

Design and Modeling: PLTW GTT-ME (Periods 3 & 5)

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Conway Middle School

2015-16 Course Syllabus

PROGRAM DESCRIPTION: The Technology Education program at Conway Middle School includes a course affiliation with **Project Lead the Way**, a nationally recognized STEM curriculum. Middle school course offerings come from the **Gateway to Technology (GTT)** curriculum. PLTW projects are high interest, making PLTW a very compelling, and often challenging course. The program, as with all PLTW programs, emphasizes student readiness for participation careers in a technology driven society, as well as the opportunity to look ahead to advanced studies in colleges and universities. Students will have access to the PLTW LMS (Learning Management System). Through this portal, they will have access to lessons and resources, as well as quizzes and other assessments for the program.

In the *Design & Modeling (GTT_DM)*, students apply the design process to solve problems and understand the influence of creativity and innovation in their lives. In OCPS, the course is an adaptation of *Exploring Production Technology* curriculum framework (*DOE 8600040*). Students in teams to design a playground and furniture, capturing research and ideas in their engineering notebooks. Using Autodesk® design software, students create a virtual image of their designs and produce a portfolio to showcase their innovative solutions. . The class is offered to seventh and eighth graders and will last for 18 weeks (offered each semester).

RESOURCES: Project Lead the Way Learning Management System (LMS)

ASSESSMENT: Student performance will be evaluated on a point system inclusive of research questions in tutorials and problems, tests, projects and products, as well as participation. Some projects, as well as objective tests and quizzes will be submitted electronically through the Project Lead the Way Learner Management System (LMS). The grading scale for all assigned work is as follows:

- **90-100% = A**
- **80 – 89.9 = B**
- **71 -79.9% = C**
- **60 – 69.9% = D**
- **59.9 OR BELOW = F**

END OF COURSE ASSESSMENT: As with all classes, the state is requiring an end of course assessment. In Orange County Public School career and technical (CTE) programs will use a portfolio assessment in which students will show growth and competency in the skills studied in class. For our students, this will mean that they will assemble a portfolio of their best work throughout the semester. This is a less stressful alternative to the conventional objective test that would be taken (in other words no bubbling of answers). More information on the assembly of this portfolio will be offered later in the semester. Students will be oriented to save and archive their work throughout the semester so it can be selected and added to this portfolio later on.

CLASS RULES AND EXPECTATIONS: Rules and expectations, as well as consequences are consistent with Conway Middle School Step Plan and the OCPS code of conduct. Students should be prepared, respectful, and on time. Food and drink are never allowed! Students must sign and comply with the CMS Computer usage agreement.

ORDER OF INSTRUCTION: This is a projected plan of goals and topics week by week.

WEEK 1 UNIT LEARNING OBJECTIVE: Students will understand what technology is, how it is studied through STEM, and how the problem solving process works in technology.

- Expectations for success
- Safe and proper use of lab resources
- Common terminology and concepts for technology for technology and STEM.
- Orientation to the PLTW LMS
- Orientation to PLTW Engineering Notebooks
 - Activity 1.1.1 Dividers
 - Activity 1.1.1a Notebooks
- Vocabulary and concepts review in a “Quiz Bowl” game.

WEEK 2 UNIT LEARNING OBJECTIVE: Students will understand what the field of Engineering is and its place in technology problem solving.

- Lesson 1.1 What Is Engineering - Key Terms
- Activity 1.1.4 What is Technology?
- Activity 1.1.2 Introduction to Engineering
- Activity 1.1.5 Engineering Careers*

*This is an ongoing assignment available on teacher website. Students are required to complete at least one career study, but may upload an additional for one extra credit. This will “bell work” done during any lab time in subsequent weeks.

- Quiz

WEEK 3 UNIT LEARNING OBJECTIVE: Students will understand the engineering design problem solving process and how it works in technology.

