DES 210 Industrial Science (Units: 3)
Nature, properties, and processing of common industrial materials used in the design and production of today's manufactured products: metallics, plastics, wood, paper, fibers, and textiles, ceramics, coatings, and composite materials. (Plus-minus letter grade only)

DES 220 Introduction to Drawing for Designers (Units: 3)
Prerequisite: Restricted to lower division Pre-Industrial Arts (Design & Industry)-BA majors or consent of instructor.

Introduction to drawing for design professions: graphic design, industrial design, digital media, and marketing. Learning to draw as learning to see and understand two- and three-dimensional objects, to give form to design ideas and to communicate these ideas to others. (Plus-minus letter grade only)

DES 222 Introduction to 2D Digital Design (Units: 3)
Prerequisite: Restricted to lower division Pre-Industrial Arts (Design & Industry)-BA majors or consent of instructor.

Digital software and design processes for creating and editing digital images, illustration, documents for print and digital applications. Topics include design vocabulary, conceptualization methods, and text formatting. Students will develop and apply their knowledge through analysis, critique, projects and exercises. (Plus-minus letter grade only)

DES 226 Modern Letterpress Printing: Traditional and Digital Techniques (Units: 3)
Integration of centuries-old methods of letterpress into contemporary design processes. Direct, hands-on work with digital and letterpress proofing press to explore typographic principles, technical methods, lettering, vector illustration, photographic images, and more. Work is project-driven, featuring demos, critique, field trips. May be repeated for a total of 6 units. (Plus-minus letter grade only)

Course Attributes:
- C1: Arts

DES 227 Rethinking Digital Visual Media: History, Technology, and Content (Units: 3)
Digital visual media (computer animation, interactive multimedia, Internet, virtual worlds) viewed through the lenses of history, cultural impact, technology, and production techniques.

DES 256 Design and Society: Contemporary Design Issues and Applications (Units: 3)
Introduction to contemporary design issues, applications, and professions; exploration of design's wide ranging social impacts from visual communication to product design, transportation to city planning, green design to design for social good. (Plus-minus letter grade only)

Course Attributes:
- C1: Arts

DES 300 Design Process (Units: 3)
Prerequisites: Upper division standing; restricted to DES majors; DES 323, DES 356, and DES 370 with a grade of C or better; or consent of instructor.

Creativity and the design process. Individual and group creative problem solving related to graphic communications and product design/development for industry. Laboratory. (Plus-minus letter grade only)

DES 305 Lab Safety Basics (Unit: 1)
Prerequisite: Restricted to DES majors and graduate students in product design/development area.

Introduction to basic power and hand tools in the product design labs to ensure safe operation of tools for the duration of the student's program of study; proper dress, techniques, and protective equipment. May be repeated for a total of 2 units. (CR/NC grading only)

DES 310 Product Design 1 (Units: 3)
Prerequisites: Restricted to upper division DES majors; DES 323, DES 356, DES 370, DES 305, DES 320, and DES 321 with grade of C or better; or consent of instructor.

Industrial manufacturing processes related to the development of three dimensional objects for product and interior designers and manufacturing personnel. Laboratory. Extra fee required. (Plus-minus letter grade only)

DES 320 Drafting and Sketching for Design (Units: 3)
Prerequisites: Upper division standing or consent of instructor; DES 323, DES 356, and DES 370 with a grade of C or better; or consent of instructor.

Mechanical and freehand drawing, the reproduction of drawings, and interpretation of graphic projections. Perspective drawing and the common elements of technical illustration. Signs and symbols of design and drafting. Laboratory. Extra fee required.

DES 321 Technical Drawing 1: Introduction to CAD (Units: 3)
Prerequisites: Upper division standing or consent of instructor; DES 323, DES 356, and DES 370 with a grade of C or better; restricted to DES majors.

Fundamentals of two-dimensional geometric image generation techniques to familiarize the student with computer-aided drafting (CAD). Microcomputer CAD hardware and software. Laboratory. Extra fee required. (Plus-minus letter grade only)

DES 322 Computer Graphic Imaging (Units: 3)
Prerequisites: Upper division standing; restricted to DES majors; DES 323, DES 356, and DES 370 with a grade of C or better; or consent of instructor.

