DEPARTMENT OF VISUALIZATION

Visualization is the study of the art and science used in the creation of traditional and digital visual communication. The Bachelor of Science in Visualization is a studio based program requiring completion of 120 credit hours including elements of traditional art, programming, history and theory as well as digital media. The degree prepares students for the artistic and technical demands facing digital content creators in a variety of visually oriented professions including interactive design, information technology, education, entertainment, and independent practice.

Enrollment in the Visualization Program

Students enrolled in the Bachelor of Science in Visualization (VISL) program will be granted automatic admission to the Sophomore level art and visualization courses by obtaining a 3.6 GPR in category A courses and a 3.0 GPR in category B courses and completing 27 semester credit hours during the first two semesters in the Visualization Program (VISL).

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If AP or Dual Credit courses are available as substitutions in any of the above courses, sequential or other art/visualization/math/science courses taken at Texas A&M University will be used to calculate the respective GPRs. For change of major and transfer students, equivalent transferable courses may be substituted for any of the above courses. In this case, courses taken at Texas A&M University in the same program area will be specified and used to calculate the respective GPRs.

Students not automatically admitted will be allowed on a space available basis into sophomore level art and visualization courses based on a ranking of the combined GPR of the Category A and Category B courses. An optional 500 word essay may be submitted to explain extenuating circumstances related to the 1st year academic experience and provide justification why the student should be allowed to take sophomore level courses. The essay may be used to adjust the overall student ranking.

Transfer and Change of Major Students

Transfer and change of major students (students currently enrolled in another major at Texas A&M University) who are admitted to the Department of Visualization are classified as lower level (VISL).

Faculty

Akleman, Ergun, Professor
Visualization
PhD, Georgia Institute of Technology, 1992

Bieber, Susanne C, Assistant Professor
Visualization
PhD, Freie Universitrat Berlin, 2012

Bologan, Anatol, Lecturer
Visualization
MA, Goldsmiths University of London, 2014

Braman, Gavin S, Lecturer
Visualization
BED, Texas A&M University, 2009

Campana, Lilia, Instructional Assistant Professor
Visualization
PhD, Texas A&M University, 2014

Chu Yew Yee, Sharon Lynn, Assistant Professor
Visualization
PhD, Texas A&M University, 2015

Davison, Richard R, Professor
Visualization
MFA, Washington university St. Louis, 1979

Eilers, Howard F, Associate Professor
Visualization
MFA, Ohio University, 1964

Finch, Krista S, Instructional Assistant Professor
Visualization
MFA, Maryland Institute College of Art, 2000

Finch, Sherman S, Assistant Professor
Visualization
MFA, Maryland Institute College of Art, 1998

Galanter, Philip, Associate Professor
Visualization
MFA, School of Visual Arts, 1999

Hajash, Donna J, Instructional Associate Professor
Visualization
PhD, Siena Heights College, 1981

Honeycutt, Amanda J, Lecturer
Visualization
BS, Texas A&M University, 2011

House, Felice L, Assistant Professor
Visualization
MFA, University of Texas at Austin, 2011

Klein, Barbara J, Lecturer
Visualization
MS, Sam Houston State University, 2008

Knox, Benjamin C, Assistant Professor of the Practice
Visualization
BED, Texas A&M University, 1993

Koustov, Dmitri V, Lecturer
Visualization
BFA, Ivanovo Art institute, 1987
Lafayette, Carol J, Professor
Visualization
MFA, SUNY, University at Buffalo, 1991

Larsen, Terry R, Senior Associate Professor
Visualization
MAR, Cornell University, 1975

Leiderman, Daniil M, Instructional Assistant Professor
Visualization
PHD, PRINCETON UNIVERSITY, 2016

Lisonbee, Laurie J, Lecturer
Visualization
MFA, California State University, Fullerton, 1998

Madrid, Nathan C, Lecturer
Visualization
MFA, Texas Woman's University, 2014

McLaughlin, Timothy D, Associate Professor
Visualization
MS, Texas A&M University, 1994

McNamara, Ann M, Associate Professor
Visualization
PHD, University of Bristol, UK, 2000

