



COURSE SYLLABUS

COURSE TITLE: Using SolidWorks to Generate Working Drawings **TERM & YEAR:**

COURSE & SECTION NUMBER: MT 323 **TIME & PLACE:**

NUMBER OF CREDIT HOURS: 3

INSTRUCTOR: **OFFICE LOCATION/HOURS:**

OFFICE PHONE: **EMAIL:**

COURSE DESCRIPTION: The emphasis in this course is on being able to turn mechanically produced drawings, CAD solid models, prototypes, or sketches into working drawings. These drawings are used to manufacture components/parts into viable and economically produced high quality products.

PREREQUISITES: ETD 173 and ETD 113

REQUIRED TEXT: Tickoo, *SolidWorks 2020 for Designers CAD/CIM*. 18th Edition ISBN: 978-1-64057-084-9

REFERENCES: Machinery's Handbook any edition, Marks' Standard Handbook for Mechanical Engineers any edition

OTHER MATERIALS:

LEARNING OUTCOMES: Upon completion of this course, the student should be able to:

1. Generate assembly drawings for multicomponent products
2. Generate basic detail and working drawings from sketches, prototypes, and 3D drawings
3. Produce detailed and well-dimensioned drawings using techniques of GDT for advanced manufacturing processes
4. Produce detailed working drawings that can be used to manufacture components accurately, economically and reliably using appropriate dimensioning techniques
5. Utilize appropriate dimensions and tolerances; recognize their critical relationships to manufacturability, quality assurance, and component functions

COURSE REQUIREMENTS:

ATTENDANCE/PARTICIPATION:

All students are expected to log in to their courses regularly throughout the week to receive instruction, materials, and updates from the instructor. It is your responsibility to check in and submit your assignments or complete your discussion board postings by the due dates. If you miss 3 classes or more you will be dropped from the course.

If you do not participate in the course, you will be counted absent. Simply logging in is not enough; you must submit/complete an assignment, post to a discussion board, or other similar assignment tasks to avoid being counted absent. Instructors are required to submit attendance the Monday following each week of class.

GRADING / EVALUATION:

Professors Assessment of Engineering Professionalism 20% - 200 points

Class discussion forum topics 20% - 200 points

SOLIDWORKS Projects & Tutorials 20% - 400 points

Final Exam 20% - 200 points

Total Points - 1000

**Professionalism refers to consistent class attendance, participation, etc. to foster work habits and attitudes that are needed in the “real world” of engineering practice. Missed meetings (i.e. classes), habitual tardiness, texting, and lack of attention, display of poor attitude, are some examples of unprofessional practice. Grades will be determined based on the following percentages*

The instructor will record the number of points earned on each assignment. At end of the semester the points will be totaled, and a grade assigned based on the following scale:

A	90% to 100%
B+	86% to 89%
B	80% to 85%
C+	76% to 79%
C	70% to 75%
D+	66% to 69%
D	60% to 65%
F	0 to 59%

The University has strict policies on giving incompletes as grades and this is rarely done. The instructor grades not only the final answer for a problem but also the method by which students reach this final answer. Thus, students must show all their work in order to get full credit.

Graded Assignments will normally be returned within one week of submission.

ASSIGNMENT DUE DATES

All weekly assignments are due by 11:55 pm on Sunday Evening at the end of each week except for the last week when they are due by Saturday Evening by 11:55 pm. There will be a severe penalty for late assignments. Please plan ahead if you cannot participate in class in a timely manner or complete an assignment on time. If a documentable personal or professional emergency arises, please contact the instructor via phone or email to make alternative submission arrangements.

OTHER POLICIES:

ACADEMIC MISCONDUCT

The University prohibits all forms of [academic misconduct](#). [Academic misconduct](#) refers to dishonesty in examinations (cheating), presenting the ideas or the writing of someone else as one's own (plagiarism) or knowingly furnishing false information to the University by forgery, alteration, or misuse of University documents, records, or identification. Academic dishonesty includes, but is not limited to, the following examples: permitting another student to plagiarize or cheat from one's own work, submitting an academic exercise (written work, printing, design, computer program) that has been prepared totally or in part by another, acquiring improper knowledge of the contents of an exam, using unauthorized material during an exam, submitting the same paper in two different courses without knowledge and consent of professors, or submitting a forged grade change slip or computer tampering. The faculty member has the authority to grant a failing grade in cases of [academic misconduct](#) as well as referring the case to Student Life.

