VIZA 611 Concepts of Visual Communications I
Credits 4. 2 Lecture Hours. 4 Lab Hours.
Theory and practice of visual communication using a variety of media to explore perception, form-making, color, and historic and personal sources of creativity.
Prerequisite: Graduate classification in visualization or approval of instructor.

VIZA 612 Concepts of Visual Communications II
Credits 4. 2 Lecture Hours. 4 Lab Hours.
Exploration of perception, vision and self-expression for communication through visual images; image-making processes include conventional and digital media.
Prerequisite: Approval of instructor.

VIZA 613 3-D Modeling and Animation
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Principles of 3-D computer animation with an emphasis in aesthetics and techniques for 3-D modeling, color, texture, lighting, motion control and rendering.
Prerequisite: Graduate classification in visualization or approval of instructor.

VIZA 614 Form/Installation/Environment
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Aesthetic and functional concerns involving public spaces; interdisciplinary investigation of audible, visual and form potential of environmental space utilizing models and electronic imaging technology; ethical responsibilities regarding the environment and its use.
Prerequisite: Graduate classification or approval of instructor.

VIZA 615 Computer Animation
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Intermediate level computer animation--focusing on production of three dimensional computer generated animation which may or may not integrate video and photographic elements.
Prerequisite: VIZA 613 or approval of instructor.

VIZA 616 Rendering and Shading
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Exploration of advanced rendering and shading techniques for the attainment of a desired visual effect; topics may include shading languages, attainment of visual realism, integration of rendering and modeling tools, and non-photorealistic rendering.
Prerequisite: VIZA 613 or approval of instructor.

VIZA 617 Advanced Animation
Credits 4. 2 Lecture Hours. 4 Lab Hours.
Development of advanced three-dimensional computer animation with emphasis on successful storytelling and visual communication; may include story development, expressive character design, motivation, acting, speech animation, choreography, stage lighting, storyboards, soundtracks, story reels, production efficiency, and successive refinement. May be taken twice.
Prerequisite: VIZA 613 or approval of instructor.

VIZA 618 Facial Modeling and Animation
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Design and analysis of articulated 3D models for creating facial animation; includes designing expressive 3D faces, exaggerations, facial expressions and facial animation techniques.
Prerequisite: VIZA 613 or approval of instructor.

VIZA 622 Design Communication I
Credits 4. 2 Lecture Hours. 4 Lab Hours.
Theory and practice of visual communication employing a variety of digital and conventional media; emphasis on creating effective, self-expressive images employing the combined use of a variety of media.
Prerequisites: VIZA 465 or equivalent; graduate classification or approval of instructor.

VIZA 623 Design Communication II
Credits 3. 1 Lecture Hour. 4 Lab Hours.
Development of concepts and forms in visual communications; organization of complex problems in production; synthesis of skills, information tools and methodology.
Prerequisite: VIZA 622 or approval of instructor.

VIZA 625 Multi-Media Web Design
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Examination of aesthetic, narrative, technical strategies; multi-media content on the web; methods of integrating imagery, animation, sound; non-linear multi-media narration. Application of multi-media techniques for navigation, interaction, animation, vector drawing, video, audio.
Prerequisite: Graduate classification in visualization or approval of instructor.

VIZA 626 Generative Art and Design
Credits 3. 1 Lecture Hour. 4 Lab Hours.
Theory and creative application of generative systems in studio art practice; chance based systems include random numbers and noise; biologically inspired systems include genetic algorithms, L-systems, and artificial life; systems drawn from complexity theory include, cellular automata, fractals, finite state machines, catastrophe theory, reaction diffusion systems, and chaos. May be taken 2 times for credit.
Prerequisite: Graduate classification in visualization or approval of instructor.

VIZA 627 Design Communication III
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Advanced methods in video, photography and/or animation production; application of image strategies used in contemporary media. May be taken twice.
Prerequisites: VIZA 613 or VIZA 622 or VIZA 643; approval of instructor.

VIZA 629 Digital Media: Inspiration and Process
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Exploration of artwork and literature that has informed contemporary creativity provides a broad basis for discovery through reading, writing, studio projects; demonstrate a knowledge of creative strategies including, but not limited to mapping, database, allegory, sampling, and generative systems.
Prerequisite: Graduate classification or approval of instructor.

