



<b>Teacher</b>	Cmdr. Schenk	<b>Semester and Year</b>	Fall 2021 – Spring 2022
<b>Course</b>	Embedded Programming	<b>Email</b>	schenk@fultonschools.org
<b>Website</b>	<a href="http://www.hawkeyedriver.com">http://www.hawkeyedriver.com</a>	<b>Room Number</b>	302

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**Textbook**      None

**Course Description:**

The demand for programming (software development) has gone well beyond desktop computers and the web, into a ubiquitous world of personal devices, smart cars, intelligent factories, and even more. These systems interact with us directly, as well as with each other. This course will focus on the interaction of programming and devices, using data from various sensors and sources in order to make decisions, take actions, and more.

A common industry term to describe this work is Internet of Things.

Students will show first-hand how programming and machines interact to accomplish common and essential tasks throughout our society. Embedded Computing is the third course in the Internet of Things pathway. Students enrolled in this course should have successfully completed Introduction to Digital Technology and Computer Science Principles. After mastery of the standards in this course, students should be prepared to earn an industry-recognized credential in this career area.

## **Course Goals**

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

- Identify the basic aspects and concepts of embedded computing and the Internet of Things (IoT)
- Describe various protocols for device communications and data transfers
- Develop and investigate interfacing circuits
- Discuss the differences between analog and digital circuits
- Categorize and use sensors on programming projects
- Manipulate electronic motors on projects
- Create and analyze programs used on devices
- Debug embedded code
- Discuss advantages and disadvantages of cloud-based computing
- Create an embedded coding master project

## **Standards**

IT-EP-1 Demonstrate employability skills required by business and industry.

IT-EP-2 Explain Embedded Computing (EC) and the Internet of Things (IoT).

IT-EP-3 Demonstrate a working knowledge of basic networking protocols for industry, homes, and the Internet including speed, power requirements, and popularity in industry and personal devices.

IT-EP-4 Develop and investigate interfacing circuits.

IT-EP-5 Classify and categorize multiple kinds of sensors.

IT-EP-6 Manipulate, connect, and examine performance aspects of motors

IT-EP-7 Investigate and draw connections within the context of programming as it relates to Embedded Computing/Internet of Things.

IT-EP-8 Interpret debugging techniques in hardware and software.

IT-EP-9 Compare, contrast, and utilize Cloud Service features.

IT-EP-10 Design an embedded computing application that solves a current problem (e.g., robotics, artbotics, visual, and kinetic art).

IT-EP-11 Explore how related student organizations are integral parts of career and technology education courses, through leadership development, school and community service projects, entrepreneurship development, and competitive events.

## **Expectations/Course Requirements:**

Much of what we do in this class will emulate the real world. This is designed to help prepare students to be more productive, trusted and valued as employees. Participation and a positive attitude are expected of every student. Independence and on-task behavior are expected.

Professionalism is always expected. Teamwork and group cooperation are a necessity. All students are expected to act as young professionals in the classroom. Students will treat each other with respect and dignity. Failure to act responsibly can result in disciplinary action and expulsion from the computer science lab.

This course is the gateway to the AP Computer Science and Embedded Programming Pathways offered here at Johns Creek. Completion of this course gives priority to limited seats in those courses based on

performance and intent to complete pathway. Top performing students will be recommended for advancement into AP Computer Science Principles as the second step in the pathway of Computer Science. Students with all four years in computer science can now complete TWO programming pathways in four years.

### Class Units and Topics

	Topic	Class Periods
0	Course Introduction, Foundations & CTSO (FBLA)	10
1	Lab Techniques and Research Assistance Leadership Training	19
2	Introduction to Hardware, Networking and the IoT	18
3	Electronics, Interfacing Circuits, & Sensors	19
4	Motors and Fall Innovation Projects	16
5	Real-World Problem-Solving with Embedded Programs	14
6	Testing and Debugging Embedded Code	19
7	<b>Senior Master Projects</b>	19
8	<b>Senior Master Projects</b>	15
9	Master Project Presentations, Assessment and Rollout	21

### Grading Scale

90-100 A      80-89 B      70-79 C      60-69 D      50-59 F

### Grading Categories Weights

Majors	60%
Minors	20%
Semester Diagnostic	20%
Total	100%

### Course Policies Specific to this Course

It is very important for students to arrive on time, and to maintain a continuous attendance routine. Our class content builds rapidly, and missing class makes keeping up with the pace of class significantly harder.

With specific prior permission, and only in very extenuating situations, the teacher may authorize some projects to be submitted via email. **These rare situations are the only circumstances in which email collection is accepted.**

While most submissions will be completed via Microsoft Teams, and printing of projects or assignments, if required, shall be completed *prior to the due date*. If projects are not available for collection on arrival on their due dates, they will be penalized as late.

## **COVID-19 Guidelines**

**Should COVID-19 cases require remote learning, all grading and turn-in requirements shall be in accordance with county-directed policies and will be enforced. Student attendance daily is expected, and attendance will also be enforced according to county guidelines.**

### **Opportunities for extra help or study sessions:**

Help sessions may be scheduled for before school, and when possible after school. Students must request help sessions twenty-four hours in advance.

During URL, Teams extra instruction will be by appointment or open office hours which will be announced.

### **Honor Code/Plagiarism Policy**

Integrity is a Johns Creek High School core value. Johns Creek students are expected to demonstrate honesty and integrity in all work submitted to a teacher. The honor code ensures the validity of student work which guides instruction. All JCHS students are bound by the Johns Creek Honor Code. (See Student Handbook for more detailed explanation.)

### **Recovery Policy**

Recovery for student work is strictly in accordance with 2021-2022 Fulton County policy.

### **Make Up Work Policy**

Students may make up all work missed on an excused and preapproved absence. Work assigned during the absence must be returned to the teacher within the same number of days as the absence which was excused. Unexcused absences may result in grade reduction. There will never be new instruction the day before an assessment. This time will be used for review. Students absent the day of an assessment will take the assessment on arrival back at school.

### **Late Work Guidelines**

Late work will be governed strictly by Fulton County guidelines for 2021-2022.

### **Technology/Cell Phones at JCHS**

Johns Creek High School supports the use of technology for academic pursuits. This includes cell phones, tablets, and laptops. The use and type of technology in a classroom is at the sole discretion of the teacher. All technology must be turned off and put away upon entering each classroom. Permission to use technology in a classroom will be explicitly stated by the teacher. Students may possess technology for personal use outside of classrooms in common areas. All devices must remain in silent mode, and students should use headphones when listening to sound. Students are responsible for the safety and security of their own devices and are not required to possess personal technology for instruction. In the case of an emergency, all technology should be turned off and put away as not to interfere with administrative emergency procedures.

**Absolutely no earbuds or earphones are to be worn in class.** On specific lab days, they may be authorized at the teacher's discretion. The pacing of our class requires full attention of students.

**Computer Science Portal** – We now have an online portal for our computer science classes, that will provide real-time blog information, all content presented in classes, assignments, and other information germane to each class. The blog is visible to anyone at <http://www.hawkeyedriver.net>.

Students are expected to routinely: Be in attendance of Teams classes, check the Team & portal for their assignments and feedback, and to be active in their educational process.

If we have any digital learning days due to inclement weather, all assignments will be given via the course pages and the blog.

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Student/Date

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Parent/Date