



Southmoreland School District Competitive Robotics Curriculum Overview

Competitive Robotics Overview:

This course provides a yearlong exploration in career development in manufacturing and teamwork. Students will work in teams to develop a working battle robot that will compete against area schools in the BotsIQ combat robot competition. Students are responsible for the overall design and fabrication of the robot, as well as developing the required documentation to accompany the robot for the competitions. Students will reinforce CAD, design, electronic and machining skills to develop and revise the 15-pound battle robot. More information can be found on www.botsiqpa.org.

Prerequisite: CAD 2D & 3D and Introduction to Automation

Module Titles:

Module 1: Team Development & Leadership

Module 2: Machine Safety

Module 3: Prototype Development

Module 4: Refined Prototype

Module 5: Final Frame Design

Module 6: Industry Tour

Module 7: Robot Fabrication

Module 8: Documentation

Module 9: Preliminary Competition

Module 10: Final Preparations

Module 11: Final Competition & Interview

Module 12: Final Reflection

Module Overviews:

Module 1: Team Development & Leadership

During the first week of the course, students will need to establish a strong communication among team members. This will allow open communication as needed through the design, fabrication and competition process. Students will nominate and elect a board of officers to serve as the liaison between the group and the instructor.

Module 2: Machine Safety

Students will learn about various tools and machines within the material processing environment. Teacher lead demonstrations will be provided and all students must pass a written (and sometimes practical) examination of the machine to use within the course. *Student safety packets are good for the entire school year and must be completed each year.



Southmoreland School District Competitive Robotics Curriculum Overview

Module 3: Prototype Development

Reinforcement of the design process will be in place to develop as many ideas as possible moving into the final design of the robot. Students will be split in small groups to research and design a robot frame and weapon system for the final project. Ideas will be presented and critiqued by the group as a whole.

Module 4: Refined Prototype

Once a baseline idea has been established, a refined prototype will be established through computer aided drafting (CAD) software and accurately cut out using computer numerical control (CNC) machinery. The refined prototype will reflect ample space for electronics and drive system and permit example armor exploration.

Module 5: Final Frame Design

Once a final design is established, final drawings of the frame will need to be created and exported so that industry partners are able to contribute their machine skills to develop the frame, weapon and armor systems of the robot. A final project schedule will be developed mapping out the major steps to be completed.

Module 6: Industry Tour

Students will attend a tour of a local manufacturing company and complete an interview with the industry advisor in regards to their career development within the company, education needed, and what they are looking for in potential employment candidates. Students will develop a short reflection outlining the information learned from the tour(s).

Module 7: Robot Fabrication

During the fabrication process, students (or industries) will complete profile cuts of all frame and armor components. Holes to be drilled and threaded for assembly of the frame and armor; electronics wired, soldered, and safely installed within the robot. Checking of the robot's major systems including power system, drive system & weapon system.

Module 8: Documentation

Throughout the fabrication process, details will be organized through the group's documentation. These items include: resumes, cover letters, safety plan, fundraising, promotion & marketing, detailed descriptions of the robots frame & armor, weapon, power, and drive systems, bill of materials, engineering drawings and wiring schematic. Due dates are posted periodically throughout the year and will require regular upkeep and maintenance of the documentation by each team member.



Southmoreland School District Competitive Robotics Curriculum Overview

Module 9: Preliminary Competition

Each group will attend (1) preliminary competition where they will formally test the functionality of the robot. The robot must meet specific requirements as outlined in the competition requirements of BotsIQ in order to compete. Students will undergo a rigorous inspection process to ensure no violations are met. Teams will participate in a double elimination competition against area schools and develop skills and refinements necessary for final competitions.

Module 10: Final Preparations

Upon completion of the preliminary competition, groups may have to rebuild or completely reconstruct the entirety of the robot. The team will need to develop a needs list of items to complete prior to the final competition. All remaining documentation items will need to be submitted and printed prior to the competition.

Module 11: Final Competition & Interview

The final test of a year's worth of research, fabrication and design; students will submit their final documentation portfolio of evaluation, and participate against all area schools involved in a final competition series to test the strength and success of the robot design. Students will need to make repairs and changes in between battles in the working pits and follow the same inspection procedures as preliminaries. Upon being eliminated from the competition, students will meet with representatives and conduct an interview of the design and building process from the year. Scores of the documentation, competition and interview will determine the final ranking scores of each school's team.

Module 12: Final Reflection

Students will use the remaining time of the school year to reflect on the knowledge and skills gained during the school year and competition season. This will serve as a roadmap for the next step: for underclassmen, next year's competition. For seniors: if utilized correctly, an internship or future in the manufacturing industry.