Course Title: **Technical Design 1**
Course Number: **8401010**
Course Credit: **1**

Course Description:
This course provides students with instruction in the characteristics and evolution of technology, underlying principles of design, and fundamental knowledge and skills in the use of illustration and drafting software. Included in the content is the use of essential application software.
The ultimate output of this course is a design portfolio created by the student. Each item or product included in the portfolio should include a narrative description and an explanation of the technical approach or techniques used to create the item. Consideration should be given to having students present the portfolio using presentation software.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
01.0	Demonstrate an understanding of the characteristics and scope of technology–The student will be able to:		
01.01	Discuss the nature and development of technological knowledge and processes.	LAFS.910.SL.1.1	
01.02	Conduct specific goal-directed research related to inventions and innovations.	LAFS.910.SL.2.5	
02.0	Demonstrate an understanding of the core concepts of technology–The student will be able to:		
02.01	Explain systems thinking and the relationship between logic, creativity, and compromise in solving complex problems.	LAFS.910.W.3.7, 8, 9	SC.912.N.1.1, 6
02.02	Describe technological systems and their role within larger technological, social, and environmental systems.	LAFS.910.W.4.10	SC.912.N.1.1, 6
02.03	Describe the trade-offs between competing values (e.g., availability, cost, desirability, waste, et al) in the selection of resources.	LAFS.910.W.4.10 MAFS.912.N-Q.1.1, 3	SC.912.N.1.1, 6
02.04	Describe the criteria and constraints of a solution and how they affect the final result.	LAFS.910.W.4.10	SC.912.N.1.1
02.05	Describe management and associated dynamics as they relate to technological development.	LAFS.910.W.4.10	SC.912.N.1.1
03.0	Demonstrate an understanding of the relationships among technologies and other fields of study–The student will be able to:		
03.01	Discuss technology transfer and its role in the evolution of technology.	LAFS.910.RI.1.1	
03.02	Describe the impact of sharing ideas, knowledge, or skills within a technology, among technologies, or across other fields.	LAFS.910.W.4.10	SC.912.N.1.1; 2.4
03.03	Explain how technological progress promotes advancement of science and mathematics.	LAFS.910.RI.1.1 LAFS.910.W.3.7, 8, 9	SC.912.N.1.1; 2.4
04.0	Demonstrate an understanding of the influence of technology on history–The student will be able to:		

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
04.01	Relate the advancement of technology to the evolution of civilization.	LAFS.910.RI.1.1 LAFS.910.W.3.7, 8, 9	SC.912.N.4.1
04.02	Describe ways in which technology helps to shape social, cultural, political, and economic aspects of society.	LAFS.910.RI.1.1 LAFS.910.W.3.7, 8, 9	SC.912.N.4.1
04.03	Describe the major technological developments that characterized the Industrial Revolution and their impact on society.	LAFS.910.RI.1.1 LAFS.910.W.3.7, 8, 9	SC.912.N.4.1
04.04	Describe the major technological developments that characterized the Information Age and their impact on society.	LAFS.910.RI.1.1 LAFS.910.W.3.7, 8, 9	SC.912.N.4.1
05.0	Demonstrate an understanding of the attributes of design–The student will be able to:		
05.01	Describe the essential activities that comprise the design process.	LAFS.910.W.2.4 LAFS.910.W.4.10	SC.912.N.1.1
05.02	Write a problem statement in sufficient clarity to enable design goals, requirements, and constraints to be identified.	LAFS.910.W.2.5; 4.10 MAFS.912.N-Q.1.1, 3	SC.912.N.1.1
05.03	Critique the design of a solution and revise the design as needed.	LAFS.910.RI.3.8	SC.912.N.1.1
05.04	Explain how a design's criteria, constraints, and efficiency can compete with each other.	LAFS.910.SL.1.1, 2, 3	SC.912.N.1.1
06.0	Apply the principles of engineering design in the creation and evaluation of a prototype–The student will be able to:		
06.01	Describe the fundamental principles of design (i.e., flexibility, balance, function, and proportion) and how each guides the design process.	LAFS.910.W.3.7, 8, 9	SC.912.N.1.1