PLAGIARISM

You are expected to submit your own work and to identify any portion of work that has been borrowed from others in any form. An ignorant act of plagiarism on final versions and minor projects, such as attributing or citing inadequately, will be considered a failure to master an essential a skill and will result in an F for that assignment. A deliberate act of plagiarism, such as having someone else do your work, or submitting someone else's work as your own (e.g., from the Internet, fraternity file, etc., including homework and in-class exercises), will at least result in an F for that assignment and could result in an F for the course.

E-DEVICE POLICY (on site venues)

Use of electronic devices including smart watches and cell phones is prohibited during exams or quizzes unless directly allowed by the instructor.

DIGITAL MEDIA DEVICES (on site venues)

Our learning environment, including classrooms and public lecture halls, should be free from disruptions from personal communication and media devices. In such settings, cell phones and all other such devices must be turned off. Camera cell phones must be turned off in locker rooms and other such private places. The use of a computer in the classroom is a privilege, not a right. The student must understand (and resist) the temptation to "surf the 'net'" or engage in ANY activity not related to the classroom topic and discussion. Violations of the Trine University Information Technology Security Policy may result in disciplinary action by the University.

ADDITIONAL INFORMATION:

ACADEMIC RESOURCES:

There are several academic services that may be useful to you during the semester along with the library and assistance with digital resources that can found in the University Center LINK.

The links to information here include:

- *Writing Center:*
- *Math Help Sessions:*
- *Study Sessions:*
- *Parent and Family Support and Parent Newsletter:*
- *Accessibility and Accommodations:*

They are accessible on one page at the following link:

<https://www.trine.edu/academics/success/academic-support-services.aspx>

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Course Mapping

MT 323 Using SolidWorks to Generate Working Drawings

Course Description: The emphasis in this course is on being able to turn mechanically produced drawings, CAD solid models, prototypes, or sketches into working drawings. These drawings are used to manufacture components/parts into viable and economically produced products.

Learning Outcomes:

1. Generate assembly drawings for multicomponent products (LO1)
2. Generate basic detail and working drawings from sketches, prototypes, and 3D drawings (LO2)
3. Produce detailed and well-dimensioned drawings using techniques of GDT for advanced manufacturing processes (LO3)
4. Produce detailed working drawings that can be used to manufacture components accurately, economically and reliably using appropriate dimensioning techniques (LO4)
5. Utilize appropriate dimensions and tolerances; recognize their critical relationships to manufacturability, quality assurance, and component functions (LO5)

Week and Title	Weekly Learning Outcome Alignment	Learning Activities and Materials (LO alignment)	Assessments (LO alignment)
Week One: Assembly Tool; Assembly Modeling (LO1)	Generate assembly drawings for multicomponent products (LO1)	Read: <ul style="list-style-type: none"> • Chapter 12 – Assembly Modeling - I (LO1) • Chapter 13 – Assembly Modeling - II (LO1) 	Participate: <ul style="list-style-type: none"> • Discussion post: Distinguish between Bottom-Up Assemblies and Top Down Assemblies. (LO1) Assignment: <ul style="list-style-type: none"> • Complete tutorials and software exercises (LO1)

