Unit 8 Advanced Computer Modeling Lesson Plan

COURSE:	TEACHER:	DURATION:
Introduction to Engineering Design (Honors)	Jason D. Redd	26 Days

STANDARDS:

This course connects to standards in the following:

- Common Core State Standards for English Language Arts Anchor Standards
- Common Core State Standards for English Language Arts
- Common Core State Standards for Mathematics
- Next Generation Science Standards
- Standards for Technological and Engineering Literacy

PLTW FRAMEWORK:

Provided by Project Lead the Way (PLTW), the PLTW Framework provides an overview of the levels of understanding that each student will build upon throughout the lesson/unit. It includes: Established Goals, Transfer, Understandings, Knowledge and Skills, and Essential Questions. The most fundamental level of learning is defined by course Knowledge and Skills statements. Each Knowledge and Skills statement reflects

content. Students apply Knowledge and Skills to achieve Learning Objectives, which are skills that directly relate to the workplace or applied academic settings.

Established Goals

It is expected that students will:

- Demonstrate an ability to identify, formulate, and solve engineering problems.
- Demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.
- Demonstrate an ability to apply knowledge of mathematics, science, and engineering.
- Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- Pursue the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- Demonstrate an understanding of professional and ethical responsibility.
- Demonstrate an ability to function on multidisciplinary teams.
- Demonstrate an ability to communicate effectively.
- Gain knowledge of contemporary issues.
- Recognize the need for, and develop an ability to engage in life-long learning.

Transfer

Students will be able to independently use their learning to:

- Use mathematical and computational thinking to represent phenomena and solve engineering problems.
- Use current engineering tools (ex., spreadsheet software, CADD software) to create models, solve problems and perform engineering design.
- Communicate technical information or ideas in multiple formats including orally, graphically, textually and mathematically, as appropriate.

Understandings

Students will understand that:

Parametric computer aided design (CAD) software packages facilitate 3D virtual modeling of parts and assemblies using parameters, such as geometric constraints (the relationships between geometric entities) as well as numeric constraints (dimensions) used to determine the shape and size of geometry and models.
A parametic numeric constraint (dimension) can be represented by a function (equation) that mathematically describes the relationship between that dimension and other related dimension(s).
Technical drawings convey information according to an established set of drawing practices which allow for detailed and universal interpretation of the drawing.
The style of the engineering graphics and the type of drawings views used to detail an object vary depending upon the intended use of the graphic.

Knowledge and Skills

Knowledge: Students will:

Identify, define, and explain the proper use of an auxiliary view in technical drawing.

Skills: Students will:

Use advanced modeling features to create three-dimensional solid models of complex parts and assemblies within CAD and with little guidance given the actual part using appropriate geometric and dimensional constraints.
Formulate equations and inequalities to represent relationships between quantities.
Using a CAD application, create relationships among part features and dimensions using parametric formulas.
Create an exploded assembly view of a multi-part product. Identify each component of the assembly with identification numbers and create a parts list to detail each component using CAD.
Perform a peer review of technical drawings and offer constructive feedback based on standard engineering practices.
Hand sketch an auxiliary view in the correct orientation to fully detail an object or part given the actual object, a detailed verbal description of the object, a pictorial view of the object, or a set of orthographic projections.
Generate an auxiliary view using CAD according to standard engineering practice.

ESSENTIAL QUESTIONS:

Students will keep considering:

Are working drawings always necessary in order to communicate the design of a consumer product? Justify your answer.
Animated assemblies are not typically included as part of the technical documentation of a design. How can 3D animated assembly models of an object or a proposed design be used in the design process? Beyond the design process?

EQUIPMENT / MATERIALS / RESOURCES:

Students will need or utilize:

- ☒ Assignment Handouts / Instructions
- ☒ CAD Software
- ☒ Classroom Materials / Equipment
- ☒ Computer / Device
- ☒ Internet Access
- ☒ Microsoft Office Software
- ☒ Online Resources
- ☐ Other Software
- ☒ Schoology
- ☒ Teacher Handouts
- ☐ Other:

Student will share why the lesson is important via guided questions.
Student will complete some sort of exit ticket.