

3D PRINTING (DPT)

DPT 100 (3 credit hours)

Introduction to 3D Printing Technology

Introduces the world of additive manufacturing, or more commonly known as three-dimensional printing (3DP), and its applications in conjunction with computer technology. Introduces topics including computer hardware and software, 3D printing technology, file management, the Internet, email, the social web, sustainability, security, and computer and intellectual property ethics. Presents basic use of applications, artificial intelligence, programming, systems, and utility software. Lecture: 2 credits (30 contact hours). Laboratory: 1 credit (30 contact hours).

Attributes: Digital Literacy, Technical

Components: LAB: Laboratory, LEC: Lecture

DPT 102 (2 credit hours)

3D Printing Technology Fundamentals

Provides an introduction to the world of three-dimensional (3D) printing or additive manufacturing (AM) and its applications. Introduces topics including 3D printing technologies, basic use of 3D applications, programming, systems, 3D-scanning, and utility software. Lecture: 1 credit (15 contact hours). Laboratory: 1 credit (30 contact hours).

Pre- or co-requisite: CIT 105, demonstration of digital literacy competency by exam or certificate, or other approved course with digital literacy status.

Attributes: Technical

Components: LAB: Laboratory, LEC: Lecture

DPT 103 (1 credit hours)

Research Lab Experience

Exposes future technicians, entrepreneurs, innovators, designers, and professionals to basic innovative research and development processes in a laboratory setting with a focus toward additive manufacturing (also known as 3D printing), integration, and utilization. Demonstrates creative methods for new and low-cost product development, market research, and application discovery. Explores concepts of intellectual property protection and working with industry collaborators to develop new technologies and potential solutions to larger societal problems. Laboratory: 1 credit (30 contact hours).

Attributes: Technical

Components: LAB: Laboratory

DPT 104 (3 credit hours)

Advanced Scanning, Processing, and Quality Control

Provides a strong foundation of 3D scanning technologies and industry-level additive manufacturing quality control. Presents essential quality control topics, such as setting realistic expectations, inspection types, and industry certifications. Discusses advanced 3D scanning and processing techniques, how to apply this technology in multiple fields of work, and the ethics of its use. Lecture: 2 credits (30 contact hours); Laboratory: 1 credits (30 contact hours).

Pre-requisite: DPT 100.

Attributes: Technical

Components: LAB: Laboratory, LEC: Lecture

DPT 150 (3 credit hours)

Introduction to Engineering Mechanics for 3D Printing

Provides an introduction to simplified engineering mechanical principles as they apply to 3D printing, or additive manufacturing, designs and products. Requires students to apply concepts related to simple force and stress analysis, material property selection, and deformation to their designs for the purpose of improving functional performance and overall printing success. Explores finishing and post processing techniques to enhance the final appearance and marketability of their printed work. Lecture: 2 credits (30 contact hours). Laboratory: 1 credit (30 contact hours).

Pre-requisite: DPT 100 or DPT 102.

Attributes: Technical

Components: LAB: Laboratory, LEC: Lecture

DPT 201 (3 credit hours)

Advanced Slicing, Resin, and Fused Filament Fabrication

Constructs upon the foundations of slicing and common additive manufacturing applications found in earlier courses. Facilitates advanced techniques such as batch printing, purge settings, G-Code manipulation, automation scripts, multi-material printing, and mesh manipulation. Expresses the differences between desktop and industrial slicing as well as how each setting will affect part strength, post-processing, quality, and cost. Cultivates in-depth knowledge of entry-level resin and FFF hardware assembly, usage, and maintenance. Prerequisite(s): DPT 100, DPT 150. Lecture: 3 credits (45 contact hours).

Attributes: Technical

Components: LEC: Lecture

DPT 203 (3 credit hours)

Advanced Additive Manufacturing Hardware and Post Processing

Provides a detailed look into state-of-the-art additive manufacturing technologies such as electron beam melting, friction-based methods, bioprinting, etc. Provides hands-on projects and industry-relevant examples that will give students a greater understanding of how the technology is used at the highest levels. Critiques research and composition skills to ensure students can thoroughly describe the applications and advantages of different printing methods. Develops a strong foundation of post-processing skills. Demonstrates industry techniques applicable to well-known and exotic materials. Lecture: 2 credits (30 contact hours). Laboratory: 1 credit (30 contact hours).

Pre-requisite: DPT 100.