Comprehensive studies in computer imaging process and production: digital image generation, image conversion processing, image assembly, and image production and reproduction. Selected computer graphic applications and software packages. Extra fee required.

DES 323 Visual Design Literacy (Units: 3)
Prerequisites: Upper division standing; restricted to DES majors; ENG 214 or equivalent with a grade of C or better; or consent of instructor.

Fundamental visual design principles, vocabulary, and applications in design. Topics relevant to 2D and 3D design techniques for both tangible and virtual results. (Plus-minus letter grade only)
DES 324GW Research and Writing for Design - GWAR (Units: 3)
Prerequisites: Restricted to DES majors; ENG 214 or equivalent with a grade of C or better, DES 323, DES 356, and DES 370 with a grade of C or better.
Critical examination of works across the industry sub-disciplines of product design, visual communication and new media. Authoring design concepts and shaping visual presentations. (ABC/NC grading only) [CSL may be available]
Course Attributes:
- Graduation Writing Assessment

DES 325 Graphic Design 1: Introduction (Units: 3)
Prerequisites: Restricted to upper division DES majors; DES 322, DES 323, DES 356, and DES 370 with a grade of C or better; or consent of instructor.
Design principles and problem solving for visual communication. Basic digital production tools and techniques for creating print and screen media. Laboratory. Extra fee required. (Plus-minus letter grade only)

DES 327 Digital Media 1 (Units: 3)
Prerequisites: Restricted to upper division DES majors; DES 322, DES 323, DES 356, and DES 370 with a grade of C or better; or consent of instructor.
Introduction to digital media design focusing on Web design. Conceptual approaches to structuring information and interaction, basic graphic design considerations germane to networked media, and basic production skills. Laboratory. Extra fee required. (Plus-minus letter grade only)

DES 330 Industrial Design Outreach (iDo) (Units: 3)
Prerequisites: Upper division standing; restricted to DES major; DES 323, DES 356, and DES 370; or consent of instructor.
Development and delivery of industrial design educational experiences to underserved high school students; providing hands-on interdisciplinary design projects to help foster curiosity, creativity, and build self-confidence. May be repeated for a total of 6 units. (Plus-minus letter grade only) [CSL may be available]

DES 332 Electricity and Electronics (Units: 3)
Prerequisites: Restricted to upper division DES majors; DES 323, DES 356, and DES 370 with a grade of C or better; or consent of instructor.

DES 340 Design and Materials (Units: 3)
Prerequisites: Restricted to upper division DES majors; DES 323, DES 356, DES 370, and DES 305 with grades of C or better; or consent of instructor.
Properties of industrial materials related to design and manufacture of contemporary products; design process of material properties and traditional technologies relative to the form and function of design objects. Classwork, 2 units; laboratory, 1 unit. (Plus-minus letter grade only)

DES 342 Metals Manufacturing (Units: 3)
Prerequisites: Restricted to upper division DES majors; DES 321, DES 323, DES 356, and DES 370 with a grade of C or better; or consent of instructor.
Contemporary metals design and manufacturing processes. Evolution of metal forming practices from traditional to computer-based automated processes. Laboratory. Extra fee required. (Plus-minus letter grade only)

DES 344 Plastics for Design (Units: 3)
Prerequisites: Restricted to upper division DES majors; DES 323, DES 356, and DES 370 with a grade of C or better; or consent of instructor.
History and development of the plastics industry; basic materials, processes, technology, and application for design. Laboratory. Extra fee required.

