DIGITAL DESIGN & FABRICATION

Digital Design & Fabrication (DDF) represents a unique partnership between the Schools of Fine & Performing Arts and Science & Engineering aimed at preparing students to conceptualize and design for 21st-century manufacturing.

DDF programs combine Fine & Performing Arts' expertise in design with Science & Engineering's expertise in materials science to introduce students to design theory, aesthetics, 3D modeling skills, and material properties and constraints, while applying analytical approaches to problem solving. An undergraduate minor and a Master of Arts (MA) program offer an interdisciplinary curriculum that encourages research and communication across fields to provide students with a foundation in design thinking for a modern world.

Computer-aided design classes are augmented with specialized courses covering computer programming and the use of open-source microprocessor boards, providing students with an understanding of the application and the technological aspects of emerging processes and materials. The minor culminates with a design course focused on the application of human-centered design for the manufacture of functional products that address real-world problems.

For DDF program information, contact:

Aaron Nelson
Associate Professor
Office: EIH 104
Phone: (845) 257-7887
E-mail: nelsona@newpaltz.edu

Successful completion of the minor in Digital Design & Fabrication will enable students to:

- Develop proficiency in 3D CAD Modeling and the ability to apply those skills to design;
- Cultivate a knowledge of manufacturing and fabrication processes, both advanced and traditional, and the ability to blend the two;
- Understand the application of computational processes in art and design for developing new tools and systems, form finding, and a medium of expression;
- Develop a design methodology that uses adaptive and iterative problem-solving strategies to reach solutions throughout the design process;
- Implement novel technological solutions bridging the liminal space between digital and physical systems.

Minor in Digital Design & Fabrication

(18-19 credits)

A grade of C or better is required to earn credit toward the Digital Design & Fabrication minor.

Code	Title	Credits
Required Introductory Courses (6 Credits)		
DDF205	Computer Aided Design I	3
DDF210	Computer Aided Design II	3
Required Intermediate Courses (9 Credits)		
DDF220	Introduction to Computation for Media	3
DDF305	Advanced 3D Printing	3
DDF310	Introduction to Designing with Microprocessors	3
Elective Course (3-4 Credits)		
Select one of the following:		3-4
Any DDF course		
Any art studio course at the 200 level or above		
EGM221	Engineering Materials	
EGE200 & EGE201	Circuit Analysis and Circuits Laboratory	
CHE202 & CHE212	General Chemistry II and General Chemistry II Lab	
Total Credits		**18-19**

DDF205. Computer Aided Design I. 3 Credits.

Introduces 3D computer aided design and drawing, rapid manufacturing. Students become acquainted with the virtual spaces of CAD software and NURBS geometry with the intent to output tangible objects through 3D printing. COURSE FEE.

Restrictions:

- Must have the following level: Undergraduate

Prerequisites:

- Math Placement Level Minimum Score of 3 or MAT 153 Minimum Grade of C or MAT053 Minimum Grade of C

May be repeated for credit

DDF210. Computer Aided Design II. 3 Credits.

This course furthers knowledge learned from DDF205, developing as advanced understanding of NURBS surfacing along with introducing organic modeling and mesh sculpting. Further application of 3D visualization technologies and advanced manufacturing will be emphasized. COURSE FEE.

Restrictions:

- Must have the following level: Undergraduate

Prerequisites:

- DDF205 Minimum Grade of C or ARS 337 Minimum Grade of C

May not be repeated for credit

DDF220. Introduction to Computation for Media. 3 Credits.

This course focuses on fundamental concepts of programming (variables, conditional, iteration, functions, and objects) and then uses these concepts to create animations, graphics, sound and 3D-models. It also touches on more advanced techniques such as image processing, computer vision, data parsing and 3D graphics. COURSE FEE.

Restrictions:

- Must have the following level: Undergraduate

Prerequisites:

- DDF205 Minimum Grade of C
- DDF210 Minimum Grade of C

May not be repeated for credit

DDF293. Dgtl Dsgn & Fab Selected Topic. 0 Credits.

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.
May be repeated for credit

DDF305. Advanced 3D Printing. 3 Credits.

This course takes students though preparing and printing files on professional level 3D printers. Students will develop the hands on technical skills needed to operate and maintain a variety of industrial grade printers in the work force. They will use critical thinking skills to identify the material, method and machine best suited for a particular application. Students will have an opportunity at the end of the course to take an exam to receive Stratasys 3D printing certification.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration): Digital Design and Fabrication (DDF)

Prerequisites:

- DDF205 Minimum Grade of C
- DDF210 Minimum Grade of C

May not be repeated for credit

DDF310. Introduction to Designing with Microprocessors. 3 Credits.

This course introduces students to the integration of mechanical, electrical, and computer technologies into the design of computer controlled electro-mechanical systems. Students will learn the basics of component creation and part selection for practical use. Programming and interfacing an industry standard microcontroller will provide the intelligence needed to sense, control, actuate, and communicate. Emphasis will be placed on the use of additive manufacturing (3D Printing) as the output platform.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration): Digital Design and Fabrication (DDF)

Prerequisites:

- DDF205 Minimum Grade of C
- DDF210 Minimum Grade of C
- DDF220 Minimum Grade of C
- DDF305 Minimum Grade of C

May not be repeated for credit

DDF320. Design Intents. 3 Credits.

