



PAINTING

COURSE: AD 150 – Color and Composition (3 credits)
PROGRAM: Foundation/School of Art + Design
LOCATION: First semester first year/fall term (undergraduate)
INSTRUCTORS: Glenn Goldman, Taro Narahara, Augustus Wendell

DESCRIPTION: The foundation-level course serves as a multiple media introduction to two-dimensional design, color theory, and two-dimensional digital graphics (raster and vector) in the context of image creation and image processing. Subjects include basic principles of design, color models and mixing in both traditional and digital mediums, and graphic design. Principles are discussed in the context of architecture, interior design, entertainment, advertising/marketing, package design, industrial design, and fine art.

PROJECT: Traditional painting and two-dimensional digital representation.

REQUIREMENTS: Using paint software (*Corel Painter*) and without scanning, create a digital facsimile of a painting, extract the principle color palette, create a composite (*Corel Draw* or *Adobe Illustrator*) in 11” x 17” size showing the process/steps by which the painting was reproduced, and write a formal analysis of the painting. The facsimile must be produced in three weeks. The composite and analysis are due in the following week for a total time spent of four weeks. Students are permitted to work in either RGB or CMYK color space, and must produce a facsimile in excess of three million pixels in order to give sufficient resolution to the final product.

OBJECTIVES: (1) To enhance visual literacy with the introduction to works of fine art. (2) To provide opportunities to improve information literacy in the process of researching art, artistic movement(s), and artists in the preparation of written essays with appropriate citations and references. (3) To provide exposure to a variety of two-dimensional images depicting three-dimensional examples of architecture, interior design, object/artifact design, and/or landscape in an evocative non-photorealistic manner. (4) To begin to explore the role of color in the perception of space and surface. (5) To begin to experiment with interpretative representation of space and surface. (6) To provide an opportunity to learn and become relatively proficient with raster/paint software (*Corel Painter*) that serves as a digital analog to freehand/traditional drawing and is useful in various ways when designing and presenting original work (by “touching up” or modifying algorithmically generated images created with automated processes, as a tool to create original materials for use in the rendering of three-dimensional models for documentation of existing conditions and/or presentation of original designs, and to create original evocative works - especially in combination with wireframe three-dimensional expressions - that may effectively communicate design intent) that may be created by interior designers, architects, industrial designers, and digital designers in a variety of two- and three-dimensional applications. (7) To develop an appreciation that the computer does NOT dictate a particular style or image type but that, ultimately, the designer/creator is responsible for whatever is presented – and has the power to modify any image to produce desired results. (8) To develop a visceral understanding that the effort required to create good work with digital graphics is as labor intensive as the effort required with traditional/analog media. (9) To provide an opportunity to learn and use a limited subset of commands available in drawing software (*Corel Draw* and/or *Adobe Illustrator*) for compositing and layout. (10) To assist us in clarifying our thoughts and observation of art by writing about it and practice critical writing and communication skills.

REFERENCES and RESOURCES: (1) Albers, Josef. *Interaction of Color/Revised Edition* (New Haven: Yale University Press, 2006). (2) Barnet, Sylvan. *A Short Guide to Writing about Art/11th Edition*. (Upper Saddle River, NJ: Pearson Prentice Hall, 2014). (3) Goldman, Glenn. *Architectural Graphics: Traditional and Digital Communication*. (Upper Saddle River, NJ: Prentice Hall, 1997) Pages 32-36. (4) Heller, Nancy G. *Why A Painting Is Like A Pizza: A Guide to Understanding and Enjoying Modern Art*. (Princeton, NJ: Princeton University Press, 2002). (5) Itten, Johannes. *The Elements of Color*. (New York: Van Nostrand Reinhold, 1970). (6) Lupton, Ellen and Jennifer Cole Phillips. *Graphic Design: The New Basics*. (New York: Princeton Architectural Press, 2008). (7) Newall, Diana. *Art in Detail: The Impressionists*. (New York: Metro Books, 2008). (8) Quiller, Stephen. *Color Choices: Making Sense Out of Color Theory*. (New York: Watson-Guptill, 1989). (9) Wong, Wucius. *Principles of Color Design: Designing with Electronic Color/2nd Edition*. (New York: John Wiley & Sons, 1997) Pages 59-97 and 101-144.

Recommended field trips to Museum of Modern Art and Metropolitan Museum of Art, New York, NY.



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

URBAN AERIE

COURSE: INT 363 – Interior Design Studio III (5 credits)
PROGRAM: Interior Design/School of Art + Design
LOCATION: First semester junior studio course/fall term
INSTRUCTOR: David Brothers

DESCRIPTION: A hands-on studio course that focuses on residential design and scale, with an emphasis on (sometimes idiosyncratic) needs of individual clients. Emphasis is placed on the use of information technology/digital media in the design process and the presentation of design proposals. Preliminary integration of multiple technical variables is included. Students are also required to develop and analyze multiple solutions for multiple sites and present reasons for the decisions made.

PROJECT: Design in detail the interior space of a condominium near Logan Airport in East Boston that combines two existing units with a total area of approximately 2,000 square feet. Clients are 50-something “empty nesters” looking to downsize from a single-family home. The design must accommodate the collection of textiles and artifacts that they have collected – specifically valuable Turkish tapestries and ancient Imari pottery from Japan – each of which must be kept from direct sunlight. There must be hanging and display space as well as considerable storage. The clients are amenable to the purchase of all new furniture. There are two sets of two units – one set with stacked units to be combined, and another with adjacent units. Students are to analyze both options prior to deciding on one.

REQUIREMENTS: In general, the combined units must create a home that contains places for entertaining, relaxing, cooking, eating (table for six), sleeping, working, and bathing. Students are responsible for both the plumbing and HVAC arrangements within the unit. All furnishings, lighting, and plumbing fixtures must be specified and evident in renderings/visualizations of the design.

OBJECTIVES: (1) To understand and appropriately apply theories of human behavior related to concepts of home, place identity and place attachment for residential environments. (2) To gather appropriate and necessary information and research findings to resolve programmatic design issues (evidence-based design). (3) To evaluate, select, apply, and synthesize information and research findings to generate multiple concepts and/or multiple design responses to programmatic requirements. (4) To produce competent presentation drawings across a range of appropriate media. (5) To learn about, and apply the use and selection of appropriate materials and products on the basis of their properties and performance criteria, including environmental attributes and life cycle cost. (6) To be able to lay out and specify furniture, fixtures, and equipment. (7) To understand the relationship of building and environmental control systems as an integral component of interior design solutions. (8) To demonstrate knowledge and application of interior construction and building systems.

