

MANCHESTER REGIONAL HIGH SCHOOL

INTRODUCTION TO COMPUTER ENGINEERING

REVISED

SEPTEMBER 2017

Manchester Regional High School Board of Education

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COURSE DESCRIPTION:

Students enrolled in this course are introduced to the major concentrations of Computer Engineering (hardware and software - design and integration), as well as many of the specialty areas including computer operating systems, wired and wireless networking, computer programming in multiple languages, and designing/ building 3D printed models. Students will also research emerging technologies, discuss copyright/fair use, and evaluate the meaning of safe digital citizenship in an increasingly connected world.
Introduction to Computer Engineering

COURSE DATA:

Length of Course:	Full Year
Credits:	5
Periods Per Week:	5
Classification:	Elective
Prerequisite:	None

EVALUATION CRITERIA:

Evaluation will be based on the following weighted components:
65% is the passing mark.

Test	30%
Project	20%
Classwork	25%
Quiz	15%
Class Participation	10%

Grading structure: Benchmark for mastery of course content is 65%; content mastery for students with IEPs may be less than the Board of Education approved minimum for regular education students.

Introduction to Computer Engineering

Class Overview:

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Major Specialties in Computer Engineering:

- I. Software Engineering (Programming Computers)
- II. Hardware Engineering (Building Computers)

Specialty Areas in Computer Engineering:

- I. Coding/Computer Language Programming
- II. Wired and Wireless Networks
- III. Operating Systems
- IV. Computational Science and Engineering
- V. CAD (3D Printing)
- VI. Creating User Interfaces

Classroom Workflow:

- I. Computer History
 - a. 8.2.B.4
- II. Parts of a Computer
 - a. 8.2.C.4, 8.2.E.2
- III. Operating Systems
 - a. IT-SUP-5, IT-SUP-8
- IV. Wired and Wireless Networking
 - a. IT-SUP-5, 8.2.E.2
- V. Raspberry Pi
 - a. Build a computer
 - i. 8.2.C.4, 8.2.E.2
 - b. Install an operating system (Raspbian)
 - i. IT-SUP-5, 8.2.D.3, IT-SUP-8
 - c. Program a computer

- i. Creating music with Sonic Pi (Procedural programming language)
 - 1. 1.3.12.B3, 1.3.12.B4, 8.2.D.3, IT-PRG-4, IT-PRG-6, ST-SM-1
 - ii. Game design with Scratch (Visual programming language)
 - 1. 8.1.B.1, 8.2.D.3, IT-PRG-4, IT-PRG-6, ST-SM-1
 - iii. Interact with peripherals using Python (Object-Oriented Programming Language)
 - 1. Solving real-world problems via science/engineering (Pi Camera and Astro Pi Sense Hat)
 - a. 8.1.C.1, 8.2.D.3, 8.2.C.4, IT-PRG-4, IT-PRG-6, ST-ET-1, ST-ET-2, ST-ET-5, ST-SM-1
 - d. Explore alternative operating systems (RetroPie, RaspBMC)
 - i. IT-SUP-5, 8.2.D.3, IT-SUP-8
- VI. 3D Printing
 - a. History, Current Usage, Future
 - i. 8.2.B.4, 8.2.C.4
 - b. Create simple 3D models (TinkerCAD)
 - i. 8.2.D.3, ST-ET-1, ST-ET-2, ST-ET-4
 - c. Preparing/Printing 3D Models
 - i. 8.2.D.3, ST-ET-1, ST-ET-2, ST-ET-4, ST-SM-1
 - d. Create intermediate 3D models (AutoDesk123D, Blender)
 - i. 8.2.D.3, ST-ET-1, ST-ET-2, ST-ET-4
- VII. 21st Century Digital Citizenship
 - a. Debate ethics on a variety of emerging technology topics
 - i. Artificial Intelligence, self-driving cars, online megastores vs. local retailers, cloning, government/private-sponsored space travel, etc.
 - 1. 8.1.D.5, 8.1.E.2, 8.1.F.1, 8.2.B.4, 8.2.E.1, 8.2.E.4
 - b. Social Media
 - i. Internet 2.0 concepts
 - 1. 8.1.D.5, 8.2.B.4, , 8.2.E.4, 8.2.F.1
 - ii. Crowdfunding
 - 1. 8.1.D.5, 8.2.B.4, , 8.2.E.4, 8.2.F.1
 - iii. Social Media and Marketing
 - 1. 8.1.D.5, 8.2.B.4, , 8.2.E.4, 8.2.F.1
 - iv. Safe use/cyber-bullying
 - 1. 8.1.D.2, 8.1.D.4
 - c. Copyright/Fair Use
 - i. 8.1.D.1, 8.2.E.4
- VIII. Final Design Project
 - a. Create product using Raspberry Pi and 3D printing to solve real-world problem
 - i. 8.1.C.1, 8.2.D.3, IT-PRG-4, IT-PRG-6, ST-ET-1, ST-ET-2, ST-ET-4, ST-ET-5, ST-SM-1