- Problem statements, design briefs, and working with criteria and constraints
- Developing a solution, solving, and testing solutions
 - Activity 1.2.1 The six step design process
- Design process, elements of design, and working in a team
 - Activity 1.2.2 Design Elements
- Decision matrix and documenting the six steps of design
 - Activity 1.2.3 Furniture Design Challenge/Hobby Organizer
- Test

WEEK 4 & 5 UNIT LEARNING OBJECTIVE: Students will know how to measure accurately in standard and metric units, and will appreciate the importance of this skill.

- New vocabulary and concepts (Activity 1.3.1)
 - Activity 1.3.1 History of Measurement
- Understanding measuring systems
 - Activity 1.3.2 Standard and metric measurement
- Using measuring and layout tools
 - Activity 1.3.4 Project: “Lab Skimmer”
- Quiz

WEEK 6 UNIT LEARNING OBJECTIVE: Students will understand the “alphabet of lines” to communicate through sketching, and learn the techniques needed to communicate through sketching.

- New vocabulary and concepts (Activity 1.4.1)
 - Activity 1.4.1 Language of Sketching
 - Activity 1.4.2 Sketching techniques
 - Activity 1.4.3 Sketching practice

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WEEK 7 & 8 UNIT LEARNING OBJECTIVE: Students will understand how to produce sketches expressing their idea in three view (orthographic) drawings, and provide detailed information for dimensions.

- New vocabulary and concepts (Activity 1.4.1)
 - Activity 1.4.4 Orthographic Projection
 - Activity 1.4.5 Dimensioning

WEEK 9 UNIT LEARNING OBJECTIVE: Students will understand how to create descriptive drawings of original ideas

- New vocabulary and concepts (Activity 1.3.1)
- Producing pictorial sketches (isometric, oblique, and perspective)
 - Design Challenge: Design one playground implement in an orthographic and pictorial drawing.
- Test

WEEK 10 UNIT LEARNING OBJECTIVE: Students will know how to use the tools within Autodesk Inventor and understand the fundamental purpose of 3d Modeling.

- New vocabulary and concepts (Activity 1.5.1)
- Launching Autodesk Inventor
- Parts Inventor and navigation tools
 - Activity 1.5.2 Computer Modeling Fundamentals
- Constraints and their purpose
 - Activity 1.5.2b Geometric Constraints

WEEK 11 & 12 UNIT LEARNING OBJECTIVE: Students will know how to produce basic shapes using parametric modeling techniques.

- New vocabulary and concepts (Activity 1.5.1)
- Drawing shapes with constraints
- Extrusion, stretch, and cut-through
- Drawing on a sketch plane
 - Activity 1.5.3 Parametric modeling
 - Activity 1.5.4 Sketch plane cube
- Quiz

WEEK 13 & 14 UNIT LEARNING OBJECTIVE: Students will be able to use parametric modeling to produce working and assembly drawings of products.

- New vocabulary and concepts (Activity 1.5.1)
- Part (.ipt) files and assembly (.iam) file formats
- Working drawings and detail
 - Activity 1.5.5a Pegboard Toy-Working drawings
- Assembly drawings
 - Activity 1.5.5a Pegboard Toy-Assembly drawings
- Test

WEEKS 15 & 16 UNIT LEARNING OBJECTIVE: Students will use sketching a parametric drawing to design a unique product.

- Working from sketch to parametric drawing
- Documenting the six steps of design to a product design
 - Activity 1.5.7 Switch Plate Design

WEEK 17 & 18 UNIT LEARNING OBJECTIVE: Students will work in design teams to design a product following and documenting the six step design process.

- Team building for design
 - Understanding a design problem
 - Review of the six steps of design
 - Activity 1.5.8 Hairbrush design
- OR**
Activity 1.5.9 Playground design

WEEK 18 UNIT LEARNING OBJECTIVE: Students will understand how to show/present work in a portfolio format.

- Archiving files electronically
- Orientation to EOC procedures
- End of course portfolio assessments