<p>Week Two: Assembly Tool; Working with Drawing Views (LO1), (LO2)</p>	<p>Generate assembly drawings for multicomponent products (LO1)</p>	<p>Read:</p> <ul style="list-style-type: none"> • Chapter 14 – Working with Drawing Views - I (LO1) (LO2) • Chapter 15 – Working with Drawing View – II (LO1) (LO2) 	<p>Participate:</p> <ul style="list-style-type: none"> • Discussion post: What is the purpose of the drawing mode and then briefly explain the purpose of each
	<p>Generate basic detail and working drawings from sketches, prototypes, and 3D drawings (LO2)</p>		<p>of the types of views in a drawing (LO1) (LO2) Assignment:</p> <ul style="list-style-type: none"> • Complete tutorials and software exercises (LO1) (LO2)
<p>Week Three: Design Principle; Dimensioning Strategy Review (LO3)</p>	<p>Produce detailed and well-dimensioned drawings using techniques of GDT for advanced manufacturing processes (LO3)</p>	<p>Watch:</p> <ul style="list-style-type: none"> • YouTube: Webinar: A Beginner’s Guide to GD&T (LO3) Review: • PowerPoint – Part and Drawing Dimensioning (LO3) • PowerPoint – Geometric Dimensioning and Tolerancing (LO3) 	<p>Participate:</p> <ul style="list-style-type: none"> • Discussion post: What is the benefit of GD&T? How has the understanding of GD&T evolved from ASME Y14.5 - 2009 (LO3) <p>Assignment:</p> <ul style="list-style-type: none"> • Complete tutorials and software exercises (LO3)

<p>Week Four: Advanced Manufacturing Overview (LO3), (LO4)</p>	<p>Produce detailed and well-dimensioned drawings using techniques of GDT for advanced manufacturing processes (LO3)</p> <p>Produce detailed working drawings that can be used to manufacture components accurately, economically and reliably using appropriate dimensioning techniques (LO4)</p>	<p>Watch:</p> <ul style="list-style-type: none"> • YouTube: Advanced Manufacturing and Materials (LO3, LO4) • You Tube: Additive and Subtractive Manufacturing with Autodesk Advanced Solutions (LO3, LO4) • You Tube: Milling, Turning, Drilling (LO3, LO4) • You Tube: Comparing 3D Printing Technologies (LO3, LO4) Review: • PowerPoint - Subtractive versus Additive Manufacturing (LO3, LO4) • PowerPoint - CNC Drilling, Milling, and Turning (LO3, LO4) • PowerPoint - Welding, Stamping/forging, other forms of CNC Cutting (LO3, LO4) • PowerPoint - 3D printing (LO3, LO4) • PowerPoint - GD&T strategies for advanced manufacturing (LO3, LO4) • <p>Read:</p> <ul style="list-style-type: none"> • Dayton Rogers Metal Forming Design Handbook (LO3, LO4) 	<p>Participate:</p> <ul style="list-style-type: none"> • Discussion post: What is the difference between additive and subtractive manufacturing? Why would one choose one over the other? (LO3, LO4) <p>Assignment:</p> <ul style="list-style-type: none"> • Answer learning questions on additive versus subtractive manufacturing, advance manufacturing, GD&T strategies for advanced manufacturing (LO3, LO4)
<p>Week Five:</p>	<p>Produce detailed and well-dimensioned drawings using techniques of GDT for</p>	<p>Watch:</p> <ul style="list-style-type: none"> • You Tube: Material Selection (LO3, LO4) 	<p>Participate:</p>

