Milton Area School District
Technical Drawing IV Syllabus
Grade Level(s): 11-12

Technical Drawing IV Description:
Technical Drawing 4 is an advanced course open to students who have completed Technical Drawing 3 with a grade of 75% or higher. The course is designed to prepare the students in advanced mechanical drawing, advanced blueprint reading, advanced architectural drawing and model building, and 3D solid Modeling. This course meets every day for one semester (1 credit). Pre-requisite - Successful completion of Technical Drawing 3 with a grade of 75% or higher.

Technical Drawing IV Goals:

This design if this program is to integrate the academic coursework with the technical competencies required to be successful in the drafting field. The skills taught in this program offer the requisite aptitudes for job advancement security and portability. By completing this high-quality program students are preparing themselves to either continue on to postsecondary education or enter the workforce in an entry-level drafting position. By taking the state approved sequence of courses for drafting listed in the course description book, students who complete this program of study are guaranteed college credits.

- ENGINEERING MATH
- MECHANICAL DRAWING AND DESIGN
- DIMENSIONING
- INTRODUCTION TO ARCHITECTURE
- INTRODUCTION TO CIVIL DRAFTING
- INTRODUCTION TO ELECTRICAL AND ELECTRONIC DRAFTING
- USING COMPUTER ASSISTED DRAFTING (CAD)

Student Literacy Objectives for Technical Drawing IV:

Students will independently use their learning to:

- Effective *Drafting and Design* readers use appropriate strategies to construct meaning.
- Critical thinkers actively and skillfully interpret, analyze, evaluate, and synthesize information.
- Active listeners make meaning from what they hear by questioning, reflecting, responding, and evaluating.
- Effective speakers prepare and communicate messages to address the audience and purpose
- Effective research requires the use of varied resources to gain or expand knowledge.
- Audience and purpose influence a *Drafting and Design* writer's choice of organizational pattern, language, and Drafting and Design concepts using appropriate literacy techniques.
- Language conventions support clarity of communications between writers/speakers and *Drafting and Design* readers/listeners.
- An expanded vocabulary enhances one's ability to express *Drafting and Design* ideas and information

Additional Content Area Student Objectives

- National Occupational Competency Testing Institute (NOCTI)
- American Drafting and Design Association (ADDA)
- Certified SolidWorks Associate (CSWA)

Technical Drawing IV Instructor Policies

Technical Drawing IV Resources:

Text Books:

- MECHANICAL DRAWING – by Helsel
- ENGINEERING DRAWING AND DESIGN – 6th Edition by Jensen and Helsel
- TECHNICAL DRAWING – 13th Edition by Giesecke, Mitchell, Spencer, and Hill
- ARCHITECTURE: RESIDENTIAL DRAFTING AND DESIGN – by Clois E. Kicklighter

Reference Books:

- MACHINERY HANDBOOK – 30th Edition by Industrial Press Inc.

Teacher and Student Technology Integration and Resources:

- AUTODESK Design Academy
- Solidworks
- Microsoft Office
- Office 365
- Internet

Technical Drawing IV Requirements:

- Intro to Architecture - 90
- CAD – 2D - 130
- Supplemental Drawings - 90
- Engineering Math - 20
- Technical Writing – 20
- Intro to Civil - 10
- Intro to Electrical and Electronics – 10

Technical Drawing IV Attendance Policy:

- See student handbook. School wide attendance policies are enforced. In addition, students will receive 10 points each day based on their work ethics. Any absence from class for a non-school related activity will result in the loss of the 10 points for that day.

Technical Drawing IV Grading Policy:

Drawing grades are based on accuracy, dimensioning, line technique, lettering, neatness, & speed. In grading drawings, the coded explanation of what is wrong is inserted near the mistake. (Duplicate mistakes are not marked) this eliminates a lengthy note explaining the mistake. This system is used to grade all jobs, assignments, and practical tests. It is a very important aspect of this course for the following reasons.

- Objective grading

- Simplified system of record keeping
- Simplified system of correcting your work
- Student work is not defaced with explanations

The overall grade for Technical Drawing IV is based on ability and work ethics. All test and quiz grades are weighted the same as a project grade. A classroom grade is given every day based on attitude and behavior. This is to help reinforce the importance of good work ethics in the job place. (It takes more than just ability to keep a job!)