VIZA 630 Contemporary Art Studio/Seminar I
Credits 4. 2 Lecture Hours. 4 Lab Hours.
Critical, theoretical and historical readings on art and artists prompt visual and textual responses; development of personal ideas, methods, and processes; research, writing, discussion and preliminary studies contribute to a final, in-depth body of work situated within the context of contemporary art.
Prerequisite: Graduate classification in visualization or approval of instructor.
VIZA 631 Contemporary Art Studio/Seminar II
Credits 4. 2 Lecture Hours. 4 Lab Hours.
Theoretical and critical tools for contemporary digital art practice and
technology-based cultural production; project proposal and development;
exhibition planning, site selection and installation.
Prerequisite: VIZA 630 or approval of instructor.

VIZA 641 Visual Storytelling
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Exploration of visual storytelling techniques for the attainment of desired
storytelling effects; includes character development, using shots, camera,
lights, props and background elements, master plots, one and multi-panel
cartoons, comics, storyboards, animatics and storyreels.
Prerequisite: Graduate classification or approval of instructor.

VIZA 643 Time Based Media I
Credits 4. 2 Lecture Hours. 4 Lab Hours.
Visual language and cinematic structure explored through time based
projects; historical, critical, and practical exploration of the interaction of
camera, lighting, sound, editing, special effects, and mise en scene.
Prerequisites: VIZA 465 or equivalent; graduate classification in
visualization or approval of instructor.

VIZA 644 Time Based Media II
Credits 3. 1 Lecture Hour. 4 Lab Hours.
Advanced theory and production of art forms with motion, tempo,
sequencing and duration as integral components; projects may
include in-depth creation using a single medium or may emphasize a
combination of media such as video, audio, networked communication,
animation, performance or installation. May be taken twice.
Prerequisite: VIZA 643 or approval of instructor.

VIZA 647 Color Photography
Credits 3. 1 Lecture Hour. 4 Lab Hours.
Theory and practice of still color photography; appropriate uses of
color processes related to digital photography and other graphic media;
exploration of vision through the photographic image as a medium of self
expression. May be taken two times for credit.
Prerequisite: Graduate classification or approval of instructor.

VIZA 654/CSCE 646 The Digital Image
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Tools and techniques for generation, handling and analysis of two
dimensional digital images; image representation and storage; display,
media conversion, painting and drawing; warping; color space operations,
enhancement, filtering and manipulation.
Prerequisite: Graduate classification or approval of instructor.
Cross Listing: CSCE 646/VIZA 654.

VIZA 656/CSCE 647 Image Synthesis
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Principles of image synthesis from 3-D scene descriptions; topics may
include local and global illumination, shading, shadow determination,
hidden surface elimination, texturing, raster graphics algorithms,
transformations and projections.
Prerequisite: Approval of instructor.
Cross Listing: CSCE 647/VIZA 656.

VIZA 657/CSCE 648 Computer Aided Sculpting
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Mathematical and artistic principles of 3-D modeling and sculpting;
includes proportion skeletal foundation, expression and posture, line of
action; curves, surfaces and volumes, interpolation and approximation,
parametric and rational parametric polynomials, constructive solid
geometry, and implicit representation.
Prerequisite: Approval of instructor.
Cross Listing: CSCE 648/VIZA 657.

VIZA 658 Experimental Visual Techniques
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Theory and experimental techniques for computer graphics, animation,
video, and other forms of electronic visualization including innovative
hardware and software systems, artificial life, virtual reality, volume
methods and hypermedia. May be taken twice.
Prerequisite: Graduate classification or approval of instructor.

VIZA 659/CSCE 649 Physically-Based Modeling
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Physical simulation as used in choreography, geometric modeling,
and the creation of special effects in computer graphics; a variety of
problems and techniques are explored which may include particle-
methods, modeling and simulation of flexible materials, kinematics and
constraint systems.
Prerequisite: Approval of instructor.
Cross Listing: CSCE 649/VIZA 659.