<p>Design Principle; Engineering Economics and Design For Manufacturability (LO3), (LO4)</p>	<p>advanced manufacturing processes (LO3)</p> <p>Produce detailed working drawings that can be used to manufacture components accurately, economically and reliably using appropriate dimensioning techniques (LO4)</p>	<p>Read:</p> <ul style="list-style-type: none"> • Engineering Economics and Design for Manufacturability(LO3, LO4) • Selecting process based on volume-costperformance (LO3, LO4) Review: • PowerPoint - Standardized features versus custom features (LO3, LO4) 	<ul style="list-style-type: none"> • Discussion post: What are the criteria for selecting shapes, tolerances, and materials for a common screw used in a wide number of industrial applications versus a hip implant? (LO3, LO4) <p>Assignment:</p> <ul style="list-style-type: none"> • Analyze what to consider when creating an economical part to meet performance criteria. (LO3, LO4)
<p>Week Six: Design Principle; Risk and Tolerance Analysis (LO1),(LO2),(LO3),(LO4),(LO5)</p>	<p>Generate assembly drawings for multicomponent products (LO1)</p> <p>Generate basic detail and working drawings from sketches, prototypes, and 3D drawings (LO2)</p> <p>Produce detailed and well-dimensioned drawings using techniques of GDT for advanced manufacturing processes (LO3)</p> <p>Produce detailed working drawings that can be used to manufacture components accurately, economically and reliably using appropriate dimensioning techniques (LO4)</p> <p>Utilize appropriate dimensions and tolerances; recognize their critical relationships to manufacturability, quality assurance, and component functions (LO5)</p>	<p>Review:</p> <ul style="list-style-type: none"> • Power Point - Design Failure Modes and Effects Analysis (DFMEA) (LO1),(LO2),(LO3),(LO4),(LO5) • Power Point - Tolerance Analysis (LO1),(LO2),(LO3),(LO4),(LO5) • Review Risk and Tolerance Analysis worksheets. (LO1, LO2, LO3, LO4, LO5) 	<p>Assignment:</p> <ul style="list-style-type: none"> • Answer learning questions based on why and how to use Risk and Tolerance analysis as a tool when designing parts. (LO1, LO2, LO3, LO4, LO5) • Complete Risk Analysis and Tolerance Analysis Exercises. (LO1, LO2, LO3, LO4, LO5)

<p>Week Seven: Integrating Design Principles into action (LO1),(LO2),(LO3),(LO4),(LO5)</p>	<p>Generate assembly drawings for multicomponent products (LO1)</p> <p>Generate basic detail and working drawings from sketches, prototypes, and 3D drawings (LO2)</p>	<p>Evaluate and Analyze:</p> <ul style="list-style-type: none"> Download model files: Valve Plate Design (LO1, LO2, LO3, LO4, LO5) 	<p>Participate:</p> <ul style="list-style-type: none"> Discussion post: What are the minimum Quality Standards that should be considered when developing a commercial
	<p>Produce detailed and well-dimensioned drawings using techniques of GDT for advanced manufacturing processes (LO3)</p> <p>Produce detailed working drawings that can be used to manufacture components accurately, economically and reliably using appropriate dimensioning techniques (LO4)</p> <p>Utilize appropriate dimensions and tolerances; recognize their critical relationships to manufacturability, quality assurance, and component functions (LO5)</p>		<p>product? (LO1, LO2, LO3, LO4, LO5)</p> <p>Assignment:</p> <ul style="list-style-type: none"> Complete Valve plate design with Risk Analysis, Tolerance Analysis, Inspection Sheet (LO1, LO2, LO3, LO4, LO5) Analyze Valve Plate Prints, Risk Analysis, Tolerance (LO1, LO2, LO3, LO4, LO5)

<p>Week Eight: Integrating Design Principles and Assembly Tools into action (LO1),(LO2),(LO3),(LO4),(LO5)</p>	<p>Generate assembly drawings for multicomponent products (LO1)</p> <p>Generate basic detail and working drawings from sketches, prototypes, and 3D drawings (LO2)</p> <p>Produce detailed and well-dimensioned drawings using techniques of GDT for advanced manufacturing processes (LO3)</p> <p>Produce detailed working drawings that can be used to manufacture components accurately, economically and reliably using appropriate dimensioning techniques (LO4)</p> <p>Utilize appropriate dimensions and tolerances; recognize their critical relationships to manufacturability, quality assurance, and component functions (LO5)</p>	<p>Evaluate and Analyze:</p> <ul style="list-style-type: none"> • Download model files: Cylinder Assembly (LO1, LO2, LO3, LO4, LO5) 	<p>Participate:</p> <p>How would you summarize to a customer the design process and value of each step? (LO1, LO2, LO3, LO4, LO5)</p> <p>Assignment:</p> <p>Complete final project: with prints, models, BOM, Risk and Tolerance Analysis (LO1, LO2, LO3, LO4, LO5)</p>
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