Students are graded on:
1. Quality of Work
2. Quantity of work
3. Tests
4. Behavior
5. Cooperation
6. Interest
7. Dependability
8. Safety Practices
9. Attendance (see attendance policy above)
10. Record Keeping

Grading System:
90-100 = A 80-89 = B 70-79 = C 65-69 = D Below 64 = Failing

Students will be required to complete one essay per marking period. The essays will include a descriptive, process, and article review essay. In addition, students will be required to complete a design review presentation. These assignments are designed to reinforce the need for strong communication skills in the drafting, design, architecture, and engineering fields. These projects will be equal to two drawing grades.

Cheating Policy:
In alignment with the Academic Integrity section of the student handbook, any student caught cheating on an assignment will receive a zero (0) for that assignment. In the event that a student is caught a second time, that individual will receive a zero (0) for that grading period. A third offense will result in a zero (0) for the year.

Course Content Schedule

Week	Unit Title	Focus/Concept(s)	Unit Essential Question(s)	Related Academic Standards	Assignment/Artifact	Method(s) of Evaluation
1-3	Architecture Review	Read and interpret blueprints. Construct a floor plan. Construct an elevation. Construct a typical wall section. Draw a pictorial view. Prepare architectural drawing to include foundation, framing, concrete, roofing, utility and etc. Construct a site plan. Identify profile view of a highway and street improvement plan. Demonstrate knowledge of a landscaping plan. Read and interpret a deed. Demonstrate knowledge of how to use survey and/or GPS equipment.	How do you create a residential drawing using standard architectural practices? How do you create civil drafting plans?	POS 900, 1000	chapter questions graphic organizers drawing assignments	observation of performance formative assessment Rubric Quiz
4-7	Supplemental Drawings	Identify and produce a BOM (parts list) for an assembly. Create a title block on a mechanical drawing.	What is a working drawing? What is an exploded view? What is a bill of material?	POS 900, 1000	chapter questions graphic organizers drawing assignments	observation of performance formative assessment Rubric Quiz
8-9	Technical Writing	Create a set of assembly and operation manuals.	How are operation and assembly manuals written?	POS 900, 1000	chapter questions graphic organizers drawing assignments	observation of performance formative assessment Rubric

						Quiz
10-14	Into to Civil	Read and interpret a deed. Construct a site plan. Identify profile view of a highway and street improvement plan. Demonstrate knowledge of a landscaping plan. Read and interpret a deed. Demonstrate knowledge of how to use survey and/or GPS equipment.	Read and interpret a deed. Construct a site plan. Identify profile view of a highway and street improvement plan. Demonstrate knowledge of a landscaping plan. Read and interpret a deed. Demonstrate knowledge of how to use survey and/or GPS equipment.	POS 900, 1000	chapter questions graphic organizers drawing assignments	observation of performance formative assessment Rubric Quiz
15-18	Intro to Electrical and Electronics	Identify and describe various symbols. Create a schematic wiring diagram.	How do you represent Electrical symbols? How do you create a schematic wiring diagram?	POS 1100	chapter questions graphic organizers drawing assignments	observation of performance formative assessment Rubric Quiz

Appendix A
Student and Teacher Roles with a Defined Focus on Literacy

Students will:

1. **Work independently in their learning to:**

- Comprehend and evaluate complex situations, be a critical consumer of ***Technical Drawing IV*** text, produce; research and gather evidence, communicate effectively, listen actively to engage in a range of conversations, to analyze and synthesize idea and positions, and to evaluate accuracy in order to learn, reflect, and respond.

2. **Construct content-meaning for self-efficacy and the efficacy all learners:**

- Build personal engagement in ***Technical Drawing IV*** literacy (RWSL), take and share power for learning, self-assess, monitor and reflect on. Set goals for extending math skills, use text-based evidence to establish clear relationships among claims, explore ***Technical Drawing IV*** concepts beyond the classroom and search to discover global perspectives

3. **Develop a Classroom Learning Community of respectful collaborative, collective dynamics:**

- Contribute and collaborate in a community of ***Technical Drawing IV*** learners, provide multiple perspectives to solve problems toward shared understanding, value, represent, and respect diverse opinions and perspectives.
- Tasks or assignments are completed on time in support of a shared responsibility
- Self-monitoring for preparation and understanding is encouraged to promote contribution and respect for equity of time

4. **Participate in the assessment process:**

- Set goals and self-monitoring their progress with an expectation for fulfilling assessment requirements
- Produce and complete tasks and assignments according to the parameters and expectations of the learning process and the instructor's timeline.
- Seek help in understanding and clarifying confusions is an expectation to foster student independence and confidence as a life-long learner.