Parke, Frederic I, Professor
Visualization
PHD, University of Utah, 1974

Quek, Francis K, Professor
Visualization
PHD, University of Michigan, 1990

Ragan, Eric D, Assistant Professor
Visualization
PHD, Virginia Tech, 2013

Ramadan, Hadeel M, Lecturer
Visualization
MFA, Virginia Tech, 2014

Schuld, Dawna L, Assistant Professor
Visualization
PHD, The University of Chicago, 2009

Seo, Jinsil, Assistant Professor
Visualization
PHD, Simon Fraser University, 2011
MFA, School of Visual Arts, 2004

Smith, Brian M, Lecturer
Visualization
MFA, Texas A&M University, 2015

Stoenescu, Livia, Instructional Assistant Professor
Visualization
PHD, Queen's University, 2010

Sutherland, Susan D, Lecturer
Visualization
MA, UNIVERSITY OF WISCONSIN - MADISON, 1994

Tassinary, Louis G, Professor
Visualization
JD, Boston College, 2003
PHD, Dartmouth College, 1984

Thomas, Andre, Assistant Professor of the Practice
Visualization
MFA, Laguna College of Art & Design, 2017

Zawadzki, Mary F, Instructional Assistant Professor
Visualization
PHD, The City University of New York, 2015

**Majors**
- Bachelor of Science in Visualization (http://catalog.tamu.edu/undergraduate/architecture/visualization/bs)

**Minors**
- Art Minor (http://catalog.tamu.edu/undergraduate/architecture/visualization/art-minor)
- Game Design and Development Minor (http://catalog.tamu.edu/undergraduate/architecture/visualization/game-design-development-minor)

**Courses**
- Art (ARTS) (p. 2)
- Visualization (VIST) (p. 4)

**Art**

**ARTS 103 Design I**
Credits 3. 2 Lecture Hours. 4 Lab Hours.
(ARTS 1311) Design I. Two-dimensional design; fundamentals of line, color, form, texture, shape, space and composition.
**Prerequisite:** Art minors only.

**ARTS 104 Introduction to Graphic Design**
Credit 1. 2 Lab Hours.
Introduction to the concepts and techniques utilized in graphic design; basic digital camera operations, typography, use of color, design principles; integration of type, graphic elements and images.
**Prerequisite:** Lower division in Visualization or minor in Art.

**ARTS 111 Drawing I**
Credits 3. 2 Lecture Hours. 4 Lab Hours.
(ARTS 1316) Drawing I. Introduction to composition and form, media, techniques and subjects; exploring perceptual and descriptive drawing; mark making as a developmental process in art and design practice.
**Prerequisite:** Art minors only.

**ARTS 115 Drawing for Visualization**
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Investigation of and practice with media, methods and techniques in communication of design; observational drawing; proportion, form, line and value.
**Prerequisite:** Lower division in Visualization.

**ARTS 149 Art History Survey I**
Credits 3. 3 Lecture Hours.
(ARTS 1303) Art History Survey I. Survey of architecture, painting, sculpture and the minor arts from prehistoric times to 14th century.
ARTS 150 Art History Survey II
Credits 3. 3 Lecture Hours.
(ARTS 1304) Art History Survey II. Survey of architecture, painting, sculpture and the minor arts from the 14th century to the end of the 19th century.

ARTS 210 Introduction to Digital Photography
Credits 3. 2 Lecture Hours. 3 Lab Hours.
(ARTS 2356) Introduction to Digital Photography. Introduction to photography; digital camera controls; creation, manipulation and critique of the digital image; composition and aesthetics; exposure control; digital workflow.
Prerequisite: Non-visualization majors only.

ARTS 212 Life Drawing
Credits 3. 1 Lecture Hour. 6 Lab Hours.
(ARTS 2323) Life Drawing. Study of the form, volume, structure and movement of the human figure; emphasis on proportion and anatomy.
Prerequisite: Grade of C or better in ARTS 111 or ARTS 115.

ARTS 234 Body Art of Tattoos
Credits 3. 3 Lecture Hours.
History of body art from the Stone Age to present day; aesthetics, sign, symbol, social and cultural significance.

ARTS 303 Graphic Design I
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Principles and elements of graphic design; composition problem solving, conceptual thinking and application to visual communication.
Prerequisites: Grade of C or better in ARTS 104 and VIST 284; grade of C or better in VIST 105 or ARTS 103.