06.02	Describe how personal characteristics and collaborative effort influence the design process.	LAFS.910.SL.1.1, 2, 3	SC.912.N.1.1
06.03	Test a design concept by creating a prototype suitable for determining the effectiveness of the design.	LAFS.910.RI.3.8	SC.912.N.1.1
06.04	Identify factors taken into account in the process of engineering design.	LAFS.910.SL.2.4	SC.912.N.1.1
07.0	Be able to select and use information and communication technologies–The student will be able to:		
07.01	Describe and give examples of the essential elements of a communication system (i.e., inputs, processes, and outputs).	LAFS.910.W.3.7 LAFS.910.SL.2.5	
07.02	Describe and give examples of human to human, human to machine, machine to human, and machine to machine communications.	LAFS.910.W.3.7 LAFS.910.SL.2.5	
07.03	Use information and communication systems to inform, persuade, entertain, control, manage, and educate.	LAFS.910.SL.2.4, 5	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	07.04 Compare and contrast the means of communicating visual messages (i.e., graphically, electronically) and associated forms (e.g., digital, analog, and multimedia).	LAFS.910.W.3.7, 8, 9	
	07.05 Compare and contrast the forms for communicating technological information (e.g., symbols, icons, graphic, measurement, et al).	LAFS.910.W.3.7, 8, 9	
08.0	Demonstrate an understanding of the processes and technologies employed in the design and production of technical illustrations and drawings–The student will be able to:		
	08.01 Differentiate between the types of computer generated illustrations (i.e., renderings, images, collages, and animations) and their appropriateness.	LAFS.910.W.3.7, 8, 9	
	08.02 Describe the activities and rationale for each step in the technical illustration process (i.e., information gathering, model creation, scene creation, rendering, and post production).	LAFS.910.W.3.7, 8, 9	
	08.03 Describe the range of activities involved in producing technical drawings, from rough sketch to final rendering.	LAFS.910.W.3.7, 8, 9	
	08.04 Compare and contrast the technologies used to produce technical illustrations and drawings using manual and computer methods.	LAFS.910.W.3.7, 8, 9	
09.0	Demonstrate technical knowledge and skills about the use and care of drafting instruments, equipment, and materials–The student will be able to:		
	09.01 Identify and demonstrate technical knowledge and skills about the use and care of drafting instruments and equipment.	LAFS.910.W.4.10 LAFS.910.L.3.6	
	09.02 Demonstrate technical knowledge and skills about the properties, specifications, and use of drafting materials and supplies.	LAFS.910.W.4.10 LAFS.910.L.3.6	
10.0	Demonstrate technical skills and applications common to all types of drafting–The student will be able to:		
	10.01 Apply lettering techniques.	LAFS.910.W.4.10	
	10.02 Make freehand sketches.	LAFS.910.W.4.10	
	10.03 Use drafting symbols and alphabet of lines in accordance with technical standards and practices.	LAFS.910.W.4.10	
	10.04 Apply measuring techniques.	LAFS.910.W.4.10 MAFS.912.N-Q.1.1, 3	SC.912.N.1.1
	10.05 Apply industry standard dimensioning techniques.	LAFS.910.W.4.10 MAFS.912.G-CO.1.1	SC.912.N.1.1
	10.06 Apply geometric construction techniques.	LAFS.910.W.4.10 LAFS.910.L.3.6 MAFS.912.G-CO.1.1, 2	
	10.07 Interpret information from drawings, prints, and sketches.	LAFS.910.W.4.10 LAFS.910.L.3.6 MAFS.912.N-Q.1.1, 3	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	10.08 Apply coordinate systems.	LAFS.910.W.4.10 LAFS.910.L.3.6 MAFS.912.A-REI.4.11	
	10.09 Produce and reproduce drawings using modern technical methods for drafting reproduction.	LAFS.910.W.4.10 LAFS.910.L.3.6 MAFS.912.N-Q.1.1, 3	
11.0	Demonstrate technical knowledge and skills for making basic orthographic drawings–The student will be able to:		
	11.01 Explain the theory of orthographic projection.	LAFS.910.W.2.6; 4.10 MAFS.912.G-SRT.1.2	
	11.02 Identify the six principal views of an object.	LAFS.910.W.2.6; 4.10 MAFS.912.G-SRT.1.2	
	11.03 Produce a three-view orthographic drawing using traditional drafting methods.	LAFS.910.W.2.6; 4.10 MAFS.912.G-SRT.1.2	
	11.04 Produce a three-view orthographic drawing using CAD software.	LAFS.910.W.2.6; 4.10 MAFS.912.G-SRT.1.2	