5. **Use of technology to support their learning:**

- Explore creative and innovative uses of technology to enhance and express their learning.
- Participate as a 21st Century student to make connections to the global learning environment
- Use and evaluate research available resources for validity and reliability

Instructor will:

1. **Conduct the learning environment that promotes a student-centered community of learners.**

- Conceptualizes instruction to include students as part of the learning community; students formally collaborate on important learning tasks
- Share learning experience to bring multiple perspectives to solve problems such that each perspective contributes to shared understanding for all; goes beyond brainstorming
- Set up the learning environment and experiences for valuing diversity, multiple perspectives, and strengths of the student.
- Foster and encourage development of new ideas and understanding in conversations and work with others
- Arrange groups to support collaboration and inquiry; students work independently, in pairs, in small groups and as a class dependent on the task.

2. **Represent themselves as a facilitator, a guide for learning, a co-learner, or as an investigator.**

- Engage in negotiation, stimulates and monitors discussion and project work but does not control
- Help students to construct their own meaning by modeling, mediating, explaining when needed, redirecting focus, providing options
- Considers themselves as self- learner; willing to take risks to explore areas outside his or her expertise; collaborates with other experts and practicing professionals

3. **Design the instructional model and learning context driven by standards and researched-based best practices.**

- Identify the specific PACCS standards addressed in all lessons and units**.**
- Provide students with an understanding of PACCS standard guiding the instruction and the relationship to the student learning goals.

4. **Develop authentic tasks to engage all learners with relevance to transfer knowledge to outside world situations**.

- Pertains to real world, meaningful intellectual work; may be addressed to personal interest
- Challenge and engage students with tasks with different levels of difficulty, enough to be interesting but not totally frustrating, and sustainable.
- Involves integrating disciplines to solve problems and address issues in context
- Engage students with rigorous course content to prepare them for College and Career readiness.
- Construct processes that engage students through cognitive application as an intentional principle of instruction.

5. Motivate and intentionally organize classroom instructional structure.

- Direct students to set goals, self-assess their progress to produce quality products and determine next steps
- Integrate the Literacy skills of Reading, Writing, Speaking and Listening that is discipline specific
- Activate and develop students' repertoire of thinking/learning strategies for changeable and complex knowledge building**.**
- Promote intrinsic learning with a passion for exploring and solving problems.
- Use data-driven instruction to plan for individual and group learning situations.

6. Assess students with a multitude and variety of formative, performance-based, generative, and summative assessments to address the needs and levels of all learners.

- Create assessments with meaning for the learner to produce product, performance, or service
- Make assessments transparent and integral to instruction; students learn during/through challenging meaningful activities
- Evaluate students fairly and equitably based upon student individual needs and achievement level.
- Use the most appropriate and effective technology available to enhance tasks and the evidence on learning

7. Utilized discipline-specific digital literacy and processes to engage and connect students in furthering 21st century teaching and learning.

- Use the most appropriate and effective technology available to allow for interaction by communicating and collaborating in diverse ways
- Use the most appropriate and effective technology available to access simulations, goals-based learning and real-world productivity tools.
- Use the most appropriate and effective technology available to complete and access task, locate data, and learning opportunities that stimulate thought and inquiry.
- Build awareness of and where possible, access media technologies to keep pace with the ever-changing technological devices to further educational possibilities

Appendix B
Engaged Learning Framework for Course Content Reflection and Review

Indicators of Engaged Learning		Indicator Definition
Evaluation		
Tasks	• Authentic • Challenging • Multidisciplinary	• Pertains to real world, meaningful intellectual work; may be addressed to personal interest • Difficult enough to be interesting but not totally frustrating, usually sustained • Involves integrating disciplines to solve problems and address issues in context
Assessment	• Performance-based • Generative • Seamless and ongoing • Equitable	• Involving a performance or demonstration, usually for a 'real' audience and addressing a useful purpose • Assessments having meaning for learner; may produce information, product, service • Assessment is transparent and integral; students learn during/through challenging and meaningful activities • Assessment is culture fair
Process		
Instructional Model	• Interactive • Generative	• Instruction actively engages learners through meaningful context and construction of knowledge; encourages, supports and responds to student contributions, needs, requests for clarification, etc. • Instruction oriented to constructing meaning; providing meaningful activities/experiences
Learning Context	• Collaborative • Knowledge-building • Empathetic	• Instruction conceptualizes students as part of learning community; students formally collaborate on important learning tasks • Learning experiences set up to bring multiple perspectives to solve problems such that each perspective contributes to shared understanding for all; goes beyond brainstorming • Learning environment and experiences set up for valuing diversity, multiple perspectives, strengths
Grouping	• Heterogeneous • Equitable • Flexible/agile	• Small groups with persons with different skill sets, backgrounds, interests • Groups sized and organized so that over time all students have challenging learning tasks/experiences • Different groups organized for different instructional purposes; supports collaboration across multiple contributors
Roles		
Instructor Role	• Facilitator • Guide • Co-learner/co-investigator	• Engages in negotiation, stimulates and monitors discussion and project work but does not control • Helps students to construct their own meaning by modeling, mediating, explaining when needed, redirecting focus, providing options • Instructor considers self as learner; willing to take risks to explore areas outside his or her expertise; collaborates with other experts and practicing professionals
Student Role	• Explorer • Cognitive Apprentice • Teacher • Producer	• Students have opportunities to explore new ideas/tools; push the envelope in ideas and research • Learning is situated in relationship with mentor who coaches students to develop ideas and skills that simulate the role of practicing professionals (i.e., engage in real research) • Students encouraged to teach others in formal and informal contexts • Students develop products of real use to themselves and others; demonstrated learning
Resources		
Technology	• Interconnectivity • Access to challenging tasks • Enables learning by doing • Media Use	• Technology allows interaction by communicating and collaborating in diverse ways • Technology offers or allows access to tasks, data, and learning opportunities that stimulate thought and inquiry • Technology offers access to simulations, goals-based learning, and real-world problems and productivity tools • Technology provides opportunities to use media technologies