DES 356 A History of Design and Technology (Units: 3)
Prerequisites: Upper division standing; restricted to DES majors; ENG 214 or equivalent with a grade of C or better; or consent of instructor.
History of modern design and attendant technology issues. Antecedents of modern design in product design, visual communications, and allied sectors in design. (Plus-minus letter grade only)

DES 360 Model Development Laboratory (Units: 3)
Prerequisites: Restricted to DES majors; DES 300 or equivalent, DES 323, DES 356, DES 370, and DES 305 with a grade of C or better; or consent of instructor.
Rudiments of model building for the industrial designer. Production of various levels of models including presentation-grade models. Laboratory. Extra fee required. (Plus-minus letter grade only)

DES 370 Introduction to Design and Industry (Unit: 1)
Prerequisites: Upper division standing; restricted to DES majors; ENG 214 or equivalent with a grade of C or better; or consent of instructor.
Orientation to major program and concentrations, resources, and extracurricular opportunities. Issues and trends in design, technology, and industry. Selecting a faculty adviser and developing a program of major study. Vocational outlooks and opportunities for graduate study. (CR/NC grading only)

DES 405 How to Develop, Patent, and Market an Idea (Units: 3)
Prerequisite: Upper division standing or consent of instructor.
Presentations by experts from the field concerning consumer trends, procedures, pitfalls, advantages, and disadvantages involved in developing, patenting, and marketing new ideas or products.

DES 410 Product Design 2 (Units: 3)
Prerequisites: Restricted to DES majors; DES 300, DES 305, DES 310, DES 321, DES 420; or consent of instructor.
Introduction to the product design and development process: people, process and product. User/market research, product development documentation, concept visual, models and applications. Extra fee required. (Plus-minus letter grade only)

DES 420 Rapid Visualization (Units: 3)
Prerequisites: Restricted to upper division DES majors; DES 370 with a grade of C or better.
Illustration of product and graphic design ideas. Three-dimensional sketching and rendering techniques. Classwork, 2 units; laboratory, 1 unit. (Plus-minus letter grade only)
DES 421 Technical Drawing 2: 3-D Solid Modeling (Units: 3)
Prerequisites: Restricted to upper division DES majors; DES 321 or equivalent; or consent of instructor.

Industry standard computer-aided drafting. Use of digital computer to develop working drawings in architectural and industrial design. Practice with industrial input and output device. Laboratory. Extra fee required. (Plus-minus letter grading only)

DES 425 Graphic Design 2: Typography (Units: 3)
Prerequisites: Restricted to upper division DES majors; DES 322 and DES 325 with grades of C or better; or consent of instructor.

Typographic design and its use in the problem solving process of layout design. Classic design exercises and experimentation in contemporary applications of type and letterforms as design elements. Laboratory. Extra fee required. (Plus-minus letter grade only)

DES 427 Digital Media 2 (Units: 3)
Prerequisites: Restricted to upper division DES majors; DES 327 with a grade of C or better; or consent of instructor.

Rich media design strategies and authoring techniques featuring graphical interaction, motion graphics, sound and video content for Web and mobile platforms. Laboratory. (Plus-minus letter grade only)

DES 430 Industrial Controls (Units: 3)
Prerequisites: Restricted to DES majors; DES 332; or consent of instructor.

DC/AC concepts associated with motors, generators, transformers, control devices, and electrical distribution systems as they pertain to industry applications. (Plus-minus letter grade only)

DES 460 Rapid Prototyping and Manufacturing Systems (Units: 3)
Prerequisites: Restricted to DES majors; DES 300, DES 305, DES 310, and DES 321, or equivalent; or consent of instructor.

Design applications for Rapid Prototyping and Computer Integrated Manufacturing (CIM) systems; Manufacturing Resource Planning (MRP), integration methodologies and flexible manufacturing systems. Classwork, 2 units; lab 1 unit. Extra fee required. (Plus-minus letter grade only)

DES 470 Portfolio Development (Unit: 1)
Prerequisite: Restricted to upper division DES majors or consent of instructor.

Development, types, containers of visual materials for showing the products of a student in a handy format, ready for presentation upon completion of schooling. May be repeated for a total of 2 units. (Plus-minus letter grade only)

DES 475 Topics in Design and Industry (Units: 3)
Prerequisite: Restricted to upper division DES majors or consent of instructor.

Directly supervised special topic design study taking various forms including teaching assistantship, group project, etc. Topic to be specified in Class Schedule. May be repeated when topics vary.

DES 505 Senior Design Project (Units: 3)
Prerequisites: Restricted to senior DES majors; all DES core requirements.

