

Principles of Technology: Robotics

2008-2009

“the important thing is not to stop questioning” Albert Einstein

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What this Science Course is about?

The Course

Principles of Technology: Robotics is a course in applied science that will immerse students in the connection between science and technology. This course combines the understanding of basic scientific principles with practice in problem solving. This course will use a hands-on approach to introduce the basic concepts of robotics, focusing on mobile robots. Instruction will be a combination of direct instruction and student experiments. Students will work in teams to create increasingly complex LEGO-based mobile robots, culminating in an end-of-semester *robot contest*.

Objectives of the course:

Throughout the course, students will:

- Develop skills to help facilitate creative thinking and problem solving.
- Improve math and science skills.
- Be provided with a hands-on learning environment.
- Learn to make predictions and decisions based on measurement, observations, and calculations.
- Be given the opportunity to design and construct systems utilizing the various classroom tools.
- Understand basic computer systems
- Develop skills to design, model, planning and control of robot systems.
- Use play to learn.

What do I need to know for this 18 week course?

Texts

The Robotics Primer by Maja J Mataric

Robotic Explorations: An Introduction to Engineering Through Design by F. Martin

At this time Mr. Beard will provide students with the necessary readings for the course.

Materials

1 One-Inch Three Ring Binder and three holed bound college ruled paper

Students are expected to come to class on time with note books, textbooks, and a pencils. You will need a notebook within the first week of the beginning of the course.

Mr. Beard also recommends, but does not require, students to have a USB flashdrive. As a good portion of the course work can be computer based, students may find it very helpful to have at least a 512 megabyte USB flashdrive.

What do I need to know going into this science course?

Homework:

All students are expected to complete homework assignments as the assignments are assigned by the teacher. Mr. Beard reserves the right to modify homework as needed on a student by student basis.

Overall the primary homework assignment is completing the note taking process by reviewing, summarizing, and reflecting on the notes taken that day in class.

Attendance

Attendance is vital to your success during this course. While a student will not be directly penalized for excused absences, you may miss important activities and information for which you will be held accountable. Unexcused absences will, however, result in a loss of points for assignments due on that date and any assignments given on that date. If a student is absent the student should make use of the course website.

Tardiness

Please be ready to begin class on time. Tardy students are distracting to others. Sharpen your pencil, go to the restroom, conduct personal business, etc. before the the class begins. The first unexcused tardy will result in a warning. Any subsequent offenses will be in concordance with building discipline plan. Repeated tardiness may be referred to the administration for appropriate action.

Behavioral Expectations

All Federal Way School District and Federal Way Public Academy polices and procedures are upheld in Mr. Beard's Science classes. Please read and know the content of the *student handbook*. I require that all students are responsible and respectful of members of our classroom.

By being a student in Mr. Beard's class you are making the following commitment

You will develop yourself in a positive manner

You will avoid anything that will harm

your physical health or mental growth

You will develop and practice discipline

and self control to protect your self and others

You will act with courtesy in all encounters

You will develop and practice integrity

in all actions that you take

You will develop and show a sense of pride in your school

and yourself that allows you to have an indomitable spirit

You will develop, practice, and master scholarship

and in the face of all challenges you will persevere...

Hall Passes

Hall passes will be issued by Mr. Beard for emergency lavatory or medical needs as needed.

Completing the Course

Mr. Beard encourages all students to complete the course by successfully learning and successfully completing the required course work as stated in the course checklist. Mr. Beard is willing to work with all students to help them complete the course and demonstrate their mastery of the course standards.

The Work and Learning

The "Work" of this course is how you gain the ability to demonstrate your understanding and skill of the course standards.

The general cycle of learning in this course is:

- Instruction of specific skill or knowledge in the classroom via a variety of instructional methods.
- Active note taking in class as part of learning processes
- Classroom practice and tutorial of specific skills and or knowledge.
- At home written practice of specific skills or knowledge through note summaries and review.
- Continued classroom instruction.
- Classroom Assessment of skills and knowledge.

Notebooks

Each student is required to keep a science notebook. All science work will be kept in this notebook. Your notebook will become your "working portfolio" and will contain a significant amount of your evidence for meeting or exceeding standards.

Your notebook will contain:

Cornell Notes:

Your daily Cornell Notes and Summaries

Hand written Lab Report Drafts:

Formal write up of scientific investigations.

Robot Designs

Your designs and parts list for all your creations.

Seminar/Discussion Reflections:

Written reflection of skills or topics discussed during Socratic seminars.