Addendum A

Drawing Rubric

1. ACCURACY - 20pts A. Incorrect Measurement B. Incorrect Construction C. Incomplete Construction D. Incorrect Scale E. Incorrect Line F. Misplaced Line G. Missing Line H. Poor Line Intersections I. Poor Tangents J. Lines Not Parallel K. Lines Not Perpendicular L. Center Not Located M. Inconsistant	**6. LETTERING** - 8pts A. Improper Height B. Slanted C. Lack of Sharpness D. Incorrect Form E. Too Light / Dark F. Incorrect Spacing G. Misspelled Word H. Too Thick I. Too Thin J. Lack of Guidelines K. Neatness
2. LINE TECHNIQUE – 8pts A. Lack of Contrast B. Uneven Density C. Lack of Sharpness D. Lines Improperly Spaced E. Incorrect Form F. Incorrect Line Weight G. Neatness H. Freehand I. LTScale (CAD) J. Line Hierarchy	**7. DIMENSIONING** - 8pts A. Incorrect Dimension B. Incorrect Information C. Missing Dimension D. Superfluous Information E. Incorrect Placement F. Incorrect Height G. Incorrect Leader Line Placement H. Misplaced Finish Mark I. Missing Finish Mark J. Incorrect Spacing 1/2 - 3/8" K. Incorrect Style L. Arrowhead Size & Form M. Neatness O. Profile Dimensioning P. Balanced Dimensioning
3. LAYOUT - 20pts A. Incorrect Projection B. Poor Selection of Views C. Poor Placement of Views D. Views Not Centered E. Views not Located Correctly	**8. NEATNESS** – 8pts A. Drawing Not Clean B. Paper Torn C. Erasure Marks Visible D. Wrinkled or Rolled Edges
4. SPEED - 20pts A. Wasted Time (Talking) B. Started Over C. Naturally Slow D. Failed To Check Drawing E. Daydreaming F. Assignment Late (Effort or Absent) G. Spinning Your Wheels	**9. CAD** - 8pts A. LTscale B. Layer C. Dimension Style D. File Name
5. CORRECTIONS A. Correct & Return B. Do Over C. Check with the Instructor	**Bonus - Overall neatness (Presentable to a client) 1 – 10** **Total points possible (100)**

