Discovery Middle School

1304 Hughes Rd., Madison, Alabama 35758

Melissa Marowski

PLTW Design and Modeling

Teacher Contact Information	**Email:** mjmarowski@madisoncity.k12.al.us **Classroom Phone:** 256- 837-3735 ext. 82002
Classroom Digital Platforms	Schoology Link: https://madisoncity.schoology.com/home Curriculum: www.pltw.org Distribution List Link: Power Schools will be used for parent contact info
Textbook Information	Online PLTW curriculum (no textbook) www.pltw.org (log in usernames provided in class)
Course Description	Design and Modeling (DM) provides students opportunities to apply the design process to creatively solve problems. Students are introduced to the unit problem in the first activity and are asked to make connections to the problem throughout the lessons in the unit. Students learn and utilize methods for communicating design ideas through sketches, solid models, and mathematical models. Students will understand how models can be simulated to represent an authentic situation and generate data for further analysis and observations. Students work in teams to identify design requirements, research the topic, and engage stakeholders. Teams design a toy or game for a child with cerebral palsy, fabricate and test it, and make necessary modifications to optimize the design solution.
Course Prerequisites	None
Course Objectives	Persistently apply an iterative process to solve a problem or create an opportunity that can be justified. Apply user-centered design principles when creating a solution. Solve a problem using computational thinking, analytical, and critical thinking skills. Analyze and describe design functionality by observation of an artifact. Design and conduct an experiment that investigates a question. Collaborate effectively on a diverse and multidisciplinary team. Communicate effectively for specific purposes and settings. Demonstrate the ability to manage multiple resources throughout a project. Identify the variety of careers related to engineering, biomedical sciences, and computer science. Demonstrate personal

	responsibility and initiative. Apply a mathematical model to represent an authentic situation. Construct a solid model.
Course Goals	1. Apply the design process to creatively solve problems 2. Students learn to use methods for communicating design ideas through sketches, solid models, and mathematical models. 3. Understand how models can be simulated to represent an authentic situation and generate data for further analysis and observations. 4. Work in teams to identify design requirements, research the topic, and engage stakeholders 5. Design a toy or game for a child with cerebral palsy, fabricate and test it, and make necessary modifications to optimize the design solution
Instructional Delivery Plan, Course Outline, and Culminating Project	**Lesson 1: Introduction to Design** Students discover the design process as they complete an instant design challenge to create an ankle foot orthosis. They learn thumbnail, orthographic, isometric, and perspective sketching as methods for communicating design ideas effectively without the use of technology. The use of a common measurement system is essential for communicating and fabricating designs. Students use both measurement systems and apply measurement skills while dimensioning sketches. They create and launch paper air skimmers and complete statistical analysis on their results. Students conduct a mechanical dissection in the lesson project to better understand how objects and parts interact while using sketches to communicate and document their findings. **Lesson 2: Solid Modeling** In this lesson, students transfer a two-dimensional representation to a three-dimensional solid model with technology. Students learn how to use a computer-aided design (CAD) application to create solid models of various objects and designs. During the design project, students work in teams and apply the design process to create a puzzle cube. Students create a solid model of their design using the CAD application and fabricate their design solution for testing. Students use a dynamic mathematics program to complete statistical analysis from their testing results to determine if their design met the criteria and constraints. **Lesson 3: Design Challenge** Within teams, students brainstorm and select a design solution to the Therapeutic Toy Design Challenge problem based on design requirements. They establish team norms, collaborate, and recognize that solving authentic problems involves interdisciplinary skills such as engineering and biomedical science. Using the design process, students create a solid