Assessment

Each student will be *formally* tested over all concepts and skills presented in this course. A formal test in Mr. Beard's class is a an opportunity for students to demonstrate their mastery of a course standard.

These test or assessments include:

- 18 Weekly Quizzes
- 5 project presentations
- 1 mid-term exam
- 1 Final Exam

Revision of Work Policy

From time to time you, the student, may feel that you performed poorly on an assignment or quiz. Students are allowed one re-take for any quiz. All retakes must be completed after school between 3:00 pm and 3:30 pm and must be scheduled at least 3 days in advance. When a student retakes a quizzes the questions asked will not be the same but content and focus will be the same. Students may not retake the final exam.

Lab reports may be corrected up to a a grade of 85%.

Projects/Presentations may be corrected up to a grade of 85%.

Make-up Work (For excused absence)

All students may complete make-up work for excused absences. When a student is absent the student may check the course website for lesson information. Students may complete the assignments they miss and submit the assignment to teacher upon return from an excused absence.

Lab Policy

This course is based on a variety of activities that will be done in the laboratory environment. Plan to be dressed appropriately for lab on lab days that are dictated in the course. In order to participate in lab activities all students are required to review and sign the Classroom Safety Form.

Safety

Safety is a priority in the science classroom. Safety infractions will not be tolerated. Any safety

- Write formulas, codes, and key words on your person or objects for use in a test.
- Lying to the teacher about another student cheating.

What happens if a student is caught cheating?

1st Offense

- Zero on assignment. Teacher confers with student. Referral sent to building principal.
- Teacher contact parent explaining specifics of incident after it is established that cheating has occurred. A copy of the assignment and referral will be kept on file. Student may be given an opportunity to retrieve credit for the assignment at the teachers discretion.
- Disciplinary action is taken.
 Discipline may include but is not limited to:
 Student must write an essay on ethics

2nd Offense

- Zero on assignment. Teacher confers with student. Referral sent to building principal.
- Teacher contact parent explaining specifics of incident after it is established that cheating has occurred. A copy of the assignment and referral will be kept on file. Grade of for the assignment is locked at zero at teachers discretion and a note is entered into the grade record.
- Disciplinary action is taken.
 Discipline may include but is not limited to:
 Student must write an essay on ethics.
 Student give a presentation on cheating and it's negative consequences.

Grading Policy

The grade for the course is determined by percentage of points earned in course for meeting or exceeding the course standards.

Grade & Percent		
A 93 to 100%		
A- 90 to 92%		
B+ 88 to 89%		
B 83 to 87%		
B- 80 to 82%		
C+ 78 to 79%		
C 73 to 77%		
C- 70 to 72%		
D+ 68 to 69%		
D 60 to 67%		
F 59% to 0%		

General Course Overview and Sequence.

Week	Unit/Topics	Lab	Quiz	Other
1	Computers Re-visited History of Robotics World of Robotics Understanding the tools.	Build a System	1	Literature Search What is out there seminar.
2	FWPABOT MK 1.0	Simple motors and power systems.	2	
3	Lego Design 1	Lego Structure and Gears	3	
4	Lego Design 2	Lego Mechanisms	4	Design Presentations 1
5	FWPABOT MK 2.0 Effectors and Actuators More Actuators Intro to Programming 1	Motors and Power	5	
6	FWPABOT Mk 3 The role of sensors Intro to Programming 2	Intro to Sensors	7	Design Presentations 2
7	FWPABOT Mk 3.1 "Bug" Simple sensors Intro to Programming 3 FWPABOT Mk 3.2 Simple sensors Intro to Programming 4	Touch Sensors Sound Sensors	8	
8	FWPABOT Mk 3.2 Simple sensors Advanced Programming 1 FWPABOT Mk 3.3 Simple sensors Advanced Programming 2	Ultrasonic Sensors Light Sensors	9	Design Presentations 3
9	Review			Mid-Term Exam
10	FWPABOT Mk 4 "Smart Bug" Complex sensors	Complex Sensors and feedback 1		
11	FWPABOT Mk 4.1 Complex sensors	Complex Sensors and feedback 2		Your Ultimate Lego Robot Project.
12	FWPABOT Mk 5 "Worker"	Robot Arms and Claws		
13	FWPABOT Mk 5.1	Simple Tasks 1		
14	Intro to Linux Robots			Linux Robot Project
15	Linux Robot Project			
16	Linux Robot Project			
17	Linux Robot Project			Linux Robot Presentations
18	FWPABOT Contest			Final Exam