REFERENCES: (1) De Chiara, Joseph with Julius Panero and Martin Zelnik. *Time-Saver Standards for Interior Design and Space Planning/2nd Edition*. (2) De Chiara, Joseph and Michael J. Crosbie. *Time-Saver Standards for Building Types/4th Ed.* (New York: Mc-Graw Hill, 2001). (3) Harmon, Sharon Koomen and Katherine E. Kennon. *The Codes Guidebook for Interiors*. (Hoboken, NJ: John Wiley & Sons, 2008). (4) Mitton, Maureen and Courtney Nystuen. *Residential Interior Design: A Guide to Planning Spaces/2nd Edition*. (Hoboken, NJ: Wiley, 2011). (5) Neufert, Ernst with Peter Neufert, Bousmaha Baiche, and Nicholas Walliman. *Architects’ Data/3rd Edition*. (Hoboken, NJ: Wiley-Blackwell/John Wiley & Sons, 2002). (6) Pile, John and Judith Gura. *History of Interior Design/4th Edition*. (Hoboken, NJ: Wiley, 2013).



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

MODERNFOLD STYLES OFFICE DESIGN COMPETITION

COURSE: INT 364 – Interior Design Studio IV (5 credits)
PROGRAM: Interior Design/School of Art + Design
LOCATION: Second semester third year studio course/spring term (undergraduate)
INSTRUCTOR: David Brothers

DESCRIPTION: A studio course that offers advanced introduction to commercial design, with a particular focus on office interior environments. Students are exposed to client requirements as well as sociological, physiological, and psychological aspects of design while using the site and building context to develop the spatial and physical character of the interior space. This course includes and makes links to issues of sustainability and buildability.

PROJECT: Design a 10,000 square foot office for a tech company located in New York City. The company has 50 employees including President/CEO + executive assistant, CFO + 5 finance support team members, CIO + 11 supporting staff members (including software engineers), CMO + 6 marketing and 10 sales team members, COO + 2 operation team members, 3 human resources staff, 5 administrative support individuals, and 2 receptionists. The project must be buildable and comply with applicable New York City building codes as well as regulations regarding universal access. The project must address the theme of “Office of the Future” to the extent it deals with (a) support of a business culture of innovation, collaboration and creativity while still maintaining practical spaces; (b) create an optimal environment to address different worker typologies; and (c) promote a productive workspace environment while integrating balance and wellness into the design.

REQUIREMENTS: Prepare and submit a project that satisfies the brief and requirements of *Modernfold Styles* “Office of the Future” student design competition (<https://www.modernfoldstyles.com/future-office-design/>). Project must include floor plan, 7 to 10 renderings, and a description of the overall goals of the project.

OBJECTIVES: (1) To encourage thinking and creative interpretation of the project’s overriding goals, the formal language and character of the design, the organization, group interaction, and privacy. (2) To develop an understanding of an integrated approach to design that clearly demonstrates a personal design sensibility, a clear idea linked through conceptual, technical, constructive, and performative criteria. (3) To bridge the gap from concept to construction, understanding how new technology, materials, furniture, and finishes inform the process and still enhance conceptual ideas. (4) To develop, resolve, and implement functional programmatic relationships and technical verification of the project concept. (5) To develop a strong understanding of the relationship between the design and fabrication of products. (7) To incorporate the study of office systems as it relates to commercial design environments. (8) To demonstrate an advanced understanding of the relationship between physical space and human behavior, studying ergonomic conditions. (9) To demonstrate craft and integrity in the model and drawings. (10) To increase communication skills, visual, and verbal presentation. (11) To understand the ADA (American with Disabilities Act) regulations and standards, specifically as it applies to building entrances, interior circulation, and bathroom facilities.



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

BRANCH PUBLIC LIBRARY FOR BROOKLYN

COURSE: INT 464 – Interior Design Studio V/Comprehensive Studio (5 credits)
PROGRAM: Interior Design/School of Art + Design
LOCATION: Second semester fourth year studio course/spring term (undergraduate)
INSTRUCTOR: Brian Holland

DESCRIPTION: A comprehensive interior design studio with a project of advanced design and programming complexity concentrating on a larger multi-level institutional and/or mixed-use building type. The semester consists of one design projects. Students 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. Students produce an interiors project that demonstrates the understanding and integration of furniture and finishes, environmental and life-safety systems, temporary and permanent interior construction systems, and principles of sustainability.

PROJECT: The studio is a semester-long engagement with the making of public interior space, structured around the design of a new branch library for Brooklyn Heights. The library will provide a rich topic of inquiry, allowing students the opportunity to create a culturally significant public space that serves the needs and desires of a diverse community of users, and to confront the many practical and conceptual challenges underlying a historically-significant program type currently undergoing profound social, cultural, and technological change. The semester is divided into three phases: Research and Analysis; Programming and Schematics; and finally, Design Development and Documentation.

REQUIREMENTS: An explicit and collaborative design process performed by teams that includes precedent study, site analysis, and study of user needs precedes the schematic design phase of the project. Upon completion of the project, students are required to present all plans and sections, concept and adjacency diagrams, and renderings of significant spaces. Also required are design details of at least one significant custom feature (e.g. stairs, circulation desk, built-in furniture); diagram of heating and cooling systems; and schedules for materials, finishes, and lighting.

OBJECTIVES: The comprehensive studio for Interior Design is, in part, a “test” for students in their final semester of design studio to assure that the level of expertise meets CIDA standards for a designer who is ready for an entry-level position in the profession. This means, among other things, that the project must comply with health, safety, and welfare requirements of users – including ADA requirements. It also means that the project has a complete set of schedules and that spaces satisfy the needs of the diverse group of individuals who will use a project. Finally, a project in comprehensive studio must be a programmatically complex multi-story project that can demonstrate clear logic and circulatory flow within floors, and between floors.