ARTS 304 Graphic Design II
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Continuation of ARTS 303; concepts in advanced graphics as a tool for design solutions for publication and promotion; emphasis on creative thinking over technology.
Prerequisites: ARTS 303; junior or senior classification.

ARTS 305 Painting I
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Traditional and contemporary painting approaches and media; emphasis on form, composition, observational representation.
Prerequisite: Grade of C or better in ARTS 111 or ARTS 115.

ARTS 308 Sculpture
Credits 3. 1 Lecture Hour. 5 Lab Hours.
Principles and processes of form making; space and materials; context and content of three-dimensional form.
Prerequisite: Grade of C or better in ARTS 111 or ARTS 115.

ARTS 311 Traditional Photography
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Photographic image as a medium of visual expression; basic theory and practice of still photography; historic development and aesthetic concern for photographic imagery.
Prerequisites: Grade of C or better in ARTS 103 or VIST 205.

ARTS 312 Advanced Photography
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Advanced photographic image-making; development, control and presentation of the expressive photographic image; traditional and/or new media.
Prerequisite: Grade of C or better in ARTS 210, VIST 310, or ARTS 311.

ARTS 315 Figure Drawing For Narrative and Concept Development
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Exploration of contemporary drawing practices and theory; investigation into the relationship with digital media including animation, photography and other digital technologies; development of personal approaches to media, techniques and thematic content; creation of a creative workflow and visual vocabulary.
Prerequisite: ARTS 212.

ARTS 325 Digital Painting
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Theory and practice of digital painting media; exploration of traditional and new forms of art making and creativity; emphasis on color theory.
Prerequisites: Grade of C or better in ARTS 305. Field trip required.

ARTS 328 Advanced Painting
Credits 3. 1 Lecture Hour. 5 Lab Hours.
Experiments in spatial design; intermediate aspects of creative process; issues in contemporary art; modeling and construction techniques as they may facilitate the generation of new forms and compositions; formal visual analysis and critique.
Prerequisites: ARTS 305; upper division in Visualization or approval of instructor.

ARTS 329 Texas Art History
Credits 3. 3 Lecture Hours.
The development of visual arts in Texas; an examination of art movements, artists and major works exhibiting a broad range of artistic techniques.
Prerequisite: Grade of C or better in ARTS 149, ARTS 150, ARTS 349, ARCH 249, ARCH 250, or ARCH 350.

ARTS 330 The Arts of America
Credits 3. 3 Lecture Hours.
Survey of painting, sculpture, crafts and architecture of prehistoric America to the present; emphasis on art as a record of cultural, economic and social evolution.
Prerequisite: Grade of C or better in ARTS 149, ARTS 150, ARTS 349, ARCH 249, ARCH 250, or ARCH 350.

ARTS 333 Visual And Material Culture of the Mediterranean
Credits 3. 3 Lecture Hours.
Visual arts and material culture of the Mediterranean world during the Renaissance and early modern period; economic, social, cultural and political influence; field trip required.
Prerequisites: ARTS 149, ARTS 150, ARTS 349, ARCH 249, ARCH 250, or ARCH 350.

ARTS 335 The Art and Architecture of Rome
Credits 3. 3 Lecture Hours.
Rome as a microcosm of western civilization; a survey of western architectural and art history from antiquity through the Baroque; a focus on the Eternal City's buildings, paintings, mosaics and sculptures exploring criteria, methods, goals and results of major architectural and artistic movements and the people involved.
Prerequisite: Grade of C or better in ARTS 149, ARTS 150, ARTS 349, ARCH 249, ARCH 250, or ARCH 350.
ARTS 340 History of the Photographic Image  
Credits 3. 3 Lecture Hours.  
History of photography; social, cultural, political, scientific and artistic contexts; important photographic themes and photographers.  
**Prerequisite:** ARTS 149, ARTS 150, ARTS 349, ARCH 249, ARCH 250, or ARCH 350.

ARTS 341 History of Animation  
Credits 3. 3 Lecture Hours.  
History of the animated image in the nineteenth-century through the twenty-first century; developments, theories and ideologies in computer animation.  
**Prerequisite:** ARTS 149, ARTS 150, ARTS 349, ARCH 249, ARCH 250, or ARCH 350.

