from the drafting component of the course, the prototypes component will - through work in the model shop - introduce the student to the most common fabrication techniques, tools and methods used to build appearance and working prototypes in various materials.

ID 217. Modeling and Manufacturing. 3 credits, 3 contact hours (3;0;0).
Prerequisite: ID 216. Corequisite: ID 264. This course will build on the computer modeling techniques of the ID 216 course and combine it with the programs, tools and facilities used in Computer-Aided Manufacturing (CAM). The student will take computer-generated designs and feed them directly into the manufacturing system. The course will also explore Computer Aided Manufacturing as a means of facilitating mass customization: the process of creating small batches of products that are custom designed to suit each particular user.

ID 263. Industrial Design Studio I. 4 credits, 8 contact hours (0;0;8).
Prerequisite: AD 111 and AD 112. Pre/Corequisite: AD 150. Students are introduced to designing objects, environments and systems through a series of exercises in conceptual, abstract, and strategic thinking as it applies to the small and large-scale artifact. The relationship between function structure materiality, production aesthetics and human needs are introduced and tested.

ID 264. Industrial Design Studio II. 4 credits, 8 contact hours (0;0;8).
Prerequisite: AD 150 and ID 263. This course is a continuation of ID 263 with the focus shifting toward selected problems derived from the areas of work, health, education, recreation and communication. Introduction to the case study method of analyzing existing products.

ID 301. Industrial Design Specialization. 3 credits, 3 contact hours (3;0;0).
Corequisite: ID 363 (or higher) or INT 363 (or higher). Restriction: Permission of Art + Design Advisor. This project-based course will expose the student to one of many specialties within the Industrial Design profession that may include industry-specific design explorations and case studies in areas that include the design of furniture, consumer products, toys, footwear and apparel, jewelry, lighting, exhibits, way-finding graphics, transportation, etc.

ID 310. Ethnographic and Marketing Research. 3 credits, 3 contact hours (3;0;0).
Restriction: Junior level or higher. Research methodologies will be explored and conducted as a means to lend an objective understanding of user needs, desires and motivations. This will occur through well documented interviews, surveys, observations and interventions. The information gathered will be used to shape new products, add value to existing products or give insite to yet unexplored products or marketing opportunities.

ID 312. Mechanics and Electronics. 3 credits, 3 contact hours (3;0;0).
Restriction: Junior level or higher. This is an advanced research course that addresses products which employ electronics predominantly as the major factor of design, then products that employ mechanical systems as the major determining factor, finally, the interpolanation of the mechanical with the electronic with a focus on the human interface with these products.

ID 340. Materials and Processes. 3 credits, 3 contact hours (3;0;0).
Restriction: Junior level or higher. The student will be introduced to the basic materials and processes used in manufacturing of both short run and mass-produced objects. The course will comprise of lectures, field trips and design exercises employing both traditional and state-of-the-art manufacturing processes.

ID 341. Sustainable Materials and Processes. 3 credits, 3 contact hours (3;0;0).
Restriction: Junior level or higher. The course will comprise of lectures and field trips that take a critical look at the traditional materials and processes used in manufacturing and evaluate alternatives based on research and experimentation. Each student will perform a Life Cycle Analysis (LCA) on an existing product by following the products life from the mining of raw materials to disposal taking particular attention to energy usage, use of natural resources, toxicity and decomposition.

ID 363. Industrial Design Studio III. 4 credits, 8 contact hours (0;0;8).
Prerequisite: ID 264. This project specific studio will address real-world needs, parameters, and research as it applies to market trends and industry focused development. Companies and entrepreneurs will be invited to submit industry or need specific project briefs to the studio which will become the project for the semester. The students will experience first-hand the challenges of designing, building and testing within a real-life, interdisciplinary framework. The company will participate as sponsor, mentor and partner to the students.

ID 364. Industrial Design Studio IV. 5 credits, 13 contact hours (0;0;13).
Pre and Co-requisite: ID 216, ID 363, AD201. A knowledge and evidence-based studio that addresses real-world needs, parameters, and research. Work and product design(s) may be derived from requirements that include governmental and non-governmental not-for-profit organizations as well as from research about needs that can affect the social, physical, and economic health of individuals.

ID 370. New Product Testing. 3 credits, 3 contact hours (3;0;0).
Prerequisite: AD 201 or permission of instructor. A hybrid course combining hands-on physical testing of products with lectures, readings, and case study presentations (both group and individual- oral and written). Multiple evaluative criteria (e.g safety, value, sustainability) will be discussed, established, and tested on a variety product types. Students may be required to provide/purchase a limited number of items for destructive testing. In-class student participation required.

ID 410. Professional Practice and Ethics. 3 credits, 3 contact hours (3;0;0).
Restriction: Senior level. This course covers the concepts of legal rights, copyrights, responsibilities and obligations of the designer, re: liabilities, contract review, patents, royalties, etc. The course also covers areas of responsibility in owner-offices, within corporate offices, working with design consultants and procedures for establishing a professional design practice. The course will also focus on the ethics of practice, research and marketing within a social, political and cultural context.

ID 463. Industrial Design Studio V. 5 credits, 12 contact hours (0;0;12).
Prerequisite: ID 364. This studio will draw from the vast academic talent at NJIT by partnering Industrial Design students with students in the other colleges and departments on campus such as engineering, architecture, management and computing. The students will develop methodologies for achieving effective collaboration and integration of industrial design with other disciplines, especially in the early phases of product development, through an industry specific design project.