REFERENCES and RESOURCES: (1) Battles, Matthew. *Library: An Unquiet History* (W.W. Norton and Company, 2003). (2) Beek, Marijke and Eva DeCarlo. *Living Library: Wiel Arets: Utrecht University Library* (Prestel, 2005). (3) Borges, Jorge Luis. “The Library of Babel” in *Ficciones*. (New York: Grove Press, 1962). (4) Campbell, James W.P. *The Library: A World History* (Chicago: University of Chicago Press, 2013). (5) Della Casa, Francesco. *Rolax Learning Center* (Lausanne: EFPL Press, 2010). (6) Kubo, Michael and Ramon Prat. *Seattle Public Library, OMA/LMN* (The University of Michigan Press, 2007). (7) Mattern, Shannon. *The New Downtown Library: Designing With Communities* (University of Minnesota Press, 2007). (8) Lushington, Nolan, Wolfgang Rudolf and Liliane Wong. *Libraries: A Design Manual* (Basel: Birkhauser, 2016). (9) Schnapp, Jeffrey T. and Matthew Battles. *The Library Beyond the Book* (Cambridge: Harvard University Press, 2014). (10) van der Werf, Huib Haye. *The Architecture of Knowledge: The Library of the Future* (Rotterdam: NAI Publishers, 2010).

The Architectural League of NY & The Center for an Urban Future. Re-envisioning Branch Libraries (2014).

<http://archleague.org/2014/07/re-envisioning-branch-libraries/>

Digital Public Library of America <https://dp.la/>

Library as Incubator Project <http://www.libraryasincubatorproject.org/>

The Danish Agency for Culture and Palaces. Model Programme for Libraries (2015). <http://modelprogrammer.slks.dk/en/>

NYPL Labs <https://www.nypl.org/collections/labs>



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

AGING CYCLE – 2D CHARACTER DESIGN

COURSES: DD443 – 2-Dimensional Character Design (3 credits)
PROGRAM: Digital Design/School of Art + Design
LOCATION: upper level selective (undergraduate student must take either 2D or 3D character design)
INSTRUCTOR: Jessica Ross

DESCRIPTION: This course focuses on the design of characters for 2-Dimensional media such as graphic novels, 2D video games, model sheets for 3D creation, concept art and so on. Students create both humanoid and creature-based characters by using a variety of skillsets, including basic anatomy, illustrating age, acting (through characters), prop and costume design, etc. Students also learn pre-production tools such as reference gathering, concept sketches and mood boards.

PROJECT: Maintaining consistency in level of detail and scale, each student is required to create a character and draw its progression in age.

REQUIREMENTS: Students must design a series of characters, caricatures, and creatures. Various assignments include the creation of a multi-panel one-page story, the design and illustration of hybrid animal/insect and human creature, and the depiction of a character going through the aging process. Drawings are created in *Adobe Photoshop* and/or *Corel Painter* using Cintiq 22 HD Touch screens.

OBJECTIVES: (1) Provide opportunity to improve sketching and freehand drawing skills. (2) Provide instruction and opportunity to design characters in a two-dimensional/flat context. (3) Look at the relationship between story/narrative and art and improve understanding of sequential art. (4) Improve observational skills when looking at humans and various animals to observe motion and emotion; and then practice the translation of observation into two-dimensional art.



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

BIOMECHANICAL CHARACTER DESIGN

COURSE: DD 363 – Digital Design Studio I (5 credits)
PROGRAM: Digital Design/School of Art + Design
LOCATION: Third year; fall term studio course (undergraduate)
INSTRUCTOR: Polina Zaitseva

DESCRIPTION: The course focuses on three-dimensional design in a digital milieu. The course includes project-based applications focusing on the design and digital representation of a combination of architectural or environmental settings for games, theater, advertisements, books, or similar contexts as well as assets/objects that populate the spaces. The 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. As a general design program, various aspects of digital design and entertainment are included. Overall, the semester focuses on narrative and graphic design with still images.

PROJECT: One of five projects during the fall semester is the design of an abstract character that combines both biological/bionic and mechanical aspects into one creature.

REQUIREMENTS: Students are to create an abstract bionic/steampunk/mechanical creature (insect, mammal, fish/aquatic life) and place it in a “realistic” natural environment using lighting techniques, depth of field, and compositing. Viewers must be able to recognize the creature and the origin or model should be clear. Students will be evaluated on both the design of the creature and the high resolutions compositions created placing the creature in context.

OBJECTIVES: (1) Provide an initial exercise for character design and modeling. (2) Learn and attain facility in the use of 3D modeling software to create high-detail physically realistic models of imaginary characters/creatures. (3) Continue the study of the impact of object location, camera lens choice, and camera location on image composition. (4) Continue to develop an ability to create physically-based lighting rigs and environments. (5) Continue to practice and gain facility with software tools of *Autodesk 3DS Max*, *Autodesk Maya*, *Blender*, and *Adobe After Effects* in a design context. (6) Begin the study of creative art direction and styles through research of precedents for biomechanical models and steampunk.

RESOURCES: A subscription to *Pluralsight* provides students with software tutorials that they may access within the studio on campus.



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

MUSIC VIDEO – MOTION CAPTURE TEST FRAMES

COURSE: DD 464 – Digital Design Studio III (5 credits)
PROGRAM: Digital Design/School of Art + Design
LOCATION: fourth year/spring term (undergraduate)
INSTRUCTORS: Augustus Wendell

DESCRIPTION: The final semester for the Digital Design program focuses on a studio with student-initiated projects guided by the studio critic requiring independent research in order to prepare the student for employment or graduate study in the specific sub-discipline of interest. The secondary focus of each project is to create something for the “public good” – from a public service announcement to an application of game design in support of biomedical therapeutic research.

PROJECT: Use of motion capture for a music video. The project involved the creation of a music video with an emphasis on the devastation pollution causes on the world’s oceans. The music video includes three-dimensional character modeling, environment modeling, application of particle effects, and the use of motion capture to develop a “water nymph” who is ultimately entrapped by oil-filled water.

REQUIREMENTS: The production of a music video approximately 3 minutes long that illustrates the dangers of pollution on our environment. Use of multiple applications (Cinema 4D, 3DS Max, etc.) is required.

OBJECTIVES: (1) To formulate a conceptual and artistic position on topics of digital design relevant to the student concentration area (e.g. entertainment, interactive graphics). (2) To understand the pipeline of the digital design production and demonstrate an ability to effectively use it. (3) To develop a sophisticated and complex project that integrates multiple formats of digital media such as modeling, rendering, video editing, interactivity, and graphic design. (4) To link artistic and creative endeavors to topics of broader social, cultural, or intellectual reach in order to use skills learned for the public good.

