Manufacturing Engineering Technology Syllabus

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Course Duration: One school year (two semesters)

Course Description:

This course introduces students to the fundamentals of manufacturing engineering technology, providing them with hands-on experience and theoretical knowledge of various manufacturing processes, equipment, and techniques. Students will learn about safety protocols, design principles, materials science, and the role of technology in modern manufacturing. Upon completing this course, students will understand the various fields and will be able to make informed decisions regarding a coherent sequence of subsequent courses. Further, students will have worked on a design team to develop a product or system. Students will use multiple software applications and robotics platforms to prepare and present course assignments.

This is a course involving basic concepts of engineering. We will be utilizing Vex, Arduino, Tinker CAD (3D design), Python and C Programming. The objective of this course is to introduce the student to system development, project assembly, programming, problem solving strategies, and teamwork. This course will involve students in the development, building and programming of a robot and microcontrollers. Students will work hands-on in teams to design, build, program and document their progress. Topics may include motor control, gear ratios, torque, friction, sensors, timing, program loops, logic gates, decision-making, timing sequences, propulsion systems and binary number systems. The final project for the course will be a compilation of all the skills your child has gained over the course of the year.

It is my hope that this class will provide motivation for students to continue in computer science and engineering courses.

Prerequisites:
None, although a basic understanding of mathematics and science concepts is recommended.

HIGH SCHOOL CREDIT:
Students will be awarded .5 credit per semester upon successful completion. To receive credit, students must earn a grade of 70 or above in each semester course and comply with attendance rules.

Course Objectives:

By the end of this course, students will be able to:

Demonstrate knowledge of fundamental manufacturing processes and their applications.
Apply safety practices and protocols in a manufacturing environment.
Utilize design software and tools to create basic manufacturing designs.
Identify and analyze materials properties and their suitability for specific applications.
Understand the role of technology in modern manufacturing and automation.
Collaborate effectively in team-based manufacturing projects.
Communicate technical concepts and ideas through oral, written, and visual presentations.
Course Outline:

Unit 1: Introduction to Manufacturing Engineering Technology

Understanding manufacturing processes and their classifications.
Exploring the history and evolution of manufacturing.
Overview of different manufacturing industries and their contributions.

Unit 2: Safety and Workplace Practices

Importance of safety in manufacturing.
Personal protective equipment (PPE) and its usage.
Emergency procedures and protocols in the manufacturing environment.

Unit 3: Design Principles in Manufacturing

Introduction to design software and tools.
Creating basic manufacturing designs.
Design considerations for manufacturability.

Unit 4: Materials Science and Properties

Properties of materials: mechanical, thermal, electrical, and chemical.
Material selection criteria for specific applications.
Introduction to metallurgy, polymers, ceramics, and composites.

Unit 5: Automation and Technology in Manufacturing

Role of automation and robotics in modern manufacturing.
Introduction to computer numerical control (CNC) machines.
Industry 4.0 and the smart factory concept.

Unit 6: Manufacturing Processes

Machining processes: turning, milling, drilling, grinding.
Forming processes: forging, casting, extrusion.
Additive manufacturing (3D printing) and its applications.

Unit 7: Team-Based Manufacturing Projects

Collaborative problem-solving in manufacturing projects.
Applying design, materials, and process knowledge to real-world scenarios.
Presentation of projects and findings.

Unit 8: Communication and Presentation Skills

Effective technical communication through writing and documentation.
Oral presentations and visual aids for conveying technical information.
Use of industry-specific terminology.
Assessment Methods:

Quizzes and tests assessing theoretical knowledge.
Hands-on projects demonstrating practical skills.
Class participation and engagement in discussions.
Team-based assignments and presentations.
Final exam covering all course content.

Grading:

Grades will be based on a combination of quizzes, tests, projects, class participation, and the final exam.

> 60% Formative – Quizzes, Notebook Checks, Class Participation
> 40% Summative – Tests, Presentations, and Projects

Each Grading period will count as 30% of the final semester grade with the Final Exam counting as 10%.

Classroom Policies

This course will require the use of a laptop or Chromebook with access to the internet. We will be using simulation software that your phones cannot process. The school has provided tech to students, your mobile device is not sufficient for this course.
Students will be expected to follow all computer rules including having signed an Acceptable Use Policy (AUP) for Internet access (this is a requirement for this course).
Student /teacher Expectations
This course is designed for the beginning to intermediate level computer user who has some experience using the computer. Students will work in-groups and teams to complete various course assignments and projects (challenges). Students will be expected to self-motivated and stay on task with all lectures, web-based instruction, and activities.

Student Data Storage

Each student will be given disks and space on the school server to store their robotic programs and activities. Students are responsible for backing up all their work and maintaining their data.

No excuses will be accepted for losing work, since multiple ways are offered to back-up and save student work.

Deadlines

Deadlines are exactly what they mean! All work is due when asked for with limited exceptions. Enough time is given for students to complete their work and projects in class with some homework as needed. Students should not PROCRASTINATE when dealing with deadlines for this class. This policy is followed strictly with limited exceptions as determined by the teacher. Many of the activities are scheduled for certain days and students missing a class period may not be able to make-up an activity. Remember, I only see each set of students five times every two weeks. Keeping up requires that you have excellent attendance and a strong work ethic.

Classroom Policies

Students are expected to follow all Houston ISD policies as outlined in the student handbook. Students will be expected to follow all computer rules including having signed an Acceptable Use Policy (AUP) for Internet access. Also, **Lab Rules** are strictly enforced, anyone violating safety policies will be immediately recommended for removal from the class and will no longer be allowed to participate in Lab Activities (this will severely affect your grade).

SAFETY:
The student will be able to compare and contrast what is safe versus unsafe, demonstrate safe and appropriate use of various tools, equipment, and materials and pass a test about safety with 100% accuracy. Students will not participate in projects if they do not pass the Safety Test or do not demonstrate safe tool and materials practices.

Computer Hardware and Software

All students will be expected to take care of and respect all school computer hardware and software while in their use. Students will have access to computers with the necessary software for the course. Intentional or reckless damage to any computer equipment by a student will be charged to the student. Students also understand that all software used for this course are the property of the Houston Independent School District and students are not allowed to make copies, share or change programs in any way.

Student Responsibilities

1.Students are expected to be in their assigned seat (or in the virtual meeting) with materials BEFORE the class begins.
2.Come to class prepared.
3.Students are expected to stay in their seat or meeting until class ends or they are dismissed.
4.Students are responsible for their computer equipment. Any problems – notify your teacher.

Classroom Rules

1.Students are expected to pay attention and stay on task while in class.
2.Respect the computers, textbooks and classroom materials.
3.Respect your peers and school property.
4.Students are to stay in the programs used for class
5.Headphone and airpods are not permitted (safety issue)

Consequences/Discipline

All school policies are followed in this classroom and enforced with the guidelines in the Stevenson M.S. 2020 – 2021 Student handbook.

Today's Assignment

Please all your parents to read over and understand the requirements of this course. Keep a copy for yourself.

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Student Name _____   (print please)

Parent Telephone _____

Parent Signature _____

Student Email Address: _____

Parent Email Address: _____