Iona Prep
Course Syllabus

Electronics and Robotics
2019-2020

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Extra Help Schedule: by appointment every day 3-4 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 robotics applications. Alternately, a group may propose an original project.	Reference materials will depend upon the individual 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. <u>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.</u>

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 (includes, but is not limited to)
- **Giving or receiving** information about the content of a quiz, test, exam, or other assessment
- **Giving or receiving** answers during a quiz, test, or exam
- Consulting with others or outside resources when instructed not to do so
- Manufacturing or changing data, inventing outside sources, falsely attributing quotations, or making up quotations and crediting them to a real or fictitious source
- Doing someone else's work, or claiming ownership of someone else's work
- Submitting the same paper, or largely the same paper, in more than one course

- Referring to notes, outlines, timelines, calculators, or translators during quizzes, tests, essays, and exams, unless told to do so by the teacher
- Using a calculator or any other electronic device in a manner inconsistent with guidelines provided by the teacher

Plagiarism (includes, but is not limited to)
- Intentionally or unintentionally using words, images, or ideas without proper citation
- Paraphrasing a source without proper citation
- Misrepresenting in any way someone else's intellectual property

The student has the responsibility of conducting himself in a manner that is above suspicion. This same responsibility applies to all classroom performance, daily and weekly quizzes and tests, homework assignments, outside readings, papers, and final examinations.

Should a teacher find that a student has cheated or plagiarized on an exam, test, quiz, homework assignment, or plagiarized a paper, **he or she should contact the Dean of Academics immediately.** The following repercussions are consistent with school policy:

- **1st offense** - The student may or may not have the opportunity to redo the assignment/assessment for partial credit. The teacher will contact the student's parents regarding the incident and the consequences.
- **2nd offense** - At the discretion of the Administration, the student may receive no credit for assignment/assessment; teacher will confer with Dean of Students. The parents/guardians will be contacted by the Dean of Academics and the student will be referred to the Dean of Students and to the School Counselor.
- **3rd offense** - The student will receive no credit for assignment/assessment and meeting with parents and Administration is mandatory.

Progressive egregious offenses will lead to further disciplinary action that may result in dismissal.

Midterms and Finals

Students found cheating on a midterm or final exam will receive an automatic zero for that midterm or final, which will result in a 0 on their report card. Infractions include:
- Operating any electronic device once the exam has started
- Accessing any website away from their exam module
- Using any notes or cheat sheet
- Any other action used to gain an unfair advantage

The aforementioned policy applies to a **student's career at Iona Prep;** it is not per class or academic year.