RESOURCES: (1) Online tutorials for various software applications are available with a College subscription to *Pluralsight* as are instructional books and manuals in the reference section of the Littman Architecture and Design Library. (2) Cabrera, Cheryl. *An Essential Introduction to Maya Character Rigging* (Focal Press, 2008). (3) Goldfinger, Elliott. *Animal Anatomy for Artists: The Elements of Form* (Oxford University Press, 20014). (4) Gray, Henry. *Anatomy of the Human Body* (Lea and Febiger, 1918). (5) Palamar, Todd. *Maya Studio Projects: Photo Realistic Characters* (Sybex, 2011) (6) Seegmiller, Don. *Digital Character Design and Painting* (Charles River Media Graphics, 2003).



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

MOTION GRAPHICS – PUBLIC SERVICE ANNOUNCEMENT

COURSE: DD 464 – Digital Design Studio III (5 credits)
PROGRAM: Digital Design/School of Art + Design
LOCATION: fourth year/spring term (undergraduate)
INSTRUCTORS: Augustus Wendell

DESCRIPTION: The final semester for the Digital Design program focuses on a studio with student-initiated projects guided by the studio critic requiring independent research in order to prepare the student for employment or graduate study in the specific sub-discipline of interest. The secondary focus of each project is to create something for the “public good” – from a public service announcement to an application of game design in support of biomedical therapeutic research.

PROJECT: Use of motion capture for a public service announcement (PSA) that easily explains a topic of national significance in the United States in order to provide an easily accessible basis for discussion among the broadest cross section of people. Topics include health care and teen-age bullying.

REQUIREMENTS: The production of a two to three-minute motion graphics public service announcement. Students were required to create stylesheets for pattern, color palette, typography, and overall style. Research was required to provide accurate statistics and facts for discussion by viewers.

OBJECTIVES: (1) To formulate a conceptual and artistic position on topics of digital design relevant to the student concentration area (e.g. entertainment, interactive graphics). (2) To understand the pipeline of the digital design production and demonstrate an ability to effectively use it. (3) To develop a sophisticated and complex project that integrates multiple formats of digital media such as modeling, rendering, video editing, interactivity, and graphic design. (4) To link artistic and creative endeavors to topics of broader social, cultural, or intellectual reach in order to use skills learned for the public good.

RESOURCES: (1) Online tutorials for various software applications are available with a College subscription to *Pluralsight* as are instructional books and manuals in the reference section of the Littman Architecture and Design Library. (2) Lupton, Ellen and Jennifer Cole Philips. *Graphic Design: The New Basics* (New York: Princeton Architectural Press, 2008). (3) Software used included *Adobe Photoshop*, *Adobe Illustrator*, *Adobe After Effects*, *Adobe Premiere Pro*, *Corel Draw*.



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

EXPERIENCE DESIGN

COURSE: AD 463 – Collaborative Design Studio (5 credits)
PROGRAM: School of Art + Design
LOCATION: First semester fourth year studio course/fall term (undergraduate)
INSTRUCTOR: Ana Peñalba

DESCRIPTION: The penultimate design studio in the School of Art + Design brings all students from Digital Design, Industrial Design, and Interior Design (and on occasion, Architecture, Information Technology, or Biomedical Engineering) back together for a required collaborative experience during which the students from the various disciplines work on common ventures, simulating a professional environment in which each student brings her or his discipline-specific knowledge to a team working on a complex project. The projects and faculty change each year with three to four studios offered annually from which teams of students may choose. Projects in past collaborative design studios have included an interactive circus, adaptive re-use of the abandoned Newark Prison into a Museum of Industry, Lifestyle Studio in which students developed a product and/or service for marketing to a chosen demographic, Superhero Studio in which students developed/designed a superhero along with her/his lair, costumes, accessories, and storyline, Fantasy Studio in which fictional warring fantasy societies were created requiring the design of characters (including and especially non-human ones), habitats (cities and landscapes and furniture), weapons, attire, and more. Each project has individual components and contributions from each discipline participating, that add up to a complete effort.

PROJECT: Multi-disciplinary students were asked to consider all senses and design an “experience” for visitors/users/participants. Starting with a study of theme parks and a visit to “Six Flags” in New Jersey, students then explored different ways they could stimulate and simulate senses. The scope of the project included a proof of concept model (digital and/or physical-analog) as well as designs of any apparatus and/or environment created for the experience.

REQUIREMENTS: An explicit and collaborative design process performed by teams that included an investigation of “how the production of experiences is challenging the design field” during which each student studied a different subject and then shared the results with colleagues. Among the methods studied were augmented reality (including *Pokémon Go*), social media, influence of technology on experience, architecture for divergent civilizations of the future, importance of senses in the production of experiences, and the relevance of shared or sharing experiences. The student teams then set about designing a place to create experiences for others as a typologically different form of location-based entertainment. Results included both tactile and virtual walk through different environments where physical cues were felt in the feet of the participants. Another group created mechanical and interactive devices that uses senses of sound and smell along with displays of immersive environments individualized based on the results of personality tests.

OBJECTIVES: (1) Provide design students from different disciplines an opportunity to collaborate in a manner that allows each student to contribute his or her own expertise towards a common goal and work in a manner that is reflective of the professional design process, and in so doing, reinforce the importance of a critical, reflective, and iterative design process. (2) Provide an opportunity to increase proficiency in an information-technology enabled/facilitated design process. (3) Allow students a measure of choice (within an admittedly limit set of constraints) to personalize and focus their design efforts in their final year of undergraduate study. (4) Provide a structure in which students’ imagination and creativity would be stretched and made an integral requirement of the design deliverables. (5) Provide students with additional structured opportunities to improve graphic and communication skills as they relate to the processes and products of design.

REFERENCES: *Delirious New York* (Rem Koolhaas), *Fun Palace* (Cedric Price), *The Archigram Archive Project* (<http://www.interactivearchitecture.org/the-archigram-archival-project.html>), *Rebel Cities* (David Harvey), *New Babylon* (Constant Nieuwenhuys), *Towards a Sociology of Information and Technology* (Saskia Sasen), *See Yourself Sensing* (Madeleine Schwartz)



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

AUTOBIOGRAPHICAL IMAGE: VANITAS-IMAGE AS STORY

COURSE: DD 363 – Digital Design Studio I (5 credits)
PROGRAM: Digital Design/School of Art + Design
LOCATION: Third year; fall term studio course (undergraduate)
INSTRUCTOR: Polina Zaitseva

DESCRIPTION: The course focuses on three-dimensional design in a digital milieu. The course includes project-based applications focusing on the design and digital representation of a combination of architectural or environmental settings for games, theater, advertisements, books, or similar contexts as well as assets/objects that populate the spaces. The 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. Overall, the semester focuses on narrative and graphic design with still images.