Culminating DES problem-solving experience. Initiating an industrial research and development project; conducting all phases of the design development, from initial research, testing and prototyping, along with feasibility analysis and presentation. (Plus-minus letter grade only) [CSL may be available]

DES 510 Product Design 3 (Units: 3)
Prerequisites: Restricted to upper division, graduate, or second BA standing in DES; DES 300, DES 310, DES 321, DES 410, DES 420; and/or consent of instructor.

Integration of design skills established in introductory courses and designing for human needs. (Plus-minus letter grade only)

DES 521 Technical Drawing 3: Advanced Modeling and Rendering (Units: 3)
Prerequisites: Restricted to DES major; DES 321 and DES 421; or consent of instructor.

Advanced techniques in solid and surface modeling and rendering, using computer aided design software and rendering programs to create accurate and visually compelling 3-D models; rapid prototyping component. (Plus-minus letter grading only)

DES 523 Information Design I: Data Visualization (Units: 3)
Prerequisites: Restricted to upper division DES majors or minors; DES 323, DES 356, DES 370, and DES 300, DES 322, DES 325, DES 327; or consent of instructor.

Introduction to the field of information design focusing on data visualization problems for digital media, print, and environmental communication. Laboratory. Extra fee required. (Plus-minus letter grade only)

DES 524 Information Design 2: Exhibit Design (Units: 3)
Prerequisites: Restricted to upper division DES majors or minors; DES 300, DES 305, DES 322, DES 323, DES 356, DES 370, and DES 310 or DES 325 or DES 327 with a grade of C or better; or consent of instructor.

Development of multimedia materials for presentations and exhibits. Methods of communicating diverse subject matter through various media, three dimensional devices, and representative models. Laboratory.

DES 525 Graphic Design 3: Advanced (Units: 3)
Prerequisites: Restricted to DES majors; DES 425 with a grade of C or better; or consent of instructor.

Application of design principles in the solution of complex design projects. Laboratory. Extra fee required. (Plus-minus letter grade only)

DES 527 Digital Media 3 (Units: 3)
Prerequisites: Restricted to DES majors; DES 327 and DES 427 with grades of C or better; or consent of instructor.

Focused experimentation and production in topics such as motion graphics, digital compositing, and interaction design. Laboratory. (Plus-minus letter grade only)
DES 532 Applied Digital Electronics (Units: 3)  
Prerequisites: Restricted to DES majors or minors; DES 332 or consent of instructor  
Study of basic Transistor-Transistor-Logic (TTL) gates, combinational logic systems, counters, registers, encoders, decoders, Analog/Digital (A/D), D/A, and the tools/techniques used for analysis and application of digital circuits. Laboratory. Extra fee required. (Plus-minus letter grade only)  

DES 560 Prototyping Smart Devices (Units: 3)  
Prerequisites: Restricted to upper division DES majors or minors; PHYS 101, DES 310, DES 321, DES 360.  
Computer programming and electronic hardware design as applicable to product design practice. Use of microcontrollers, sensors, digital I/O devices and various programming environments. Techniques of prototyping interactive electronic "smart" products for demonstration and evaluation. Extra fee required. (Plus-minus letter grade only)  

DES 570 Professional Practices for Designers (Units: 3)  
Prerequisites: Restricted to senior DES majors; DES 300, DES 322, DES 325, DES 327; or consent of instructor.  
Professional standards and practices of design. Development of an entry-level design portfolio and supporting documentation. Investigation of design and related roles in industry, employment opportunities, professional associations, design ethics, and interview skills. Hybrid components. Activity. (Plus-minus letter grade only)  

DES 575 Workshop (Units: 3)  
Prerequisites: Restricted to upper division DES majors or minors; completion of DES 323, DES 356, and DES 370.  
Supervised study/activities taking various forms including teaching assistantship, independent study, group project, etc. Topic to be specified in Class Schedule. May be repeated when topics vary. Laboratory. Extra fee may be required. [CSL may be available]  

DES 576 Practical Experience: Internship (Units: 3)  
Prerequisites: Restricted to upper division DES majors; completion of DES 323, DES 356, and DES 370.  
In-service experience in a special field. Directed experience in teaching and/or industry. May be repeated for a total of 9 units. (CR/NC grading only) [CSL may be available]  