12.0	Demonstrate technical knowledge and skills for making pictorial drawings–The student will be able to:		
	12.01 Explain methods of pictorial drawing.	LAFS.910.W.2.6; 4.10 MAFS.912.G-CO.1.1	
	12.02 Produce an isometric drawing using traditional drafting methods.	LAFS.910.W.2.6; 4.10 MAFS.912.G-CO.1.1	
	12.03 Produce an isometric drawing using CAD software.	LAFS.910.W.2.6; 4.10 MAFS.912.G-CO.1.1, 2	
	12.04 Produce an oblique drawing using traditional drafting methods.	LAFS.910.W.2.6; 4.10 MAFS.912.G-CO.1.1	
	12.05 Produce an oblique drawing using CAD software.	LAFS.910.W.2.6; 4.10 MAFS.912.G-CO.1.1, 2	
	12.06 Produce a perspective drawing using traditional drafting methods.	LAFS.910.W.2.6; 4.10 MAFS.912.G-CO.1.1	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
	12.07 Produce a perspective drawing using CAD software.	LAFS.910.W.2.6; 4.10 MAFS.912.G-CO.1.1, 2	
13.0	Demonstrate technical knowledge and skills for making auxiliary view drawings–The student will be able to:		
	13.01 Explain terminology and concepts associated with auxiliary view drawings.	LAFS.910.W.2.6; 4.10 MAFS.912.G-CO.1.2, 5	
	13.02 Produce an auxiliary view drawing using traditional drafting methods.	LAFS.910.W.2.6; 4.10 MAFS.912.G-CO.1.2, 5	
	13.03 Produce an auxiliary view drawing using CAD software.	LAFS.910.W.2.6; 4.10 MAFS.912.G-CO.1.2, 5	
	13.04 Develop a pattern using surface development techniques.	LAFS.910.W.2.6; 4.10 MAFS.912.G-CO.1.2, 5	
14.0	Demonstrate technical knowledge and skills for making sectional view drawings–The student will be able to:		
	14.01 Define sectional view and types of sectional views.	LAFS.910.W.2.6; 4.10 MAFS.912.G-GMD.2.4	
	14.02 Illustrate the types of breaks and symbols used in drawing sectional views.	LAFS.910.W.2.6; 4.10 MAFS.912.G-GMD.2.4	
	14.03 Produce a sectional view drawing using traditional drafting methods.	LAFS.910.W.2.6; 4.10 MAFS.912.G-GMD.2.4	
	14.04 Produce a sectional view drawing using CAD software.	LAFS.910.W.2.6; 4.10 MAFS.912.G-GMD.2.4	
15.0	Demonstrate technical knowledge and skills for making working drawings–The student will be able to:		
	15.01 Produce detailed machine drawings.	LAFS.910.W.2.6; 4.10 MAFS.912.G-CO.1.1, 2, 5	
	15.02 Produce detailed assembly drawings.	LAFS.910.W.2.6; 4.10 MAFS.912.G-CO.1.1, 2, 5	
	15.03 Produce a technical illustration.	LAFS.910.W.2.6; 4.10 MAFS.912.G-CO.1.1, 2, 5	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
16.0	Demonstrate technical knowledge and skills for making a basic residential drawing–The student will be able to:		
16.01	Produce a dimensioned floor plan.	LAFS.910.W.2.6; 4.10 MAFS.912.G-SRT.1.1	
16.02	Produce dimensioned elevation drawings.	LAFS.910.W.2.6; 4.10 MAFS.912.G-SRT.1.1	
17.0	Identify computer components and their functions–The student will be able to:		
17.01	Identify the internal components of a computer (e.g., power supply, hard drive, mother board, I/O cards/ports, cabling, etc.).	LAFS.910.L.3.6	SC.912.N.1.1
17.02	Identify various computer input devices (e.g., mouse, keyboard, phone, camera) and describe their use.	LAFS.910.L.3.6	SC.912.N.1.1
17.03	Identify various computer output devices (e.g., monitor, printer, phone) and describe their use.	LAFS.910.L.3.6	SC.912.N.1.1
17.04	Identify various storage devices (e.g., flash drive, iPod, phone, external hard drive, etc.)	LAFS.910.L.3.6	SC.912.N.1.1
18.0	Demonstrate proficiency with common computer peripherals, including connections to standard input and output devices–The student will be able to:		
18.01	Identify the types and purposes of common input devices (e.g., mouse, keyboard, camera, microphone, scanner).	LAFS.910.SL.1.2	SC.912.N.1.1
18.02	Identify the types and purposes of specialized input devices (e.g., digital cameras, mobile devices, GPS devices).	LAFS.910.SL.1.2	SC.912.N.1.1
18.03	Describe the types and purposes of various computer connections (e.g., USB, firewire, parallel, serial, Ethernet, WiFi, et al).	LAFS.910.SL.1.2	SC.912.N.1.1
18.04	Connect an input device (e.g., mouse, keyboard, cell phone, camera, et al) and verify proper operation.	LAFS.910.RI.1.3; 2.4	SC.912.N.1.1
18.05	Connect an output device (e.g., printer, monitor, projector, et al) and verify proper operation.	LAFS.910.RI.1.3; 2.4	SC.912.N.1.1
19.0	Demonstrate knowledge of computer file management–The student will be able to:		