PROJECT: A three-week assignment in which each student must create a single-frame image exercising traditions of “Vanitas” painting within the specific context of the student’s life and background. The image must communicate either a personal history, ore ethnic/cultural history through the selection and composition of symbolic objects. These objects or artifacts must be culled either from the life/culture of the student, or intimately tied to them. For each object, students must collect documentation to assist in building and texturing a three-dimensional model of the object. In addition, each student must prepare a written statement about each object/artifact placing it a life/cultural contexts. There must be a minimum of six objects in the image and placed in a shallow realistic setting or environment.

REQUIREMENTS: Provide one high-resolution 40” x 30” print of an autobiographical image. Digital deliverables include the composite file as well as 3D models of each object/artifact to be used in the final image. Progress shots illustrating geometry and different rendering techniques must be provided. Finally students must explore different compositional organizations and camera viewpoints and document preliminary trials including the final composition with “rule of thirds” analysis.

OBJECTIVES: (1) Provide an opportunity for self-exploration in a cultural context and a platform for discussion among and between students of very diverse backgrounds. (2) Study and acquire compositional skills in the organization of three-dimensional objects and their relation to two-dimensional representation. (3) Study the impact of camera position when exploring visual expression. (4) Gain expertise and practice in three-dimensional modeling, rendering, and texturing all in a design context.



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

MODELING AND EXPRESSION

COURSE: DD 363 – Digital Design Studio I (5 credits)
PROGRAM: Digital Design/School of Art + Design
LOCATION: Third year; fall term studio course (undergraduate)
INSTRUCTOR: Polina Zaitseva

DESCRIPTION: The course focuses on three-dimensional design in a digital milieu. The course includes project-based applications focusing on the design and digital representation of a combination of architectural or environmental settings for games, theater, advertisements, books, or similar contexts as well as assets/objects that populate the spaces. The 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. Overall, the semester focuses on narrative and graphic design with still images.

PROJECT: The first project of the semester is an immersion into formal composition and simple narrative. Each student is required to build a digital duplicate of one piece of fruit or an inanimate object (like a piece of furniture or a glass) and an optional storage vessel or prop or setting. Then using those digital models (assets), students are to create an evocative composition expressing sadness, happiness, action, etc.

REQUIREMENTS: Students are required to select a physical piece of fruit or object and optional prop or environment. They recreate the objects exactly using 3D modeling and texturing tools. Students must use the object and produce no fewer than three high-resolution renderings in addition to files of selected progress images that show the modeling and rendering processes, and compositional alternatives.

OBJECTIVES: (1) Provide an opportunity for students to study the cultural history of loaded emotional vocabulary in relation to imagery. (2) Learn and attain facility in the use of 3D modeling software to create high-detail physical realistic duplicates. (3) Study the impact of object location, camera lens choice, and camera location on image composition. (4) Develop an ability to create physically-based lighting rigs and environments. (5) Continue to practice and gain facility with software tools of *Autodesk 3DS Max*, *Autodesk Maya*, and *Adobe After Effects* in a design context.

RESOURCES: A subscription to *Pluralsight* provides students with software tutorials that they may access within the studio on campus.



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

ABSTRACTION – ANIMATION, TRANSFORMATION, SOUND

COURSE: DD 284 – Video and Animation (3 credits)
PROGRAM: Digital Design/School of Art + Design
LOCATION: Second semester second year course/spring term (undergraduate)
INSTRUCTOR: Polina Zaitseva

DESCRIPTION: This course explores 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. Overall, the semester focuses on narrative design and the craft of motion-based media.

PROJECT: The sixth of seven short projects requires students to develop a one- to two-minute animated film thematically based on an audio track of the student’s choice. The audio may be musical or ambient, but not spoken and not from a motion picture. The animation must be based on a non-literal approach to form (i.e. no characters, animals, or real world sets) and include geometric transitions between shapes and forms. Project-specific objectives include (1) providing students an opportunity to practice, apply, and reinforce basic compositional principles learned in courses during the freshman/foundation year; (2) providing students an opportunity to learn, practice, and apply techniques in animation and non-linear editing by using *Autodesk 3DS Max*, *Autodesk Maya*, and *Adobe After Effects* in a design context; (3) begin to apply techniques syncing sound and motion and understanding the relationship between video and audio; (4) develop facility with motion and geometric transformations. (Images shown are screen captures from animation.) All projects are uploaded to Vimeo.

OBJECTIVES: (1) Gain perspective and understanding about important milestones in motion based art and design; (2) Provide opportunities to explore post production techniques and application pipelines; (3) Provide opportunities to explore basic storytelling design principles using motion media; (4) Provide an introduction to motion based computer graphics and an opportunity to learn, practice, and become familiar and relatively proficient with editing and compositing applications; (5) Provide exposure to a reflective and iterative design process; (6) Provide exposure to criteria used in creating and evaluating two and three-dimensional motion compositions; (7) Develop a sense of quality of craft that is motion media specific; (8) Develop the ability to clearly plan, document and present a motion project.

REFERENCES: (1) Birn, Jeremy. *Digital Lighting and Rendering*. (San Francisco, CA: New Riders Publishing/Peachpit Press/Pearson, 2013). (2) Demers, Owen. *Digital Painting and Texturing*. (San Francisco, CA: New Riders Publishing/Peachpit Press/Pearson, 2001). (3) Derakhshani, Dariush and Randi L. Derakhshani. *Autodesk 3ds Max 2016 Essentials*. (Hoboken, NJ: Sybex/Wiley, 2015). (4) Maschwitz, Stu. *The DV Rebel’s Guide*. (5) Murch, Walter. *In the Blink of an Eye: A Perspective of Film Editing*. (5) Palamar, Todd. *Mastering Autodesk Maya 2016*. (Hoboken, NJ: Sybex/Wiley, 2015). (6). Perkins, Chad. *The After Effects Illusionist: All the Effects in One Complete Guide*. (New York, NY: Focal Press/Routledge/Taylor & Francis Group, 2012).