DES 627 Advanced Projects in Visual Communication Design (Units: 3)  
Prerequisite: Restricted to upper division DES majors or consent of instructor.  
Development of student-driven project in advanced areas of digital and/or print media. Topics may include programming in design, physical computing, mobile media, corporate identity, information design. Extra fee required. May be repeated for a total of 6 units. (Plus-minus letter grade only) [CSL may be available]  

DES 628 Design Gallery: Exhibitions and Communications (Units: 3)  
Prerequisites: Restricted to upper division DES majors; DES 322, DES 356 with a grade of C or better; or consent of instructor.  
Theory and production of exhibitions, symposia, and publications for the Design Gallery, including planning, preparation, annotation, and critique. May be repeated for a total of 6 units. (Plus-minus letter grade only)  

DES 700 Seminar in Design Research (Units: 3)  
Prerequisite: Graduate Essay Test must be taken within 6 months of starting graduate program.  
Seminar in research methodology and introduction to the graduate program. Must be completed in first semester of enrollment. (Plus-minus letter grade only)  

DES 701 Seminar: Trends and Issues (Units: 3)  
Prerequisite: Graduate standing in Consumer and Family Studies or Design and Industry.  
Trends and issues in discipline-specific fields affecting individuals, families, and communities. Review of research; and application of findings to problems. (This course is offered as CFS 700 and DES 701. Students may not repeat the course under an alternate prefix.)  

DES 724 Graduate Research Methods and Scholarly Writing for Creative Disciplines (Units: 3)  
Prerequisite: DES 700 with a passing grade or consent of instructor.  
Overview and practicum of graduate level research methods and scholarly writing forms, such as literature review, methods, abstracts, chapter outlines, in preparation for graduate creative work and thesis projects. Specific methods, techniques, and strategies for students in creative disciplines. (Plus-minus AB/NC)  

DES 750 Seminar in Industrial Design Education (Units: 3)  
Prerequisite: DES 700 or consent of instructor.  
Principles and practices for teaching industrial design curriculum including planning of curriculum, design of content, and creation of learning tools with consideration for experiential learning methods. (Plus-minus letter grade only)  

DES 755 Seminar in Design Management (Units: 3)  
Prerequisite: DES 700 or consent of instructor.  
Students create a production using their project management skills throughout the experience. (Plus-minus letter grade only)  

DES 800 Seminar in Design Topics (Units: 3)  
Prerequisite: DES 700 or equivalent.  
Design theory and practice. Special techniques in individual and group approaches to problem solving. (Plus-minus letter grade only)  

DES 805 Seminar in Design Methodology (Units: 3)  
Prerequisite: Graduate standing or consent of instructor.  
Research driven design projects using advanced methodologies related to user centered design, market/consumer research, human factors, product development, etc. Topic to be specified in Class Schedule. May be repeated when topics vary. (Plus-minus letter grade only)  

DES 852 Directed Experience in Design and Industry (Units: 3)  
Prerequisite: Consent of graduate major advisor, supervising faculty member, and department chair.  
Specified activities related to studies in industrial and technology education, design, or industrial technology. May be repeated for a total of 6 units. [CSL may be available]
DES 894 Creative Work Project (Units: 3)
Prerequisites: Consent of instructor and departmental graduate committee; and approval of Advancement to Candidacy (ATC) and Culminating Experience (CE) forms by Graduate Studies. ATC and Proposal for Culminating Experience Requirement forms must be approved by the Graduate Division before registration.

DES 898 Master's Thesis (Units: 3)
Prerequisites: Consent of instructor and major adviser and approval of Advancement to Candidacy (ATC) and Culminating Experience (CE) forms by Graduate Studies. ATC and Proposal for Culminating Experience Requirement forms must be approved by the Graduate Division before registration. (CR/NC grading only)

DES 899 Independent Study (Units: 3)
Prerequisite: Enrollment by petition approved by the supervising instructor, the major adviser, and the department chair.

Special study of a particular problem in industry or industrial education conducted under the direction of a faculty member. May be repeated. [CSL may be available]