VIZA 662 Physical Computing for Art and Design
Credits 3. 1 Lecture Hour. 4 Lab Hours.
Theory and creative application of digital technology in studio art and
design practice to create dynamic environments, interactive objects, and
tangible interfaces in the physical world; technologies involved include
microcontrollers, basic electronics, sensors, actuators, motors, wireless
and internet data communication, light, sound, and wearable devices.
May be taken 2 times for credit.
Prerequisites: Graduate classification in Visualization or approval of
instructor.

VIZA 665 Digital Compositing
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Principles of Digital Compositing--Image based lighting and modeling,
camera calibration, shape reconstruction, reconstruction of transparency
and specularity and digital compositing of computer generated
animations with video images.
Prerequisite: VIZA 613 or approval of instructor.

VIZA 670/CSCE 620 Computational Geometry
Credits 3. 3 Lecture Hours.
Design and analysis of algorithms for solving geometrical problems;
includes convex hull problems, Voronoi diagrams, range searching and
proximity problems.
Prerequisite: CSCE 311 or approval of instructor.
Cross Listing: CSCE 620/VIZA 670.

VIZA 672/CSCE 641 Computer Graphics
Credits 3. 3 Lecture Hours.
Representation of 3-dimensional objects, including polyhedral objects,
curved surfaces, volumetric representations and CSG models' techniques
for hidden surface/edge removal and volume rendering; illumination
and shading; antialiasing; ray tracing; radiosity; animation; practical
experience with state-of-the-art graphics hardware and software.
Prerequisite: CSCE 441 or approval of instructor.
Cross Listing: CSCE 641/VIZA 672.
VIZA 673/CSCE 643 Robotics Programming
Credits 3. 3 Lecture Hours.
Manipulator dynamics, position control, hybrid position/force control, and
impedance controls; advanced topics in manipulator motion planning,
assembly planning and grasp planning; cell decomposition; retraction;
back projection; hypothesize-and-test; and potential field methods;
subassembly stability; task-level and fine motion planning; grasp
stability; grasp synthesis; dexterous manipulation.
Prerequisite: CSCE 452 or approval of instructor.
Cross Listing: CSCE 643.

VIZA 675/CSCE 645 Geometric Modeling
Credits 3. 3 Lecture Hours.
Geometric and solid modeling concepts, Freeform curves and surfaces
(splines and BeZier) with their relational, intersectional and global
mathematic properties; parametric representation of solids, topology of
closed curved surfaces, boundary concepts and Boolean/Euler operators;
construction and display of curves and surfaces, and solid models.
Prerequisites: CSCE 441 and CSCE 442 or equivalent.
Cross Listing: CSCE 645/VIZA 675.

VIZA 679 Advanced Topics in Physically Based Modeling
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Current research and advanced methods in choreographing motion
for animation using a physics-based approach; mainstream research
literature in animation; theoretical and methodological topics addressed,
through both study and implementation. May be taken twice.
Prerequisite: Graduate classification or approval of instructor.

VIZA 680 Professional Practice in Visualization
Credits 4. 2 Lecture Hours. 4 Lab Hours.
Preparation of a portfolio, creating an internet presence, use of social
media, interviews, negotiation, business practices, and fundamentals of
teaching. Professional practice in pursuit of career paths for the Master
of Fine Arts in Visualization.
Prerequisites: Graduate classification in visualization and approval of
instructor.

VIZA 684 Professional Internship
Credits 3. 3 Lecture Hours.
Practical experience in a studio/museum/gallery setting working with
allied professionals; minimum fifteen week internship with a minimum
of 600 hours continuous employment; departmental pre-approval
through the departmental internship coordinator required; post approval
evaluation conducted following the internship. May not be repeated for
credit.

VIZA 685 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Individual problems involving application of theory and practice in
Visualization. May be repeated for credit.
Prerequisites: Approval of instructor and department head.

VIZA 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified field of design communication and/or
electronic media. May be repeated for credit.

VIZA 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for preparation of MS thesis.
Prerequisites: Graduate classification in visualization and approval of
instructor.

VIZA 693 Professional Study
Credits 1 to 9. 1 to 9 Other Hours.
Research and writing combined with MFA studio projects; prepare and
present a public exhibition of a final body of work; submit a related
scholarly journal paper as approved by the committee chair. May be
repeated for credit.
Prerequisites: Graduate classification in visualization and approval of
instructor.