A subscription to *Pluralsight* provides online access to tutorials for software use.



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

VOICE: MOTION-BASED NARRATIVE

COURSE: DD 284 – Video and Animation (3 credits)
PROGRAM: Digital Design/School of Art + Design
LOCATION: Second semester second year course/spring term (undergraduate)
INSTRUCTOR: Polina Zaitseva

DESCRIPTION: This course explores 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. Overall, the semester focuses on narrative design and the craft of motion-based media.

PROJECT: The seventh and final project of the semester is a three and one-half week original animation or film. Each student is required to write, design and produce an original 60-90 second story. Students choose the medium of production after a semester of analog, live action and digital animation assignments. Project-specific objectives include (1) providing students an opportunity to apply the semester of narrative studies into an original story; (2) selecting, planning and executing a high resolution film or animation production; and (3) provide students the opportunity to develop a personal voice, vision and style in the field of time based narrative. Applications used for 3D modeling include *Blender*, *Autodesk 3DS Max*, and *Autodesk Maya*. 2D graphics for animations are created with *Corel Painter*, *Corel PaintShop Pro*, and *Adobe Photoshop*. Compositing of all work is accomplished with *Adobe After Effects*. (Images shown are screen captures from animation.)

REQUIREMENTS: Students are required to create an original story and then submit a 60-90 second original film or animation mastered at 720p 24 FPS. The animation is required to have a custom slate countdown. Students are required to have a properly licensed or royalty free soundtrack.

OBJECTIVES: (1) Gain perspective and understanding about important milestones in motion based art and design; (2) Provide opportunities to explore post production techniques and application pipelines; (3) Provide opportunities to explore basic storytelling design principles using motion media; (4) Provide an introduction to motion based computer graphics and an opportunity to learn, practice, and become familiar and relatively proficient with editing and compositing applications; (5) Provide exposure to a reflective and iterative design process; (6) Provide exposure to criteria used in creating and evaluating two and three-dimensional motion compositions; (7) Develop a sense of quality of craft that is motion media specific; (8) Develop the ability to clearly plan, document and present a motion project.

RESOURCES: Students have access to *Pluralsight* tutorials about software applications from the lab. Students have 24/7 access to the Animation Lab that contains Lenovo P700 dual Xeon workstations with NVIDIA Quadro cards, 128GB RAM and Windows 10 Professional.



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

GAME DESIGN: GAME ENVIRONMENTS/HISTORY OF GAMES

COURSE: DD 275 – History of Games (3 credits)
PROGRAM: Digital Design/School of Art + Design
LOCATION: first semester second year/fall term (undergraduate)
INSTRUCTOR: Taro Narahara

DESCRIPTION: The course is a guided exploration through the world of games. Students 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. Formats for electronic games from proprietary consoles to open source mobile platforms are studied. 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.

PROJECT: Students are to create a game environment, significant asset(s), or game character(s) based on their study and understanding of the history of games. Storyboard of gameplay is also required.

REQUIREMENTS: A series of analytical and creative tasks are undertaken throughout the semester, starting with an analysis of traditional games covering a variety of genres, from sports games to strategy war games. Subsequently game structures, environments, characters, props/tools, etc. are all studied. The course includes two creative projects. The first, pairs of students create and build a traditional/physical game. These games include rules/instructions and must be fabricated (generally with digital fabrication techniques) by the team which are then presented and played at the annual *NJIT GameFest* in November of each year. At the end of the semester, students are given the opportunity to select from a wide range of options for a final project created entirely within the digital realm. The options include the development of a game and character or environment based on a non-game literary/narrative or other source.

Final submission includes storyboards and preliminary sketches for the proposed game, story/script, analysis and narrative description of game structure, 3D model(s) (created in either *Autodesk 3DS Max* or *Autodesk Maya*) of environment and/or character(s), screen captures showing development of 3D model, and a series of sequential renderings (still images) illustrating key views/perspectives of the environment(s) and/or positions and costumes/apparel for the character(s).

COURSE OBJECTIVES: (1) To gain perspectives and understanding about the history of both traditional and non-traditional (digital) games. (2) To provide exposure to principles of game structures including concepts, such as abstract strategy games, game tree, and state space through simple game examples. (3) To provide opportunity to explore underlying concepts, technologies, and languages of contemporary video game productions. (4) To gain an understanding of available game-related digital environments not only from a standpoint of a game-player but also from that of a game-maker. (5) To provide an opportunity to develop the ability to present (“pitch”) a game idea project to others.

REFERENCES: (1) Bogost, Ian. *Persuasive Games: The Expressive Power of Videogames*. (Cambridge, MA: MIT Press, 2007). (2) Botermans, Jack. *The Book of Games: Strategy, Tactics & History*. (New York: Sterling, 2008). (3) Burnham, Van. *Supercade: A Visual History of the Videogame Age, 1971-1984*. (Cambridge, MA: MIT Press, 2003). (4) Hofer, Margaret K. *The Games We Played: The Golden Age of Board and Table Games*. (New York: Princeton Architectural Press, 2003). (5) Newman, James A. *100 Videogames*. (London: BFI, 2007). (6) Nielsen, Simon Egenfeldt with Jonas Heide Smith and Susana Pajares Tosca. *Understanding Videogames: The Essential Introduction*. (New York: Routledge/Taylor & Francis Group, 2008). (7) Taylor, T.L. *Play Between Worlds: Exploring Online Game Culture*. (Cambridge, MA: MIT Press, 2006). (8) Thompson, Jim. *Game Design Course: Principles, Practice, and Techniques – the Ultimate Guide for the Aspiring Game Designer*. (Hoboken, NJ: Wiley, 2007). (9) Reas, Casey. *Processing: A Programming Handbook for Visual Designers and Artists*. (Cambridge, MA: MIT Press, 2007). (10) Watkins, Adam. *Creating Games with Unity and Maya: How to Develop Fun and Marketable 3D Games*. (New York: Focal Press/Taylor & Francis Group, 2011).



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

GAME DESIGN – SPECIAL TOPICS

COURSE: DD 464 – Digital Design Studio III (5 credits)
PROGRAM: Digital Design/School of Art + Design
LOCATION: fourth year/spring term (undergraduate)
INSTRUCTORS: Augustus Wendell

DESCRIPTION: The final semester for the Digital Design program focuses on a studio with student-initiated projects guided by the studio critic requiring independent research in order to prepare the student for employment or graduate study in the specific sub-discipline of interest. Students interested in game design are asked to focus on a specific area of interest that will facilitate deeper study into a specific aspect of game design, from virtual and/or augmented reality to public service announcements in the form of games to detailed realistic environment design created with architectural precision.