19.01	Describe and use conventional file naming conventions.	LAFS.910.SL.1.2 LAFS.910.RI.1.3	
19.02	Demonstrate proficiency with file management tasks (e.g., folder creation, file creation, backup, copy, delete, open, save).	LAFS.910.RI.1.3	
19.03	Be able to identify file types by extension (e.g., .doc, .txt, .wav, xls, etc.).	LAFS.910.SL.1.2 LAFS.910.RI.1.3	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
20.0	Demonstrate proficiency using the Internet to locate information–The student will be able to:		
20.01	Identify and use web terminology.	LAFS.910.L.3.6 LAFS.910.W.2.6	
20.02	Define Universal Resource Locators (URLs) and associated protocols (e.g., http, ftp, telnet, mailto).	LAFS.910.L.3.6	
20.03	Compare and contrast the types of Internet domains (e.g., .com, .org, .edu, .gov, .net, .mil).	LAFS.910.L.3.6	
20.04	Demonstrate proficiency using search engines, including Boolean search techniques.	LAFS.910.L.3.6 LAFS.910.W.2.6	
20.05	Apply the rules for properly citing works or other information obtained from the Internet.	LAFS.910.L.3.6	
20.06	Identify and apply Copyright Fair Use guidelines.	LAFS.910.L.3.6	
20.07	Evaluate online information for credibility and quality using basic guidelines and indicators (e.g. authority, affiliation, purpose, etc.).	LAFS.910.L.3.6	SC.912.N.1.4
21.0	Demonstrate an understanding of Internet safety and ethics–The student will be able to:		
21.01	Describe cyber-bullying and its impact on perpetrators and victims.	LAFS.910.W.3.7, 8, 9	
21.02	Differentiate between viruses and malware, specifically their sources, ploys, and impact on personal privacy and computer operation, and ways to avoid infection.	LAFS.910.W.3.7, 8, 9	
21.03	Demonstrate proficiency running an antivirus scan to remove viruses and malware.	LAFS.910.W.3.7, 8, 9	
21.04	Describe risks associated with social networking sites (e.g., FaceBook, MySpace, and Twitter) and ways to mitigate these risks.	LAFS.910.W.3.7, 8, 9	
21.05	Adhere to cyber safety practices with regard to conducting Internet searches, email, chat rooms, and other social network websites.	LAFS.910.W.3.7, 8, 9	
21.06	Adhere to Acceptable Use Policies when accessing the Internet.	LAFS.910.W.3.7, 8, 9	
22.0	Develop and apply word processing and document manipulation skills–The student will be able to:		
22.01	Apply and adjust margins, tabs, line spacing and paragraph indents.	LAFS.910.W.4.10	
22.02	Insert and manipulate text, graphics/images, and WordArt.	LAFS.910.W.4.10	
22.03	Format text using the font interface and styles interface.	LAFS.910.W.4.10	
22.04	Adjust the size, position, and layout wrapping settings of a graphic/image.	LAFS.910.W.4.10	
22.05	Use the status bar to determine the number of pages, words, and characters in a document.	LAFS.910.W.4.10	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
22.06 Insert codes for current date and time.	LAFS.910.W.4.10	
22.07 Copy text between documents using mouse, menu, and keyboard techniques.	LAFS.910.W.4.10	
22.08 Move text in a document using mouse, menu, and keyboard techniques.	LAFS.910.W.4.10	
22.09 Create bulleted and numbered lists.	LAFS.910.W.4.10	
22.10 Create a table – Inserting, moving and entering data.	LAFS.910.W.4.10	
22.11 Create a table – format rows, columns and cells.	LAFS.910.W.4.10	
22.12 Insert page breaks.	LAFS.910.W.4.10	
22.13 Adjust magnification of document display single and multiple pages.	LAFS.910.W.4.10	
22.14 Understand printing options including shrink to fit, gutters, and document orientation.	LAFS.910.W.4.10	
22.15 Create a report or essay that contains a title page, text, a graphic/image, and WordArt.	LAFS.910.W.4.10	
23.0 Develop and apply fundamental spreadsheet skills–The student will be able to:		
23.01 Describe a spreadsheet and the ways in which it may be used.	LAFS.910.SL.2.4, 5	
23.02 Identify the parts of the spreadsheet display.	LAFS.910.W.4.10	
23.03 Insert and format text information into cells.	LAFS.910.W.4.10	
23.04 Insert and format numeric information into cells.	LAFS.910.W.4.10	
23.05 Insert and format date and time information into cells.	LAFS.910.W.4.10	
23.06 Select multiple cells using the mouse.	LAFS.910.W.4.10	
23.07 Copy information from one or more cells to another part of the spreadsheet.	LAFS.910.W.4.10	