	model of their design, build a prototype for design testing, and make necessary design modifications based on testing results. ***Design and Modeling Design Project Due at end of the 9 weeks (progressive project completed in class)***
Credentialing	**None**
CTSO Integration (DMS Career Technical Student Association)	Technology Student Association, TSA, is a **career technical student organization** and a fundamental part of this course. It is a national career and technical student organization of students engaged in science, technology, engineering, and mathematics (STEM). TSA is integrated into the program which includes competitions and leadership opportunities. TSA provides students with activities during their class time and after school with our local TSA Chapter. *TSA Based Activities relevant to Design and Modeling include but are not limited to: Inventions and Innovations, Technical Design, and Problem Solving.*
Embedded Numeracy Anchor Assignment (Skimmer project data interpretation)	Students will **statistically analyze** their data by performing calculations to create a summary that describes their data. The data will be described by two features, center (**median)** and spread (**interquartile)**.
Embedded Literacy Anchor Assignment (Instant Design Challenge)	In this activity you will **work in a team** of four to solve an instant design challenge. You and your team will use the **design brief** to understand and **define** the needs of a person with a physical challenge, then **design**, **build**, test a **prototype,** and **draw logical conclusions** to help that person. As designers, you will **document** and explore the steps you use to solve this problem. - Linked on PLTW Standards Page

CTE Lab Safety Guidelines	Each student in a CTE/PLTW course will be required to complete a lab safety exam and score a 100% correct before being allowed to use any tools on projects. We expect students to responsibly and safely use the CTE equipment. Examples of equipment used in CTE courses may include and are not limited to the following: scissors, hot glue guns, box cutters, power tools, hand tools, measuring tools, electronic equipment, computers, medical supplies, robotics equipment, food items (consumable and non-consumable).
Classroom Expectations	**Classroom Rules and Procedures:** **1. Be on time, on task and prepared to learn. #nofreedays** **2. Respect the teacher, the classroom, other students, and yourself. #benice** **3. Be responsible for your own learning. #nocheating #workhard** **4. Clean up after yourself and your classmates. #notyourhousekeeper** **5. Keep all personal electronics PUT AWAY. #onlywithpermission**
Progressive Discipline *(DMS Policy)*	**Discipline Policy** Support will be provided to assist student in making good decisions that result in positive educational outcomes. - 1st STEP: Warning #youfixit - 2nd STEP: I will document a conversation(s) with the student about the behavior. #thinksheet #wefixit - 3rd STEP: I will discuss the behavior and assign consequence #BLOOMIT - 4th STEP: I will contact home. #reinforcements - 5th STEP: Office referral Major offenses will result in the student being sent directly to the office. Semi major offenses such as but not limited to, not following protocol with

	the lab or lab materials can result in a detention referral.
Grading Policy and Scale ***(MCS Policy)***	**60%** = Assessments (Tests, Projects, Mini-Assessments) **40%** = Daily Grades (Quizzes, Exit Slips, Progress Checks, Classwork, Daily Activities, Participation) **Grade Scale:** 90-100 = A; 80-89 = B; 70-79 = C; 65-69 = D; <64 = F
Late Work Policy	Late work is considered on a case by case basis. It is the student's responsibility to contact me regarding a late work request.
Make-up Work/Test Policy	ZNAP - NO zeros allowed policy - Students with excused absences will be allowed to make-up all work within three days of returning to school. It is the student's responsibility to ask for make-up work. Students can get with a classmate or ask the teacher for help. Work that is not made up will become a zero (including quizzes/tests). Many times, missed quizzes and tests can be made up during school.
Technology	Student laptops should not be hard-wired to the network or have print capabilities. Use of discs, flash drives, jump drives, or other USB devices will not be allowed on Madison City computers. Neither the teacher, nor the school is responsible for broken, stolen, or lost laptops. Laptops and other electronic devices will be used at the individual discretion of the teacher.
Accommodations	Requests for accommodations for this course or any school event are welcomed from students and parents.
Materials & Supplies	Students should have all materials listed on the DMS Website. All other materials for the class will be provided.
Homework	N/A

9 Week Plan *Subject to Change	
Week:	Unit:
1	Lesson 1: Introduction to Design
2	Lesson 1: Introduction to Design
3	Lesson 1: Introduction to Design
4	Lesson 1: Introduction to Design

5	Lesson 2: Solid Modeling
6	Lesson 2: Solid Modeling
7	Lesson 2: Solid Modeling
8	Lesson 3: Design Challenge
9	Lesson 3: Design Challenge