ARTS 342 History of Graphic Design  
Credits 3. 3 Lecture Hours.  
History of graphic design; understanding visual language, semiotic theory, technological developments associated with graphic design production, social, cultural, political and artistic influence on visual communication.  
**Prerequisite:** ARTS 149, ARTS 150, ARTS 349, ARCH 249, ARCH 250, or ARCH 350.

ARTS 343 History of Illustration  
Credits 3. 3 Lecture Hours.  
History of illustration; early scrolls, codices and manuscript illumination; print culture; commercial processes of the 19th and 20th centuries.  
**Prerequisite:** ARTS 149, ARTS 150, ARTS 349, ARCH 249, ARCH 250, or ARCH 350.

ARTS 345 History of Gaming  
Credits 3. 3 Lecture Hours.  
Modern game creation and play; theory, history, and development.  
**Prerequisites:** ARTS 149, ARTS 150, ARTS 349, ARCH 249, ARCH 250, or ARCH 350.

ARTS 349 The History of Modern Art  
Credits 3. 3 Lecture Hours.  
Chronological development of late 19th through 20th century art; emphasis on key artists, paintings, sculpture, photography and architecture.  
**Prerequisite:** Junior or senior classification or approval of instructor and undergraduate program coordinator.

ARTS 350 The Arts and Civilization  
Credits 3. 3 Lecture Hours.  
Investigation of the image of work of selected periods in terms of criticism, aesthetic rationale, specific masters and social significance by going beyond historical chronology.  
**Prerequisites:** Grade of C or better in ARTS 149, ARTS 150, ARTS 349, ARCH 249, ARCH 250, or ARCH 350.

ARTS 353 Color Theory  
Credits 3. 2 Lecture Hours. 4 Lab Hours.  
Aspects of color and color theory including optical phenomena, color theory and perception; application and principles with respect to art and design; two-dimensional and three-dimensional projects examining color theories.  
**Prerequisites:** Upper division in Visualization or minor in Art.

ARTS 403 Graphic Design III  
Credits 3. 2 Lecture Hours. 4 Lab Hours.  
Advanced graphic design concepts and practices; development of unified graphic campaigns to promote a product, an organization, a publication, a service, or business; advanced problem-solving techniques based on the design process through research, analysis, and presentation; systematic approach to visual development.  
**Prerequisites:** ARTS 303 and ARTS 304; junior or senior classification or approval of instructor and undergraduate program coordinator; knowledge of industry-standard software (Adobe Photoshop, InDesign and Illustrator) is expected.

ARTS 445 Byzantine Art and Architecture  
Credits 3. 3 Lecture Hours.  
A critical and historical investigation of Mediterranean art and architecture from the third century to the middle of the fifteenth century; emphasis on the artistic achievements from the late antique Mediterranean and the Byzantine Empire; investigation of architectural decoration, public monuments, cultural diversity and controversies over images.  
**Prerequisite:** Grade of C or better in ARTS 149, ARTS 150, ARTS 349, ARCH 249, ARCH 250, or ARCH 350.

ARTS 485 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Special problems in the fine and applied visual and plastic arts. May be repeated for up to 12 credit hours.  
**Prerequisite:** Approval of instructor and undergraduate program coordinator.

ARTS 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified field of the fine or applied visual and plastic arts. May be repeated for up to 9 credit hours.  
**Prerequisite:** Approval of instructor and undergraduate program coordinator.

**Visualization**

VIST 105 Principles of Design I  
Credits 3. 1 Lecture Hour. 7 Lab Hours.  
Principles and theory of design and visual communication; elements and organizational structure of the visual language; sign, symbol and meaning; visual perception; problem solving and the creative process; introduction to color theory; emphasis on two-dimensional design.  
**Prerequisite:** Lower division in Visualization.

VIST 106 Principles of Design II  
Credits 3. 1 Lecture Hour. 7 Lab Hours.  
Fundamentals of spatial design; theory of form; transformations, additive/subtractive techniques as process; 3D composition; traditional modeling and construction techniques; formal visual analysis and critique.  
**Prerequisite:** VIST 105.

