Iona Prep
Course Syllabus

Electronics and Robotics
2020- 2021

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Extra Help Schedule: by appointment 3:30–4:30 PM.

Course description: This is a senior elective course involving the construction of electronic circuits, the programming of a microcontroller, and the construction of a robot controlled by the microcontroller.

This course will explore the basics of electronics and electronic circuits with an emphasis on their application in sensing the environment and controlling the motion of a robot. Since much digital circuitry is controlled by software, the development and debugging of appropriate software will also be covered in as much detail as time permits.

Requirements: Each student must have a properly functioning PC/MAC computer with Internet access and an available USB port. The computer must be able to run the Parallax software. Each student must have a notebook for the course. They will be allowed to use this notebook on at least some tests and on all projects.

LEARNING GOALS

At the end of this course, students will have the following **understandings, knowledge, and skills**:

- Understand the basic behavior of resistors, capacitors, diodes, integrated circuits, motors, servos, and a variety of sensors.
- Be able to construct a moderately complex circuit when provided with a schematic diagram and appropriate components.
- Be able to use appropriate reference materials to write a program to control a simple robot. The first programming language will be BLOCKLY. The underlying programming language for the course is C.
- Understand multiprocessing and be able to use it appropriately in a complex program.
- Be able to debug a malfunctioning Blockly or C program.
- Have an understanding of basic binary logic and digital circuitry.

- Have become competent in the use of a digital multi-meter, breadboard, and assorted electronic components.
- Have become familiar enough with a CAD program to use it to control a 3D printer to produce one or more components of a project. (optional topic)

TEXTS & MATERIALS

There is no printed text for this course. Tutorials and reference materials are all online. For that reason, each student must have a PC or MAC which can access the Internet and has a USB port available and can run the Parallax software.

Quarter 1

Topic	**Text**
Intro. to Electronics and programming in C	Online Tutorial
Building and controlling an LED circuit	Online Tutorial
Digital Input	Online Tutorial
Controlling the motion of a servo	Online Tutorial
CAD and 3D printing (optional topic)	

Quarter 2

Topic	**Text**
Measuring rotation; the potentiometer	Online Tutorial
Digital Display 7-segment	Online Tutorial
Measuring Light	Online Tutorial
Frequency and Sound	Online Tutorial

Quarter 3

Topic	**Text**
Building the Activity Bot	Online Tutorial
Navigation basics (dead reckoning)	Online Tutorial
Use of Whiskers and sonar	Online Tutorial
Use of Infrared Headlights (optional topic)	Online Tutorial

Quarter 4

Topic	**Text**
Groups choose projects from a list of possibilities which include Activity-Bot extensions and other more advanced	Reference materials will depend upon the individual project.

robotics applications. Alternately, a group may propose an original project.	

RUBRIC

This will vary from project to project. The rubric will be explained when the project is assigned.

ASSESSMENT

The first few tests are written. After that, some tests are written and others are "Performance Tests" where the student must program his circuit/robot to perform a particular task. Performance tests may include a written component in addition to the actual completion of the task. Projects often have a competitive component.

#	Assessment	% Of Quarter Grade
3-5	Tests	100%

ATTENDANCE AND LATE WORK

When a student is absent for a test, he is expected to take the test on the date of his return, unless a mutually acceptable agreement is decided upon by the teacher and student.

Due to the pace and the amount of material covered in this course, it is imperative that assignments be completed on time. It is the daily responsibility and expectation of the student to check my web page (ionaphysics.org) and his Iona e-mail for assignments and announcements. Late work is not acceptable and may adversely affect a student's quarter average as shown in the assessment summary. If a student does not have a properly functioning computer in class every day he will find it difficult, if not impossible, to accomplish the work and his grade will be adversely affected.

Academic Integrity Policy

Iona Prep's Academic Integrity Policy is simple: Cheating, in any guise **whether giving or receiving information**, is morally wrong and will not be tolerated. As a Catholic community, it is vital that each member appreciates and practices a strong code of ethics.

CHEATING ON EXAMS AND PLAGIARISM

Plagiarism is the "use or close imitation of the language and thoughts of another author and the representation of them as one's own original work." Don't do it. Work deemed as plagiarism will receive zero credit. The full policy is located here: https://docs.google.com/document/d/112hksR9xG77x5FSEG0g0gMC7pLTvmynhEnsR1I1aLkg/edit?usp=sharing

Distance learning: If we are in distance learning, please refer to the distance learning policy in the handbook.