

IONA PREP

COURSE SYLLABUS

ELECTRONICS AND ROBOTICS *2010-2011*

INSTRUCTOR: BR. R.W. HARRIS

EMAIL: BR.HARRIS@IONAPREP.ORG

PHONE: 914-632-0714 x 227

***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 laptop computer. Students should have completed the honors physics course.

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 and servos.
- Be able to construct a moderately complex circuit when provided with a schematic diagram and appropriate components.
- Have gained broad experience in the construction and debugging simple electronic circuits.
- Be able to use appropriate reference materials to write a program to control a simple robot.
- Be able to debug a malfunctioning program.
- Have an understanding of basic binary logic and its application to simple digital circuitry.

- Have gained competence in constructing and debugging digital electronic circuits.
- Have become competent in using digital multi-meters, oscilloscopes, signal generators and breadboards in the laboratory setting.

TEXTS & MATERIALS

1. **What is a Microcontroller** by Parallax Corporation
2. **Robotics with the Boe-Bot** by Parallax Corporation.
3. **Various data sheets and reference materials relative to individual projects**
4. **Basic Stamp Syntax and Reference Manual** by Parallax Corporation
5. **Each student must have a computer which can access the Internet and has a USB port available.**

Quarter 1

Topic	Text
Setting up the system hardware and software	What is a Microprocessor Pages 1-33
Building and controlling an LED circuit	What is a Microprocessor Pages 37-64
Digital Input	What is a Microprocessor Pages 71-88
Controlling motion	What is a Microprocessor Pages 103-128

Quarter 2

Topic	Text
Measuring rotation; the potentiometer	What is a Microprocessor Pages 139-152
Digital Display 7-segment	What is a Microprocessor Pages 165-186
Measuring Light	What is a Microprocessor Pages 189-193
Frequency and Sound	What is a Microprocessor Pages 219 - 222

Quarter 3

Topic	Text
Building the Boe-Bot	Robotics with the Boe-Bot Pages 1-118
Boe-Bot Navigation	Robotics with the Boe-Bot Pages 123-157
Use of Whiskers	Robotics with the Boe-Bot Pages 165-177
Use of Infrared Headlights	Robotics with the Boe-Bot Pages 235 - 255

Quarter 4

Topic	Text
Groups choose projects from a list of possibilities which include Boe-Bot extensions and other more advanced robotics applications.	Depends upon the project chosen

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 frequently include a written component in addition to the actual completion of the task. Often there is a competitive component to the project.

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

CHEATING ON EXAMS AND PLAGIARISM

Iona Prep’s policy on honesty 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.

The student has the responsibility of conducting himself in a manner that is above suspicion. It is also to be understood that 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 on an exam, test, quiz, homework assignment, or plagiarized a paper, the following will occur:

- The teacher will contact the student’s parents.
- The student will be assigned a “zero” on the assignment, paper, quiz or test.
- The teacher will inform the Dean of Students.

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 Edline 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.