VIST 131 First Year Seminar  
Credit 1. 1 Other Hour.  
Seminar on contemporary topics related to Visualization; introduction to college instruction and experiences; focus on writing, exploration, discussion and research.  
**Prerequisite:** Lower division in Visualization.
VIST 170 Introduction to Visualization Computing Environments  
Credit 1. 2 Lab Hours.  
Procedures, practices and environments useful for visual problem solving using programmatic languages; setup and use of the computing environment; useful system tools and commands; basic programming concepts and constructs.  
Prerequisite: Lower division in Visualization.

VIST 201 Writing for Design  
Credit 1. 2 Lab Hours.  
Writing as a discipline for the development, conceptualization, critique and presentation of visual works; emphasis on portfolio and narrative development.  
Prerequisite: Major in visualization.

VIST 205 Principles of Design III  
Credits 3. 1 Lecture Hour. 7 Lab Hours.  
Introduction to the creative processes, workflows and methodologies used in the field of visualization including interactive design, game design and development and animation.  
Prerequisites: Upper division in Visualization.

VIST 206 Visual Studies Studio I  
Credits 3. 1 Lecture Hour. 5 Lab Hours.  
Theory and practice of visual communication methodologies and processes used in interactive media, game design and development, or animation; visual storytelling.  
Prerequisite: VIST 205.

VIST 235 Theory and Practice in Visualization  
Credits 1. 2 Lab Hours.  
Professional material development, media theory and trends, copyright law and common business practices; professional practice in pursuit of career paths for creative fields in Visualization.  
Prerequisite: Grade of C or better in VIST 205.

VIST 237 Computing for Visualization I  
Credits 4. 3 Lecture Hours.  2 Lab Hours.  
Theory and practice of visual computer based problem solving; system tools; scripting; software design principles and practice; basics of interactive programming and interface design; development concepts and principles useful in digital art and visualization production.  
Prerequisite: MATH 151 and upper division in Visualization.

VIST 271 Computing for Visualization II  
Credits 4. 3 Lecture Hours.  2 Lab Hours.  
Continuation of Computing for Visualization I; concepts of object oriented programming; emphasis on principles and techniques useful for three dimensional visualization and real time graphic display.  
Prerequisite: MATH 152 and VIST 270.

VIST 275 Introduction to Visualization  
Credits 3. 3 Lecture Hours.  
Introduction to visualization concepts, techniques and applications; introduction to significant visualization topics including cultural context, visual perception, the digital image, visual language, geometric modeling, animation, image creation, image compositing; application areas, ethical issues in visualization and the future of visualization.  
Prerequisites: Grade of C or better in MATH 150 or MATH 151; non Visualization majors only.

VIST 284 Visualization Techniques  
Credit 1. 2 Lab Hours.  
Introduction to software used in the visual arts including 2D raster and vector systems, modeling, rendering, animation, post production and multimedia. Specific course content will vary based upon curriculum requirements. May be repeated for up to 3 credit hours.  
Prerequisite: Major in visualization or minor in art.

VIST 289 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  0 to 4 Lab Hours.  
Selected topics in an identified area of visualization. May be repeated for credit.  
Prerequisite: Approval of instructor.

VIST 305 Visual Studies Studio II  
Credits 3. 1 Lecture Hour. 5 Lab Hours.  
Theory and practice of visual communication employing digital and conventional media; development of artistic concepts, proposal development and related implementation techniques; introduction to digital painting, 3D modeling, animatics and post production.  
Prerequisites: Grade of C or better in VIST 206.

VIST 310 Photography for Visualization  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Advanced aesthetic and thematic control of the digital image; exposure refinement; advanced lighting techniques and digital compositing; digital workflow; image conversion and control; color management; digital forensics; printing technology, processes and presentation.  
Prerequisites: Upper division in Visualization.

VIST 339 Research Techniques in Visualization  
Credits 3. 3 Lecture Hours.  
Research techniques used in visualization and creative fields; qualitative and quantitative methods, formulating research questions; determining appropriate methods, research planning and designing, data collection, testing and assessment; data analysis and interpretation.  
Prerequisites: Grade of C or better in VIST 206 and VIST 235.

VIST 354 Principles of Multimedia Design  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Application and design of web and mobile platforms to create interactive products; planning, design, and development of intuitive user interfaces; focus on user-centered design, interaction principles, and standards-based technologies.  
Prerequisite: Grade of C or better in VIST 271 or ARTS 303.