Attributes: Technical

Components: LAB: Laboratory, LEC: Lecture

DPT 210 (3 credit hours)

Introduction to Powder-Based Additive Manufacturing

Prepares technicians for the advanced applications and utilization of powder-based additive manufacturing, or 3D printing, materials, and equipment. Requires students to demonstrate knowledge of related safety, additive manufacturing processes, lightweighting, generative design, appropriate equipment utilization, and quality control methodologies. Directs students in applying finishing and post-processing techniques through the use of conventional machining equipment to enhance the final appearance, strength, and marketability of their work. Lecture: 2 credits (30 contact hours). Laboratory: 1 credit (30 contact hours).

Pre-requisite: DPT 100, CIT 105.

Attributes: Technical

Components: LAB: Laboratory, LEC: Lecture

DPT 212 (3 credit hours)**Additive Manufacturing for Supply Chain and Broad Industry Production**

Prepares industry technicians and professionals for the use of additive manufacturing technologies, also known as 3D printing, to produce new or existing products in low-and-medium-run volumes in response to the variety of reasons for global supply chain disruption or to facilitate new product market entry. Focuses on using technology to quickly produce specialized products for critical industry sectors such as biomedical, aerospace, agricultural, transportation, and industrial equipment repair. Prepares technicians to employ additive manufacturing technologies to support, enhance, or even replace conventional injection molding for consumer and industrial products. Lecture: 2 credits (30 contact hours). Laboratory: 1 credit (30 contact hours).

Pre-requisite: DPT 150.

Attributes: Technical

Components: LAB: Laboratory, LEC: Lecture

DPT 220 (3 credit hours)**Advanced Additive Materials, Properties, and Sustainability**

Outlines industry materials not frequently accessible in a classroom setting including but not limited to materials used in the aerospace, medical, automotive, and electronics industries. Emphasizes the importance of material selection, certification, safety, storage, and sustainability. Cultivates in-depth knowledge of what is possible through material science by exploring more exotic materials used in specialized applications such as biodegradable composites, bio-printing, and nano-printing. Explores material development through hands-on research and testing. Lecture: 2 credits (30 contact hours). Laboratory: 1 credit (30 contact hours).

Pre-requisite: DPT 100, DPT 150, DPT 201, DPT 203.

Attributes: Technical

Components: LAB: Laboratory, LEC: Lecture

DPT 280 (1 credit hours)**Special Projects for 3D Printing, Level I**

Allows the student to gain intermediate level experience in their prospective fields through projects and tasks assigned by the instructor and based on applications the student may one day experience as a professional. Focuses on various assignments and curriculum as determined by the program instructor. Laboratory: 1 credit (30 contact hours).

Pre-requisite: DPT 100 or DPT 102.

Attributes: Technical

Components: LEC: Lecture

DPT 281 (3 credit hours)**Special Projects**

Allows the student to gain intermediate level experience in their perspective fields through projects and tasks assigned by the instructor and based on applications the student may one day experience as a professional. Focuses on various assignments and curriculums as determined by the program instructor. Laboratory: 3 credits (90 contact hours).

Pre-requisite: DPT 100, DPT 150.

Attributes: Technical

Components: LAB: Laboratory

DPT 285 (3 credit hours)**Advanced Special Projects**

Operates as a capstone-like experience to hone the skills developed throughout the Additive Technology program. Demonstrates the most common stages of new product creation using additive manufacturing technologies and skills. Prepares students to generate complete documentation of the development and manufacturing processes. Assesses materials testing, concept review, marketing strategies and materials, cost analysis, and AI utilization for product development. Examines printing efficiency, advanced post-processing techniques, and quality control. Laboratory: 3 credits (90 contact hours).

Pre-requisite: DPT 100, DPT 150, DPT 281.

Attributes: Technical

Components: LAB: Laboratory

DPT 290 (3 credit hours)**Additive Manufacturing Internship**

Provides on-site job experience to students through partnerships with local businesses. Arranges internships for students at businesses that either already utilize Additive Manufacturing (AM) or need assistance in developing new internal AM operations. Defines a minimum of 120 contact hours of appropriate experience approved by the faculty member (40 contact hours per credit) and a learning contract signed by the student, faculty member, and supervisor. Laboratory: 3 Credits (90 Contact Hours).

Pre-requisite: DPT 100, DPT 104, DPT 150, DPT 203, DPT 280.

Attributes: Technical

Components: LAB: Laboratory