This course introduces collaborative team research and interdisciplinary practices that approach real world challenges. Tenets of design practices include being human-centeredness, prototype-driven, and mindful of process. Topics include design processes/innovation methodologies, need finding, human factors, visualization, rapid prototyping, team dynamics, storytelling, and project leadership. COURSE FEE.

Restrictions:

- Must not be enrolled in the following class: Freshman

Prerequisites:

- DDF205 Minimum Grade of C
- DDF210 Minimum Grade of C
- DDF310 Minimum Grade of C

May not be repeated for credit

DDF393. Dgtl Dsgn & Fab Selected Topic. 1-12 Credits.

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.
May be repeated for credit

DDF495. Indep Study Digital Design Fab. 1-12 Credits.

May be repeated for credit

DDF502. Introduction to Computation for Media. 3 Credits.

The course focuses on the fundamental concepts of programming (variables, conditionals, iteration, functions, and objects) and then uses these concepts to create animations, graphics, sound and 3D-models. It also touches on more advanced techniques such as image processing, computer vision, data parsing and 3D graphics.

Attributes:

- Liberal Arts

Restrictions:

- Must have the following level: Graduate

May not be repeated for credit

DDF510. Computer Aided design 1. 3 Credits.

Introduces 3D computer aided design and drawing, rapid manufacturing. Students become acquainted with the virtual spaces of CAD software and NURBS geometry with the intent to output tangible objects through 3D printing.

Restrictions:

- Must be enrolled in the following class: Graduate

May not be repeated for credit

DDF512. Computer Aided Design 2. 3 Credits.

Furthers the student knowledge and skills taught in DDF510 CAD1, developing an advanced understanding of 3-dimentional modeling and fabrication. Parametric modeling and further application of 3D visualization technologies and advanced additive manufacturing process will be emphasized.

Restrictions:

- Must be enrolled in the following class: Graduate

Prerequisites:

- DDF510 Minimum Grade of C

May not be repeated for credit

DDF555. 3D Computational Design. 3 Credits.

This course serves as an introduction for designing 3D objects using a parameter-based computational approach. Students will be guided through using the fundamentals of programming variables, conditionals, loops and iteration) to explore software-based 3D modeling.

Restrictions:

- Must have the following level: Graduate

Prerequisites:

- DDF510 Minimum Grade of C-
- DDF502 Minimum Grade of C-

May not be repeated for credit

DDF560. Introduction to Designing with Microprocessors. 3 Credits.

Making Things Move is the integration of Science, Technology, Engineering, Art, and Math (STEAM). and computer technologies into synergic design of computer controlled electronic mechanical systems. The instructors approach to this course will be project based.

Restrictions:

- Must have the following level: Graduate

Prerequisites:

- DDF510 Minimum Grade of C
- DDF502 Minimum Grade of C

May not be repeated for credit

DDF593. DDF Selected Topic. 1-12 Credits.

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

Restrictions:

- Must be enrolled in the following class: Graduate

May be repeated for credit

DDF595. Independent Study DDF. 1-12 Credits.

Restrictions:

- Must have the following level: Graduate

May be repeated for credit

DDF701. Advanced Computer Aided Design. 3 Credits.

This course will expand upon skills developed in CAD I and CAD II and introduce alternative tools and techniques for the development of complex designs. Students will gather and manipulate 3D scan information, reverse engineer from scan data, develop an understanding of tri, quad, and n-gonal mesh topologies, and model multiple part assemblies.

Restrictions:

- Must have the following level: Graduate

Prerequisites:

- DDF512 Minimum Grade of C-

May not be repeated for credit

DDF705. Advanced 3D Printing. 3 Credits.

This course takes students through preparing and printing files on professional level 3D printers. Students will develop the hands on technical skills needed to operate and maintain a variety of industrial grade printers in the work force. They will use critical thinking skills to identify the material, method and machine best suited for a particular application. Students will have an opportunity at the end of the course to take an exam to receive Stratasys 3D printing certification.

Restrictions:

- Must have the following level: Graduate

Prerequisites:

- DDF512 Minimum Grade of C-

May not be repeated for credit

DDF710. Fabrication Processes. 3 Credits.

Fabrication process is concerned with the production of products and the manufacturing processes used to shape materials. Students will be exposed to rapid prototyping technologies that exist beyond 3D printing such as subtractive milling, laser cutting, and CNC.

Restrictions:

- Must have the following level: Graduate

Prerequisites:

- DDF512 Minimum Grade of C-

May not be repeated for credit

DDF790. Thesis Digital Design & Fabric. 1-6 Credits.

May be repeated for credit

DDF794. Fieldwork/Digital Design & Fab. 1-6 Credits.

May be repeated for credit

DDF795. Independent Study. 1-12 Credits.

May be repeated for credit