**Course Description:**

Robotic Engineering is a high school level course that is appropriate for 10th – 12th grade students who are interested in the design, engineering and programming of robots or another technical career. The Robotics Engineering course is designed to explore the past, current and future use of automation technology in industry and everyday use. Robotic Engineering focuses heavily on prior knowledge from STEM related courses. The students will receive a comprehensive overview of robotic systems and the subsystems that comprise them.

With curriculum provided by Carnegie Mellon University and their National Robotics Engineering Center, the students will program several autonomous robots using Robot C and Robot G. There will be class competitions and engineering challenges using the radio controlled TETRIX robotic system, smart phones with BLUETOOTH and the LEGO NXT package. Careers in robotics, programming, and engineering will be discussed.
Course Objectives:

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

1. Apply the Engineering Process
2. Create, maintain and work in a safe laboratory environment
3. Create engineering documentation and plan projects using a Gantt Chart
4. Create flowcharts
5. Write Pseudocode
6. Design and engineer autonomous robots using various sensors
7. Design and engineer an autonomous robot that can complete tasks using NXT 2.0 programming software
8. Design and engineer an autonomous robot that can complete tasks using RobotC
9. Design and engineer a robot that can be complete tasks using a smart phone and Bluetooth
10. Design and engineer a robot that can be complete tasks using a radio controlled system with wireless camera

Academic Honesty:

Any work submitted by the student shall be his/her own. Work taken from others shall be deemed as unacceptable. Any doubts will initiate the completion of an alternative assignment or a zero on the required effort, depending on the severity of the infraction.

Class Policies and Expectations:

1. **Attendance**: Perfect attendance is strongly recommended. Arrive to class on time – Tardiness, without a pass, will be reported to the office. (see student handbook)
2. **Be prepared to work** - Bring all appropriate materials to class (Engineer's Notebook/Binder and pencil). Immediately take your assigned seat. Daily objectives are posted in classroom. Study Quizlet terms for current unit while you wait for attendance and wait for further instruction.
3. **Pay attention** – All lectures and demonstrations are important. These concepts will be built upon. Lab demonstrations are extremely important because they often involve your safety and the safety of everyone else in the lab.
4. **Food or drink** - Prohibited.
5. **Electronic devices** - Prohibited. Unless required in lesson. Ex. Use cell or digital camera to capture evidence of work to upload to ePortfolio.
6. **Computers** – Are available and used regularly. Students must follow internet usage policy. (see student handbook) Students caught using computer for reasons other than associated with classroom assignment (during assignment) will fail that assignment. Example: Playing games during programming of robot in Robotic Engineering or on Craigslist during instructional time. Students who change settings on computer will not receive help until settings are set back.
7. **Assessments** – Include, but are not limited to, group and/or individual classroom assignments, tests, quizzes (on-line), portfolios, e-portfolio, engineers book and lab assignments. Students must successfully complete a safety quiz (100%) on specific machinery that they will use in the lab. Failure to successfully complete this assessment will not affect their grade, but will prohibit them from using this machine in any lab situation.

8. **Student’s responsibility** – Each student is responsible for his/her actions. Each student should monitor their progress utilizing EDLINE. Check it weekly on EDLINE. It is the student’s responsibility to make up any incomplete assignment(s). To be successful in my class, you must complete all assignments. Student’s also need to activate and use your school issued email via Gmail.

9. **Follow all lab policies and procedures** – Lab policies and procedures are posted throughout the lab. They are then discussed, reviewed and tested in great detail within each course. This includes (but is not limited to) machine/material/tool use, clean up procedures, behavior, lab dress code, and the safety of the individual students and class. Violation of any of these policies/procedures will not be tolerated. Any violations will be reported to the office and will result in an immediate and permanent removal from class. All students will be closely supervised in classroom and lab situations. It is extremely important that the parent/guardian emphasize, to their child, the importance of appropriate behavior in all lab situations to support classroom instruction. Approved safety glasses, provided, must be worn in the lab at all times.

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**Course Grading Criteria:**

All quizzes, tests, and labs will be graded according to the Belle Vernon Area School District grading policy. Total points will be accumulated for all evaluated efforts in this class rather than having letter grades per each effort. The grading scale is as follows:

*The Belle Vernon Area High School grading scale:*

- A----------100-90%
- B----------89-80%
- C----------79-70%
- D----------69-60%
- F----------59-0%

**Assignments per Quarter:**

- Engineer’s Notebook Random Checks – Informal
- Engineer’s Notebook End of Quarter/Year Check – Formal
- ePortfolio – Optional
- Quizzes (Key Terms) – Formal
- Sketches – Informal
- Projects – Formal
- End Of Course Exam (EOC) – Formal
TOTAL POINTS = Points (varies due to numbers of lab activities)
*Assignments or assessments may vary due to pace of class and individualized instruction.

Academic Standards:

Students will be reacquainted with the International Technology Engineering Pennsylvania Academic Standards that have been adopted by the Department of Education, along with the Common Core Standards that are in the process of being implemented nationwide. Students will be made aware of the importance of the standards and the efforts to meet them.

Edline:

Grades will be updated every Friday on Edline. It is the responsibility of the student to monitor and check their grade on a regular basis. If you lost or cannot remember log in information, please contact our Child Accounting Department at 724-808-2500 ext. 1108.

Schoolwires (Website):

My website will be updated every Friday. Course Topics, Assignments, and Quizzes and Tests are also posted weekly. A link to www.my.pltw.org is also listed. Students can access all course material there. The following signatures state that all parties are aware of the preceding syllabus.

Student Signature________________________Date____________________

Parent Signature________________________Date____________________

Teacher Signature________________________Date____________________
Course Outline:

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<td>I. Overview of Robots</td>
<td>I. Robot Behaviors</td>
<td>I. Radio Controlled Robotic Systems</td>
<td>I. Design Challenge</td>
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<td>- Past</td>
<td>- Autonomous block programming with Motors and Sensors using NXT and Tetrix platforms.</td>
<td>- Transmitters</td>
<td>- Capstone assignment that involves the application of The Design Process to create a fully automated system that will work on a continuous loop for a specified number of cycles according to a design brief.</td>
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<td>- Present</td>
<td>- Antique block programming with Motors and Sensors using NXT and Tetrix platforms.</td>
<td>- Receivers</td>
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<td>- Future</td>
<td>- DC Motor Speed Controllers</td>
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II. Basics in Robotic Engineering
- What is Engineering?
- Engineering Design Process
- Programming
- Motors
- Sensors

II. Hardware
- Parts Identification
- Building Instructions for the Tetrix platform, DC motor and servo motor wiring configurations as well as power supplies.

II. Design Options
- Chassis
- Direct Drive
- Indirect Drive
- Gearing
- End Effectors
- Wheels vs Tank Treads
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<td>• Parts Identification</td>
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<td>• Loops</td>
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<td>• Switch Blocks</td>
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