23.08 Move information from one or more cells to another part of the spreadsheet.	LAFS.910.W.4.10	
23.09 Sum the numeric values of multiple cells.	LAFS.910.W.4.10	
23.10 Use the sort function to alphabetize a table of information.	LAFS.910.W.4.10	
23.11 Create and navigate through a worksheet.	LAFS.910.W.4.10	
23.12 Change column width and row height.	LAFS.910.W.4.10	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
23.13	Insert columns and rows.	LAFS.910.W.4.10	
23.14	Merge cells.	LAFS.910.W.4.10	
23.15	Use Undo and Redo features.	LAFS.910.W.4.10	
23.16	Insert arithmetic formulas into a spreadsheet.	LAFS.910.W.4.10	
23.17	Create and print a table that displays and sums the quantities or values of different categories of data.	LAFS.910.W.4.10	
23.18	Create a chart based on data sets defined in a spreadsheet.	LAFS.910.W.4.10	
23.19	Adjust chart types to appropriately represent base data.	LAFS.910.W.4.10	
24.0	Demonstrate an understanding of color theory and its role in technical design–The student will be able to:		
24.01	Describe the spectral colors in the visible light spectrum.	LAFS.910.W.3.7	SC.912.P.10.18
24.02	Describe the difference between color and light.	LAFS.910.W.3.7	SC.912.P.10.18
24.03	Differentiate between spectral and primary colors.	LAFS.910.W.3.7	
24.04	Describe the difference between additive and subtractive color mixing.	LAFS.910.W.3.7	
24.05	Compare and contrast the RGB and CYMK color models as used in technical design.	LAFS.910.W.3.7	
24.06	Demonstrate knowledge in terms relating to color such as: chroma, lightness, saturation, hue, intensity, luminance/value, shade, tint, etc.	LAFS.910.L.3.6	
24.07	Demonstrate an understanding relating to the meanings of color (the psychology of color and the application of color in design).	LAFS.910.L.3.6	
24.08	Demonstrate a working knowledge and technical skills relating to Application of color theory to design practices.	LAFS.910.L.3.6	
25.0	Demonstrate an understanding of the elements and principles of graphic design–The student will be able to:		
25.01	Describe the elements of graphic design (e.g., line, shape, mass, texture, color, lighting).	LAFS.910.L.3.6	
25.02	Describe the principles of graphic design (e.g., balance, unity, contrast, rhythm, proportion, scaling).	LAFS.910.L.3.6	
25.03	Distinguish between criteria and constraints for a given technical design problem.	LAFS.910.L.3.6	
26.0	Develop a design portfolio–The student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
26.01 Identify the proper elements of a fully developed portfolio.	LAFS.910.W.2.6	
26.02 Identify and discuss the ethical issues surrounding portfolio artifacts.	LAFS.910.SL.1.1	
26.03 Create a design portfolio that is well organized and displays their work.	LAFS.910.W.2.5, 6	

Course Title: **Technical Design 2**
Course Number: **8401020**
Course Credit: **1**

Course Description:
In this course, students learn more about the nature of design and drafting techniques for architectural purposes. Students are also provided with instruction in a variety of technical illustrations commonly produced to depict architectural concepts and designs. Students are expected to continue collating their portfolio using exemplars of their work. As with previous portfolio pieces, each exemplar should include a narrative description of the item with an explanation of any special techniques used to create the item.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
27.0	Demonstrate an understanding of the various approaches used in problem solving–The student will be able to:		
27.01	Employ research and development processes to assess the functional, economic, and ethical viability of a product or prototype.	LAFS.910.W.1.1	SC.912.N.1.1, 4
27.02	Research a problem and determine the most appropriate problem-solving method to employ.	LAFS.910.W.3.7, 8, 9	SC.912.N.1.1, 4
27.03	Determine whether the solution to a specific problem is technology-based.	LAFS.910.W.3.7, 8, 9	SC.912.N.1.1
27.04	Utilize a multidisciplinary approach to solving technological problems.	LAFS.910.W.3.7, 8, 9	SC.912.N.1.1
28.0	Demonstrate abilities to apply the design process–The student will be able to:		