PROJECT: Students interested in game design are asked to create a working prototype of a game while concentrating on a specific aspect of game design that goes beyond the work required at the introductory level. In addition, students are encouraged to create games that address topics of social significance (e.g. sustainability/conservation).

REQUIREMENTS: The requirements vary by project and are individualized for each student based on the objectives and goals of the student, and the degree of difficulty of any specific project. In general, for a full-semester project, students are expected to create a navigable environment and strategy for gameplay. In some instances, this may include a detailed investigation into a specific architectural and interior style and the construction of a physically accurate imaginary set for the game. In another instance, a game may be designed to provide messages about preservation of the environment. And yet another option is to create a virtual reality environment using currently available technology (e.g. Oculus Rift, HTC Vive).

OBJECTIVES: (1) To formulate a conceptual and artistic position on topics of digital design relevant to the student concentration area (e.g. entertainment, interactive graphics). (2) To understand the pipeline of the digital design production and demonstrate an ability to effectively use it. (3) To develop a sophisticated and complex project that integrates multiple formats of digital media such as modeling, rendering, video editing, interactivity, graphic design, and/or virtual or augmented reality. (4) To link artistic and creative endeavors to topics of broader social, cultural, or intellectual reach in order to use skills learned for the public good.

RESOURCES: Online tutorials for various software applications are available with a College subscription to *Pluralsight* as are instructional books and manuals in the reference section of the Littman Architecture and Design Library.



IMAGINARY WORLDS: REIMAGINING MOTION PICTURES

COURSE: DD 449 – Imaginary Worlds: Architecture in Motion Pictures (3 credits)
PROGRAM: Digital Design/School of Art + Design
LOCATION: second semester third or fourth year/spring term (undergraduate)
INSTRUCTOR: Glenn Goldman

DESCRIPTION: Like childhood photographs in scrapbooks and family albums (physical and/or digital), movies are part of our collective memories and become a unique way of establishing environments that never existed or could exist and make them “real” in our minds. Even more than architectural magazines or esoteric museum exhibits, film is part of our visual world and tends to frame many of the visual expectations of society. Because detailed study and precise copying with consummate skill allow architects and interior designers, art directors, digital designers, environment designers, set designers, authors of graphic novels, book illustrators, etc. to re-create existing environments, the creativity needed is different from that required of those who are creating new and interesting worlds or environments for virtual or real environments. In order to have the best possibilities to impact inventive creation, motion pictures are studied that postulate new or unique environments rather than those films that faithfully document reality. “Historical” films to be studied contain sets that are imaginary or interpretive environments for past locations. In this sense, the movies being studied will have a lineage more readily traceable to Georges Melies “who came to film from illusionism and the theater,” rather than the reality of the Lumiere brothers who came to film from photography which ultimately lead to “cinema-verite.” A diverse selection of motion pictures that include seminal films like *The Cabinet of Dr. Caligari*, *Metropolis*, *Things to Come*, *Lost Horizon*, *Cabiria*, and *Blade Runner* are studied and/or reviewed. Historically, much of the significant work in this field comes from a small subset of directors and art directors who have had an impact on set design – and in some instances architectural design – that include luminaries like Fritz Lang, Frank Capra, Ridley Scott, William Cameron Menzies, Terry Gilliam, Tim Burton, and Syd Mead. While it is likely that individual films discussed will be selected to maximize diversity in representation of these contributors, assignments and projects will provide individual student opportunities for focused study across the breadth of an individual’s body of work.

PROJECT: Study a film with significant (either by originality or quality of architectural design) imaginary set. Analyze the set and create a three-dimensional model from the fragments seen in the motion picture. Propose either a sequel or remake for the film and design one or two significant new environments as three-dimensional digital constructs using either Autodesk’s *3DS Max* or *Maya*; or McNeel & Associates *Rhino*.

REQUIREMENTS: After studying a specific, assigned film, and depending on the nature and age of the film, propose a redesign of studied and relevant elements for an updated remake (e.g. *Things to Come*, *The Golem*, *Thief of Bagdad*, *Lost Horizon*) or a sequel (appropriate for newer motion pictures like *City of Lost Children*, *Nightmare Before Christmas*, or *Imaginarium of Dr. Parnassus*). The decision to create sets/costumes/props for a sequel or remake must be made in consultation with, and approved by, the instructor. The extent of the set redesign will invariably depend on the nature of the original motion picture. Provide a series of still rendered images and progress prints of the redesigned environment. Sets designed for a sequel should contain a narrative (may be very brief – a few sentences) explaining/outlining the story.

COURSE OBJECTIVES: (1) Study architectural design unfettered from many of the quotidian requirements of buildings and places while concentrating explicitly on the relationship between design and narrative. (2) Provide an opportunity to prepare and deliver oral presentations, present architectural analyses (of theoretical places), and write analytically. (3) By understanding the imaginary worlds for what they can communicate and the ideas they may contain, students have an opportunity to modify their own concept of architecture and set design. (4) Provide the opportunity for practice and improvement in the use of three-dimensional modeling systems and the archeologically significant ability to (re)construct complete environments from fragments, useful in a variety of applications from forensic reconstruction to environment extensions in entertainment applications. (5) Gain a visceral understanding of the relationship between environment design and narrative. (6) Explore needs and requirements of virtual set design for use in entertainment. (7) Improve understanding of the history of architecture and architectural styles through the representation of the built environment in motion pictures.

REFERENCES: (1) Albrecht, Donald. *Designing Dreams: Modern Architecture in the Movies*. (New York: Harper & Row, 1986). (2) Arnheim, Rudolf. *Film as Art*. (Berkeley: University of California Press, 1946). (3) Barsacq, Leon. *Caligari's Cabinet and Other Grand Illusions: A History of Film Design*. (Boston: Little, Brown and Company, 1976). (4) Eisner, Lotte H. *The Haunted Screen: Expressionism in the German Cinema and the Influence of Max Reinhardt*. (Berkeley: University of California Press, 1973). (5) Neumann, Dietrich, editor. *Film Architecture: Set Designs from Metropolis to Blade Runner*. (Munich and New York: Prestel-Verlag, 1996). (6) Snowden, Elizabeth and Ingersoll, Richard, Editors. “*Cinemarchitecture*.” Design Book Review. MIT Press Journals: Issue 24 - Spring 1992.