VIST 357 Interaction Design  
Credits 3. 3 Lecture Hours.  
Concepts, theories and methods in interaction design and interaction; dimensions of interaction design; data gathering methods and evaluation; task analysis; aesthetics and the sensory experience; prototyping, and workflow.  
Prerequisite: Upper division in Visualization.

VIST 370 Interactive Virtual Environments  
Credits 3. 3 Lecture Hours.  
Languages and techniques useful for the creation of real time virtual environments; definition of formal scene description structures; modeling and transformation techniques; simulation techniques; behaviors and message passing; user interaction and animation; multuser environments; creating virtual interfaces; scripting techniques.  
Prerequisite: Grade of C or better in VIST 271.
VIST 372 Creating Digital Environments  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Terminology, principles and practices in the creation of 3D models; mathematical principles of geometrical modeling theory and application of modeling techniques; boolean operations; parametric modeling; modeling; particle systems; L-Systems; nurbs and/or grammar based techniques; lighting setup and control.  
Prerequisite: Grade of C or better in VIST 271.

VIST 374 Multimedia Design and Development  
Credits 3. 2 Lecture Hours. 4 Lab Hours.  
Concepts and techniques for integrating multimedia with user control and interactivity; production of computer presentations and interactive mobile devices; computer animation, graphics, production and use of digital images; scripting techniques; projects for stand-alone computers and mobile devices.  
Prerequisite: Junior or senior classification or approval of instructor and undergraduate program coordinator.

VIST 375 Foundations of Visualization  
Credits 3. 3 Lecture Hours.  
Visualization concepts, techniques and applications; major topic areas include cultural context, application areas, visual perception, the digital image, visual language, coordinate systems, geometric representation, modeling animation, image synthesis, image composing, ethics and the future of visualization.  
Prerequisites: Grade of C or better in VIST 271.

VIST 405 Visual Studies Studio III  
Credits 3. 1 Lecture Hour. 5 Lab Hours.  
Theory and practice in the art and science of the visual image; scientific and mathematical principles as process; information theory and sensorial design; interactivity and user integration; integration of real and virtual environments including lighting design and material definition.  
Prerequisites: Grade of C or better in VIST 305, and CARC 301 or VIST 494.

VIST 406 Visual Studies Studio IV  
Credits 3. 1 Lecture Hour. 5 Lab Hours.  
Theory and practice in the development of the digital image; non-traditional modeling methods; camera control and animation techniques; special effects; creative lighting methods; non-photorealistic rendering; integration of traditional and digital media in the creation of visual works.  
Prerequisites: Grade of C or better in VIST 305, and CARC 301 or VIST 494.

VIST 409 Capstone Studio  
Credits 3. 1 Lecture Hour. 5 Lab Hours.  
Completion of the proposed capstone project; integration of core methodologies, concept development, drawing and design, art history, aesthetics, research, methodology and processes, scripting and programming and digital communication; required peer reviewed publication or other appropriate venue.  
Prerequisites: VIST 405 and VIST 439.

VIST 432 Applied Perception  
Credits 3. 3 Lecture Hours.  
Topics in perceptual science useful for Visualization; cognitive, neural and evolutionary processes that undergird perceptual systems; perceptual factors that influence design decision.  
Prerequisite: Upper division in Visualization.

VIST 439 Capstone Proposal Development  
Credit 1. 2 Lab Hours.  
Individual proposal development for capstone studio; demonstration of ideation and concept development, drawing and design, art history, aesthetics, research, methodology and processes, scripting or programming and digital communication.  
Prerequisites: VIST 339 and VIST 375.

VIST 441 Scientific and Technological Developments in Visual Arts  
Credits 3. 3 Lecture Hours.  
Advanced level course focusing on the relationship between art, science and technology; visual arts before the digital revolution; the development of computer graphic arts.  
Prerequisite: Upper division in Visualization.

VIST 442 Digital Characters: Art, Technology, Uses and Meaning  
Credits 3. 2 Lecture Hours.  
Examination of the art and technology employed in the creation of digital characters; exploration of the reasons for, and impact of, their use in popular media and science; digital character creation techniques; estimating performance requirements; visual examples and written work used to illustrate topics and application areas.  
Prerequisite: Grade of C or better in ARTS 349.