Addendum B

Residential Drawing Rubric

CRITERIA					TOTAL
The plan shows all the required rooms.	The house includes all required rooms/areas. (Accomplish 90-100%) 9 - 10	The house includes all required rooms/areas. (Accomplish 80-89%) 8	The house includes all required rooms/areas. (Accomplish 70-79%) 7	The house includes all required rooms/areas. (Accomplish 60-69%) 6	
Floor plan layout	Draw the interior walls 3-1/2" thick and the exterior walls 6" thick. Exterior is even feet (Accomplish 90-100%) 9-10	Draw the interior walls 3-1/2" thick and the exterior walls 6" thick. Exterior is even feet (Accomplish 80-89%) 8	Draw the interior walls 3-1/2" thick and the exterior walls 6" thick. Exterior is even feet (Accomplish 70-79%) 7	Draw the interior walls 3-1/2" thick and the exterior walls 6" thick. Exterior is even feet (Accomplish 60-69%) 6	
Doors and windows	Show all doors and windows. Show the swing of the doors. Doors should swing toward the wall with 3" min to corner. Doors are proper width and layer. (Accomplish 90-100%) 9-10	Show all doors and windows. Show the swing of the doors. Doors should swing toward the wall with 3" min to corner. Doors are proper width and layer. (Accomplish 80-89%) 8	Show all doors and windows. Show the swing of the doors. Doors should swing toward the wall with 3" min to corner. Doors are proper width and layer. (Accomplish 70-79%) 7	Show all doors and windows. Show the swing of the doors. Doors should swing toward the wall with 3" min to corner. Doors are proper width and layer. (Accomplish 60-69%) 6	
Kitchen: Show built in structures and large appliances. Base and top cabinets, shelves, etc. Working triangle is less than 21'-22"	Base cabinets are 2' wide and top cabinets are shown with a dotted line 1' deep. Show the sink, stove, trash compactor, microwave, refrigerator, etc. (Accomplish 90-100%) 9 - 10	Base cabinets are 2' wide and top cabinets are shown with a dotted line 1' deep. Show the sink, stove, trash compactor, microwave, refrigerator, etc. (Accomplish 80-89%) 8	Base cabinets are 2' wide and top cabinets are shown with a dotted line 1' deep. Show the sink, stove, trash compactor, microwave, refrigerator, etc. (Accomplish 70-79 %) 7	Base cabinets are 2' wide and top cabinets are shown with a dotted line 1' deep. Show the sink, stove, trash compactor, microwave, refrigerator, etc. Accomplish 60-69%) 6	
Utility Room:	Show the washer, dryer, and any storage in the utility room. Use 3' doors for the utility room. (Accomplish 90-100%) 9-10	Show the washer, dryer, and any storage in the utility room. Use 3' doors for the utility room. (Accomplish 80-89%) 8	Show the washer, dryer, and any storage in the utility room. Use 3' doors for the utility room. (Accomplish 70-79 %) 7	Show the washer, dryer, and any storage in the utility room. Use 3' doors for the utility room. (Accomplish 60-69%) 6	
Bathrooms:	Bathroom is laid out following all standards for residential bathrooms. (Accomplish 90-100%) 9-10	Bathroom is laid out following all standards for residential bathrooms. (Accomplish 80-89%) 8	Bathroom is laid out following all standards for residential bathrooms. (Accomplish 70-79%) 7	Bathroom is laid out following all standards for residential bathrooms. (Accomplish 60-69%) 6	

Lettering & Labeling	All rooms must be labeled. Make sure all words run right to left as I look from the front door. View title, door, window, and section label is included. All notes on proper layer and style. (Accomplish 90-100%) 9-10	All rooms must be labeled. Make sure all words run right to left as I look from the front door. View title, door, window, and section label is included. All notes on proper layer and style. (Accomplish 80-89%) 8	All rooms must be labeled. Make sure all words run right to left as I look from the front door. View title, door, window, and section label is included. All notes on proper layer and style. (Accomplish 70-79 %) 7	All rooms must be labeled. Make sure all words run right to left as I look from the front door. View title, door, window, and section label is included. All notes on proper layer and style. (Accomplish 60-69%) 6	
Measurements of rooms	Any room that you walk into should show the measurements. All exterior dimensions are included. (Accomplish 90-100%) 9-10	Any room that you walk into should show the measurements. All exterior dimensions are included. (Accomplish 80-89%) 8	Any room that you walk into should show the measurements. All exterior dimensions are included. (Accomplish 70-79%) 7	Any room that you walk into should show the measurements. All exterior dimensions are included. (Accomplish 60-69%) 6	
Stair Design	The stairs need to be at least 3' wide, riser plus tread equal 18", Located for easy use and designed to meet cade. Stairs and railing are on proper layer. (Accomplish 90-100%) 9-10	The stairs need to be at least 3' wide, riser plus tread equal 18", Located for easy use and designed to meet cade. Stairs and railing are on proper layer. (Accomplish 80-89%) 8	The stairs need to be at least 3' wide, riser plus tread equal 18", Located for easy use and designed to meet cade. Stairs and railing are on proper layer. (Accomplish 70-79%) 7	The stairs need to be at least 3' wide, riser plus tread equal 18", Located for easy use and designed to meet cade. Stairs and railing are on proper layer. (Accomplish 60-69%) 6	
Layers	All entities are on their proper layer. (Accomplish 90-100%) 9-10	All entities are on their proper layer. (Accomplish 80-89%) 8	All entities are on their proper layer. (Accomplish 70-79%) 7	All entities are on their proper layer. (Accomplish 60-69%) 6	
Bonus - Overall neatness (Presentable to a client) 1 – 10					
Total points possible (100)				SCORE OUT	