28.01	Determine whether an illustrative design problem is worthy of being resolved or addressed.	LAFS.910.W.1.1; 3.7, 8, 9	
28.02	Identify the criteria and constraints associated with an illustrative design problem and select the most appropriate solution based on these factors.	LAFS.910.SL.2.4	
28.03	Evaluate the quality, efficiency, and productivity of an existing or proposed design and refine the design accordingly.	LAFS.910.SL.1.1, 2, 3	SC.912.P.10.8
28.04	Evaluate an existing design using conceptual, physical, and mathematical models and note aspects for improvement.	LAFS.910.SL.1.1, 2, 3	SC.912.N.1.1
28.05	Design and develop an illustrative design solution using the design process.	LAFS.910.W.4.10	
28.06	Create and deliver a slide presentation to communicate the design process and final solution to an illustrative or technical design problem.	LAFS.910.SL.2.4	
29.0	Create architectural drawings to industry standards–The student will be able to:		
29.01	Produce a dimensioned floor plan showing walls, windows, doors, cabinets, stairs, appliances, fixtures, and other details.	LAFS. 910.W.4.10 MAFS.912.G-SRT.1.1	SC.912.N.1.1
29.02	Produce a dimensioned foundation plan with details.	LAFS. 910.W.4.10 MAFS.912.G-SRT.1.1	SC.912.N.1.1

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
29.03	Produce an architectural electrical plan.	LAFS. 910.W.4.10 MAFS.912.G-SRT.1.1	
29.04	Produce an architectural plumbing plan.	LAFS. 910.W.4.10 MAFS.912.G-SRT.1.1	
29.05	Produce an architectural climate control plan (HVAC).	LAFS. 910.W.4.10 MAFS.912.G-SRT.1.1	
29.06	Produce a dimensioned roof plan with details.	LAFS. 910.W.4.10 MAFS.912.G-SRT.1.1	
29.07	Produce a detailed information sheet including wall section and schedules.	LAFS. 910.W.4.10 MAFS.912.G-SRT.1.1	
29.08	Produce a dimensioned plot plan.	LAFS. 910.W.4.10 MAFS.912.G-SRT.1.1	
29.09	Produce dimensioned elevation drawings showing grade lines, floors, ceilings, windows, doors, and other details.	LAFS. 910.W.4.10 MAFS.912.G-SRT.1.1	
30.0	Create a reverse engineered drawing (as built) from a solid object–The student will be able to:		
30.01	Identify and apply advanced measuring tools and techniques.	LAFS. 910.RI.3.7 MAFS.912.N-Q.1.1, 3	SC.912.N.1.1
30.02	Apply precision dimensioning standards.	LAFS. 910.RI.3.7 MAFS.912.G-CO.1.1	SC.912.N.1.1
30.03	Produce a detailed multi view orthographic drawing.	LAFS. 910.W.4.10 MAFS.912.G-SRT.1.2	
30.04	Produce an enhanced pictorial drawing.	LAFS. 910.W.4.10 MAFS.912.G-CO.1.1	
30.05	Produce an auxiliary view drawing.	LAFS. 910.W.4.10 MAFS.912.G-CO.1.1	
30.06	Produce a section view drawing.	LAFS. 910.W.4.10 MAFS.912.G-GMD.2.4	
31.0	Create technical illustrations–The student will be able to:		
31.01	Produce a colored or shaded pictorial rendering for presentation.	LAFS. 910.W.4.10	
31.02	Produce a labeled graph or chart for display.	LAFS. 910.W.4.10	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
32.0	Demonstrate proficiency in using presentation software–The student will be able to:		
32.01	Describe presentation software and the ways in which it may be used.	LAFS. 910.SL.2.4	
32.02	Create a Slide Master.	LAFS. 910.SL.2.4	
32.03	Adjust presentation format using the Slide Master.	LAFS. 910.SL.2.5	
32.04	Add and format titles, subtitles, and talking points to a presentation slide.	LAFS. 910.SL.2.5	
32.05	Insert date and time codes and slide numbers to slides.	LAFS. 910.SL.2.5	
32.06	Insert and format images/graphics onto slides.	LAFS. 910.SL.2.5	
32.07	Insert new or duplicate slides.	LAFS. 910.SL.2.5	
32.08	Adjust slide transition to include animation.	LAFS. 910.SL.2.5	
32.09	Insert and adjust sound settings and timing in presentation.	LAFS. 910.SL.2.5	
32.10	Adjust the sequence of slides in the presentation.	LAFS. 910.SL.2.5	
32.11	Produce a presentation that includes text, graphics, and digital images and present it using a projection system.	LAFS. 910.SL.2.5	SC.912.N.1.1
32.12	Adjust Slide Show Set-up to loop show continuously.	LAFS. 910.SL.2.5	
33.0	Create technical illustrations using illustration software applications–The student will be able to:		
33.01	Demonstrate proficiency in the use of common functions and features of illustration software.	LAFS. 910.W.2.6	SC.912.N.1.1
33.02	Prepare images using illustration software.	LAFS. 910.W.4.10	