VIST 465 Art, Culture and Time Based Media  
Credits 3. 2 Lecture Hours.  
Exploration of perception, vision and self-expression for communication through time based media; investigation of expression, vision, and visual language as a process; practice of visual communication strategies.  
Prerequisites: Grade of C or better in ARTS 349.

VIST 470 Digital Rendering  
Credits 3. 3 Lecture Hours.  
Creation of photorealistic images; rendering techniques and control; perceptual and physical principles related to creating realistic images; lighting and environmental effects; properties of materials; rendering models and techniques for adding visual detail; shading languages.  
Prerequisite: Grade of C or better in VIST 271.

VIST 472 Digital Compositing  
Credits 3. 3 Lecture Hours.  
History, mathematical foundations, techniques and applications used in combining two dimensional images for film, video and multimedia; includes theoretical foundations of the digital image, color spaces and corrections, matte techniques, keying, rotoscoping, camera and object tracking, stereo compositing and process workflow.  
Prerequisite: Grade of C or better in VIST 271.

VIST 474 Designing for the Web  
Credits 3. 2 Lecture Hours.  
Principles of web page and site creation; elements of visual design; typography for the web; web technologies; controlling the page real estate through cascading style sheets (CSS); imaging for the web; creation and use of color and graphics; web standards; building complete web sites.  
Prerequisite: Upper division in Visualization or minor in Art.

VIST 476/CSCE 447 Data Visualization  
Credits 3. 3 Lecture Hours.  
Visual representation and design of data and information; 3D visualization, infographics, data narratives, principles of visual data encoding and interaction techniques.  
Prerequisite: Grade of C or better in VIST 271, or CSCE 221, or CSCE 441.  
Cross Listing: CSCE 447/VIST 476.
VIST 477/CSCE 446 Virtual Reality  
Credits 3. 3 Lecture Hours.  
Theory and practice of virtual reality; interactive 3D virtual environments; input/output devices, 3D interaction techniques, augmented reality, role of realism in VR, navigation techniques, design guidelines and evaluation methods.  
Prerequisite: Grade of C or better in VIST 271, CSCE 221, or CSCE 441.  
Cross Listing: CSCE 446/VIST 477.

VIST 484 Summer Internship  
Credits 3. 3 Lecture Hours.  
Practical experience in a visualization related company; 10-week internship with a minimum of 400 hours continuous employment; departmental pre-approval through the departmental internship coordinator required; post evaluation conducted following the internship. May not be repeated for credit.  
Prerequisites: Upper division in Visualization and approval of visualization intern coordinator.

VIST 485 Directed Studies  
Credits 1 to 6. 1 to 6 Other Hours.  
Special problems in visual studies. May be repeated for up to 9 credit hours.  
Prerequisite: Approval of instructor and undergraduate program coordinator.

VIST 486 Introduction to Game Design  
Credits 3. 3 Lecture Hours.  
Computer game design; emphasis on interactive storytelling, game play and interface design; history of computer games, review of selected games; analysis of rules of play and simple game prototype development.  
Prerequisite: Grade of C or better in VIST 375, or minor in Game Design and Development.

VIST 487/CSCE 443 Game Development  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Aesthetic and technical aspects of computer game development, including game mechanics, story development, content creation and game programming; includes game design, interface design, 3D modeling and animation, graphics algorithms, shader programming and artificial intelligence; group project includes the design and development of a game from start to finish.  
Prerequisite: VIST 486 or CSCE 441 or approval of instructor; junior or senior classification.  
Cross Listing: CSCE 443/VIST 487.

VIST 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified field of visual studies. May be repeated for up to 9 credit hours.  
Prerequisite: Approval of instructor and undergraduate program coordinator.

VIST 491 Research  
Credits 1 to 4. 1 to 4 Other Hours.  
Research conducted under the direction of faculty members in visualization; emphasis on visual studies. May be repeated 2 times for credit.  
Prerequisites: Upper division in Visualization; approval of instructor and undergraduate program coordinator.

VIST 494 Internship  
Credits 6. 6 Other Hours.  
Practical experience in a visualization related company; equivalent of 600 hours over at least 15 weeks; departmental pre-approval through the departmental internship coordinator required; post evaluation conducted following the internship. May not be repeated for credit.  
Prerequisites: Upper division in Visualization and approval of Visualization intern coordinator.