ID 464. Industrial Design Studio V. 5 credits, 13 contact hours (1;0;12).
Prerequisites: ID 364 and PHYS 102. A comprehensive studio with projects (including multi-disciplinary projects) of advanced design and complexity. Students will work to initiate research and development of projects within the studio to demonstrate a full range of professional competencies, including but not limited to, the ability to independently critique work in progress. Completed work and presentaion materials are expected to be exhibitable quality.

INT 221. Building and Interior Systems I. 3 credits, 3 contact hours (3;0;0).
An introduction to, and overview of, large-scale systems used in and affecting the design of building interiors. The operation and impacts of heating, ventilating, and air conditioning equipment on building space and layout are emphasized. Additional topics include the design of plumbing and waste systems as they affect building planning and the design of related spaces (including kitchens and bathrooms) and the use and design requirements for vertical transportation in building interiors.

INT 222. Building and Interior Systems II. 3 credits, 3 contact hours (3;0;0).
Prerequisite: PHYS 102. An introduction to, and overview of, small-scale systems used in and affecting the design of building interiors. The needs and scope of design potentials in electrical systems (including requirements for media installations) and lighting design as they are used in, affect the design of, interiors are emphasized. Also included is an introduction to building acoustics and how basic principles affect design layout and material and furniture selection for a variety of building and construction types.

INT 263. Interior Design Studio I. 4 credits, 10 contact hours (1;0;9).
Prerequisites: AD 111, AD 112. Co/prerequisite: AD 150. Corequisite: INT 221. A hands-on studio based introduction to the basic principles and elements of design for interior design students. Emphasis on design methods using multiple media, manipulating form and space. Course includes lectures, readings, analytical exercises, and (primarily three-dimensional) design projects.

INT 264. Interior Design Studio II. 4 credits, 10 contact hours (1;0;9).
Prerequisites: AD 150, INT 263. Corequisite: INT 222. A continuation of Interior Design Studio I. A hands-on studio course that expands introductory design problems into commercial interiors and public spaces. Interior design as a knowledge-based discipline is introduced. Emphasis is placed on the development of an iterative and reflective design process as well as the production and presentation of interior design proposals. Preliminary integration of multiple technical variables is included.

INT 321. Methods and Materials. 3 credits, 3 contact hours (3;0;0).
Prerequisites: AD 111, AD 112, AD 150 or ARCH 334, AD 161, AD 162 and ARCH 251. The study of materials, products, and assemblies used in interior design. The course covers code requirements and life safety, specification, installation, performance of materials (including fabrics and textiles), and sustainability of material selection and utilization. Also covered are the impacts of materials utilization on health and interior environmental quality.

INT 322. Contract Documents. 3 credits, 3 contact hours (3;0;0).
Prerequisites: INT 321, INT 363. Co/prerequisite: ARCH 282. The course addresses issues of standards and methods of ethical and professional practice. It covers the production of contracts between the professional design service provider and clients as well as various project deliverables used in initial design phases through project close out. Document types covered include letters of agreement, contract document drawing sets and addenda sketches, specifications, schedules and budgets.

INT 350. History of Furniture. 3 credits, 3 contact hours (3;0;0).
Prerequisite: AD 161 and AD 162 or equivalent; or ARCH 251, ARCH 252 and ARCH 381. Survey course studying the history and characteristics of furniture design from antiquity to the present day. Study of social and design forces influencing furniture. Students will analyze furniture in terms of style, aesthetic intent, construction and materials, ergonomics, universal/barrier-free accessibility, sustainability, and technology. Major stylistic movements will be discussed.

INT 351. Furniture Design. 3 credits, 5 contact hours (2;0;3).
Prerequisites: INT 264 or ID 264 or DD 364 or FA 264 or ARCH 264. Corequisite: Studio enrollment. This course is an introduction to the concepts, materials and construction technologies involved in the design and fabrication of furniture. It explores the relationship between ergonomics, comfort and function in the design of furniture for both site-specific environments and mass-produced applications. Course includes lectures, field trips and a variety of drawn, modeled, and built design projects.

INT 363. Interior Design Studio III. 5 credits, 13 contact hours (0;0;5).
Prerequisites: INT 222, INT 264. CO/Prerequisites: INT 221, INT 321, INT 350. Design studio focusing on residential design. The course includes a study of the relationship of human behavior to design emphasizing dwelling, security, comfort, and home. The correlation between furniture use and selection and residential space is explored. Variables studied include aesthetics and design organization, as well as the link between residential design and interior systems like lighting and plumbing.

INT 364. Interior Design Studio IV. 5 credits, 13 contact hours (1;0;12).
Prerequisites: INT 221, INT 222, INT 321, INT 363. Co/prerequisite: ARCH 282. A continuation of the studio sequence with design and space planning projects of increasing complexity selected within the context of commercial and institutional building types - from office environments and healthcare facilities to religious venues and community facilities. Students are expected to further develop skills to simultaneously resolve coneptual, technical, aesthetic, and functional aspects of designs.

INT 464. Interior Design Studio V. 5 credits, 13 contact hours (0;0;13).
Prerequisites: ARCH 282, ARCH 337, INT 321, INT 322, INT 364; Co/prerequisite: AD 201. A comprehensive studio with projects of advanced design and programming complexity concentrating on larger multi-level institutional and/or mixed-use building types. Students will work to initiate research and development through all design phases to synthesize the functional, sociological, aesthetic, regulatory, and project-specific technical requirements of their projects as they relate to interior design.