33.03	Demonstrate technical skill and knowledge in the composition of a technical illustration.	LAFS. 910.W.4.10	
33.04	Demonstrate proficiency in manipulating a technical illustration to achieve a desired result.	LAFS. 910.W.4.10	
34.0	Create technical drawings using software applications–The student will be able to:		
34.01	Demonstrate proficiency in the use of common functions and features of technical drawing software.	LAFS. 910.L.3.6	
34.02	Prepare technical drawings using CAD software.	LAFS. 910.W.2.6; 4.10	
34.03	Create technical drawings according to technical design specifications.	LAFS. 910.W.4.10	

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
34.04 Apply rendering techniques as appropriate.	LAFS. 910.W.4.10	
35.0 Maintain a design portfolio–The student will be able to:		
35.01 Select appropriate items for showcasing in a design portfolio.	LAFS. 910.W.3.7, 8	
35.02 Modify/adjust a design portfolio to accommodate additional exemplars.	LAFS. 910.W.37, 8	
36.0 Demonstrate technical writing skills–The student will be able to:		
36.01 Create a resume highlighting technical skills for non-technical readers.	LAFS. 910.W.2.4, 5, 6; 3.7, 8	
36.02 Write a proposal for a technical project.	LAFS. 910.W.2.4, 5, 6; 3.7, 8	
36.03 Draft an Engineering Change Order/Request.	LAFS.910.W.2.5	
36.04 Interpret revisions to technical drawings that have been made according to standard change symbols.	LAFS.910.W.2.5	

Course Title: **Technical Design 3**
Course Number: **8401030**
Course Credit: **1**

Course Description:
In addition to exploring the implications of applying technologies, this course provides students with instruction in advanced imaging techniques relative to both static and animated illustrations. In addition to learning more advanced techniques, students will have an opportunity to research a project, design an appropriate solution, and present their results. The ultimate output of this course is the student's presentation of a completed portfolio illustrating their best exemplars. The portfolio should include a narrative description of the scenario, the approach to data collection, resulting renderings, and an interpretation of each chart/graph. Research references should be cited appropriately. Given the advanced nature of this course, students should be encouraged to produce the portfolio using presentation software suitable for dissemination via the Internet.

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
37.0	Demonstrate an understanding of the cultural, social, economic, and political effects of technology–The student will be able to:		
37.01	Discuss changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious.	LAFS.1112.SL.1.1	SC.912.N.4.1, 2
37.02	Evaluate the use of technology involving weighing the trade-offs between the positive and negative effects.	LAFS.1112.SL.1.1	SC.912.N.4.1, 2
37.03	Debate the cultural, social, economic, and political changes caused by the transfer of technology from one society to another.	LAFS.1112.W.3.7, 8, 9	SC.912.N.4.1, 2
38.0	Demonstrate the abilities to use and maintain technological products and systems–The student will be able to:		
38.01	Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.	LAFS.1112.SL.1.1 LAFS.1112.W.2.4, 5, 6	SC.912.N.1.1
38.02	Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.	LAFS.1112.W.3.7, 8, 9	SC.912.N.1.1
38.03	Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.	LAFS.1112.W.3.7, 8, 9	SC.912.N.1.1
38.04	Operate systems so that they function in the way they were designed.	LAFS.1112.W.3.7, 8, 9	SC.912.N.1.1
38.05	Use computers and calculators to access, retrieve, organize process, maintain, interpret, and evaluate data and information in order to communicate.	LAFS.1112.W.2.6	SC.912.N.1.1
39.0	Demonstrate the abilities to assess the impact of products and systems–The student will be able to:		
39.01	Collect information and evaluate its quality.	LAFS.1112.W.3.7, 8, 9 MAFS.912.S-ID.2.5	SC.912.N.1.1

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
39.02	Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and environment.	LAFS.1112.W.3.7, 8, 9 MAFS.912.S-ID.2.5	SC.912.N.1.1; 4.1
39.03	Apply assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology.	LAFS.1112.W.4.10	SC.912.N.1.1