COMPUTATIONAL DESIGN/INTERACTIVITY

COURSE: DD 364 – Digital Design Studio II (5 credits) and DD 320 – Computational Design (3 credits)
PROGRAM: Digital Design/School of Art + Design
LOCATION: second semester junior year/spring term studio; junior or senior year/spring term design elective
INSTRUCTOR: Taro Narahara

DESCRIPTION: There are multiple ways to study and incorporate computational design and physical computing into a student’s design education in the School of Art + Design at NJIT. All Digital Design students take one semester of physical computing within the undergraduate design studio sequence, devoting the term to the study and use of Arduino and Processing and the creation of projects emphasizing interactive techniques. They utilize sensors in student-built projects, along with 3D printing and laser-cutting. But students in other programs including Architecture, Interior Design, and Industrial Design – as well as students from the Colleges of Engineering and Computing Sciences seek out design courses in which they can creatively “make thinking things” and study physical computing, robotics, product design with sensors, adaptive structures, and so on. These students are afforded a lab-based seminar that deals with similar issues addressed in the studio, but at a more limited scale, for only three credits, and can be targeted towards the creation of products more closely aligned with the different areas and disciplines of study represented in the diverse student body. In both the design studio and course, there is an explicit requirement to create interactive products and applications.

PROJECT: Individual interactive assignments. Some projects involve the use of Microsoft Kinect or Asus Xtion Pro Live to create interactive installations (e.g. interactive digital projection, augmented reality block construction game) and various ways particles and/or objects may be remotely manipulated through physical activity (e.g. proximity controlled lighting, hand movement). Other projects require the design and construction of a kinetic interactive prototype using both sensor(s) and actuator(s) based on a conceptual idea in the context of the student(s) area of discipline (e.g. architecture, industrial design). Multi-disciplinary projects that link to other fields (e.g. biomedical engineering) are encouraged.

REQUIREMENTS: Deliverables vary by project. In all cases, built proof-of-concept elements are required that demonstrate degree of response to stimuli. Students build all components of physical projects and work with instructor to write code in Processing. Where interactive or kinetic products are designed and built, all components must be neatly integrated into the prototype using digitally fabricated parts (generally laser cut or 3D printed). Deliverables include live demonstration of project, a one-page description of the project that includes all hardware, software, methods and materials used, and references to online tutorials or resources. Also required is a video (up to two minutes in length) that captures the successful interactions inherent in the project, image files and photos of the product, and all files for Arduino, laser cuts, and 3D prints.

OBJECTIVES: (1) Provide design students with an opportunity to learn some computer programming and apply the knowledge to a project that deals either with human/computer interface. (2) Require digital design students to get out of the virtual environment into the physical one by building components and thinking of user interface(s). (3) Provide an opportunity for students to mix physical and digital with augmented and virtual reality applications of interactive computational design. (4) Provide an introduction to rapid prototyping, CAD/CAM, and algorithmic design for designers. (5) Explore potential relationships between various human senses (touch, hearing) and inanimate objects. (6) Provide opportunities for Industrial Design and Information Technology students to create algorithmically driven, sensor-based smart products outside of the studio sequence. (6) Reinforce the importance of craft when making digital or physical products. (7) Reinforce the importance and provide opportunity to practice a reflective and iterative design process with multi-phase/stepped projects that require prototypes and proof-of-concept products throughout the design process.

REFERENCES: (1) Borenstein, Greg. *Making Things See: 3D Vision with Kinect, Processing, Arduino, and MakerBot*. (O’Reilly Media/Make, 2011). (2) Fry, Ben. *Visualizing Data: Exploring and Explaining Data with the Processing Environment*. (O’Reilly Media/Make, 2011). (3) Igoe, Tom. *Making Things Talk: Using Sensors, Networks and Arduino to see, hear, and feel your world/2nd Edition*. (O’Reilly Media/Make, 2011). (4) Margolis, Michael. *Arduino Cookbook*. (O’Reilly Media/Make, 2011). (5) Noble, Joshua. *Programming Interactivity: A Designer’s Guide to Processing, Arduino, and Openframeworks*. (O’Reilly Media/Make, 2011). (6) Reas, Casey. *Processing: A Programming Handbook for Visual Designers and Artists*. (MIT Press, 2007) (7) Terzidis, Kostas. *Algorithms for Visual Design Using the Processing Language*. (Wiley, 2009)



**NEW JERSEY INSTITUTE OF TECHNOLOGY
COLLEGE OF ARCHITECTURE AND DESIGN**

PRODUCT DESIGN: WEARABLE AND LINKED TECHNOLOGY

COURSES: ID 264 – Industrial Design Studio II (4 credits)
PROGRAM: Industrial Design/School of Art + Design
LOCATION: second year/spring semester design studio (undergraduate)
INSTRUCTORS: Jobe Bobee

DESCRIPTION: Design studio for product design program. Products designed vary in focus from term to term and include household products, tabletop and cutlery products, office supplies, building/architectural products, furniture, “smart” sensor-based and adaptive products, transportation, jewelry and timepieces, and more.

PROJECT: Students were asked to identify a need for technology-enabled interactive products. Products were to be “wearable” and/or linked to other controlling devices (e.g. smartphone). Projects varied from a sensor and materials-dependent “ice pack” to a modular and customizable bracelet for children containing GPS, tactile toys for self-distraction, watch, and more.

REQUIREMENTS: Students must produce a physical prototype of whatever product is being designed and proposed. The process is defined and must be documented as part of the project. This process includes (1) study of precedents and investigation of current products; (2) ideation sketching for alternative proposals; (3) exploration of form and alternatives with digital modeling (SolidWorks); (4) digital visualization (renderings) of proposed products; (5) physical prototype (generally a combination of 3D-printed objects with hand-finishing); (6) package design and product booklet justifying production.

OBJECTIVES: (1) Hone research, critical thinking, and presentation skills. (2) Be able to identify the parts, materials, and production methods of a product. (3) Be able to use a comprehensive design process that integrates multiple media from freehand sketching to virtual models to 3D printed prototypes. (4) Increase facility with use of digital media for visualization and study of alternatives (including color options) for product design.