39.04	Design forecasting techniques to evaluate the results of altering natural systems.	LAFS.1112.W.4.10	SC.912.N.1.1
40.0	Demonstrate technical knowledge and skills for making engineering drawings–The student will be able to:		
40.01	Produce an advanced detailed machine drawing with tolerances, hidden surfaces and other mechanical details.	LAFS.1112.W.2.6; 4.10 MAFS.912.G-CO.1.1, 2, 5	
40.02	Produce detailed electrical and electronic schematics with appropriate components.	LAFS.1112.W.2.6; 4.10 MAFS.912.G-CO.1.1, 2, 5	
40.03	Produce a contour map with a cut and fill drawing annotated in accordance with government codes.	LAFS.1112.W.2.6; 4.10 MAFS.912.G-CO.1.1, 2, 5	
41.0	Demonstrate and present a research and design project–The student will be able to:		
41.01	Identify and research a design problem related to one of the following technologies (medical, GIS, agriculture, energy & power, information & communication, transportation, manufacturing, and construction).	LAFS.1112.L.3.6	SC.912.N.1.1
41.02	Identify criteria and constraints.	LAFS.1112.L.3.6	SC.912.N.1.1
41.03	Produce a virtual or physical model of the solution.	LAFS.1112.W.2.6; 4.10	SC.912.N.1.1
41.04	Test and evaluate the solution.	LAFS.1112.RI.3.8	SC.912.N.1.1
41.05	Deliver a professional quality presentation of the design process and solution (e.g., a rendering, 3D model, walk-through, fly-over, or animation of a design).	LAFS.1112.W.2.6; 4.10	SC.912.N.1.1
42.0	Demonstrate an understanding of career opportunities and requirements in the field of drafting/illustrative design technology–The student will be able to:		
42.01	Discuss individual interests related to a career in drafting/illustrative design technology.	LAFS.1112.SL.1.1	
42.02	Explore career opportunities related to a career in drafting/illustrative design technology.	LAFS.1112.W.3.7, 8, 9; 4.10	
42.03	Explore secondary education opportunities related to drafting/illustrative design technology.	LAFS.1112.W.3.7, 8, 9; 4.10	
42.04	Conduct a job search.	LAFS.1112.W.3.7, 8, 9; 4.10	

CTE Standards and Benchmarks		FS-M/LA	NGSSS-Sci
42.05	Complete a job application form correctly.	LAFS.1112.W.3.7, 8, 9; 4.10	
42.06	Demonstrate competence in job interview techniques.	LAFS.1112.W.3.7, 8, 9; 4.10	
42.07	Create a professional resume and letter of introduction.	LAFS.1112.W.3.7, 8, 9; 4.10	
42.08	Solicit awards, letters of recommendation and recognition.	LAFS.1112.W.3.7, 8, 9; 4.10	
42.09	Organize work samples in a professional, presentable format.	LAFS.1112.W.3.7, 8, 9; 4.10	
43.0	Demonstrate familiarity with techniques associated with digital photorealism–The student will be able to:		
43.01	Describe digital photorealism and its role in technical design.	LAFS.1112.W.3.7, 8, 9 LAFS.1112.L.3.6	
43.02	Describe techniques that infuse photorealism into 3D drawings (e.g., beveling, gamma corrections, photometric lighting, depth of field, chromatic aberration, specular maps, texturing, and asymmetry).	LAFS.1112.W.3.7, 8, 9 LAFS.1112.L.3.6	SC.912.P.10.18
43.03	Use advanced functions in illustration software used to achieve photorealism.	LAFS.1112.W.3.7, 8, 9 LAFS.1112.L.3.6	
44.0	Create complex technical drawings using appropriate software applications–The student will be able to:		
44.01	Demonstrate proficiency in the use of advanced functions and features of technical drawing software.	LAFS.1112.W.4.10 LAFS.1112.L.3.6 MAFS.912.G-CO.4.12 MAFS.912.A-REI.4.11	SC.912.N.1.1
44.02	Prepare complex technical drawings using CAD or 3D illustration software.	LAFS.1112.W.4.10 LAFS.1112.L.3.6 MAFS.912.G-GMD.2.4	SC.912.N.1.1
44.03	Integrate special effects into complex 3D technical drawings.	LAFS.1112.W.4.10 LAFS.1112.L.3.6 MAFS.912.G-MD.2.4	SC.912.N.1.1
44.04	Create complex technical drawings according to technical design specifications.	LAFS.1112.W.4.10 LAFS.1112.L.3.6	SC.912.N.1.1
44.05	Apply advanced rendering techniques as appropriate.	LAFS.1112.W.4.10 LAFS.1112.L.3.6	SC.912.N.1.1
45.0	Prepare and present a design portfolio–The student will be able to:		

CTE Standards and Benchmarks	FS-M/LA	NGSSS-Sci
45.01 Select appropriate items for showcasing in a design portfolio.	LAFS.1112.W.3.7, 8	
45.02 Modify/adjust a design portfolio to accommodate additional exemplars.	LAFS.1112.W.2.4, 5, 6	