

# Advanced Robotics (VEX)

**Course Description** This advanced robotics course uses VEX EDR Robotics parts and VEX Code software to develop the student's basic programming, design, build, as well as problem solving strategies. This course will involve students in the development, building and programming of robots to accomplish various tasks specific to the VRC competition. Students will work hands-on in teams to design, build, and program robots as well as document their progress using an engineering notebook. Topics may include game analysis, advanced base design, programming a controller, sensors, intake and lift systems, project documentation and decision-making. Students have the opportunity to work as a project manager, a builder, and a programmer throughout the course as a collaborative team with the goal to compete with other schools in the area..

- Course Objectives**
- Design robots and use VEX Code software for specific activities and scenarios
  - Use and analyze gear ratios related to speed and torque
  - Understand the ability and limitations of programming robots using time versus using sensors
  - Understand and explain programming loops, if statements, functions and variables and use them appropriately in programming
  - Collaborate in groups and teams

**Assessment** Students are assessed through quizzes and group projects focused on building design, programming, and project management skills.

Equipment	Cost/Unit
Competition Super kit (276-7040)	\$1 649 each (1 set per 5 students)
V5 Inertial Sensor (276-4855)	\$49.99 each (1 per 5 students)
Computers to Run VEXCode V5	\$0 if you already have some, \$500-600 per computer if you need to purchase

**Course Outline:**

<b>Unit 0: Safety and Ethics</b>	Safety, Ethics
<b>Unit 1: Overview of Advanced Robotics</b>	History of VRC competition, Team structure, Design Process
<b>Unit 2: Advanced Robot Design</b>	Advanced base design, Programming a Controller
<b>Unit 3: Intake/Lift systems and Sensors</b>	Research and Build Lift Design and Accumulators, multi sensor usage
<b>Unit 4: Outputting to the Brain and Joystick</b>	Send outputs to the brain and program buttons on a joystick to run functions
<b>Unit 5: Autonomous Programming</b>	Learn how to use the competition template to add autonomous programming to your robot
<b>Unit 6: Robotics in Inventor</b>	Use Inventor to model your robot to use in competition interviews
<b>Unit 7: Competition Preparation</b>	Practice interviews, understand the judging rubrics,
<b>Unit 8: Post competition Activities</b>	Exploring Vex robotics outside of the competition setting



### ADVANCED ROBOTICS (VEX)

1. Materials

A desktop or laptop computer, access to 1-to-1 daily, and Internet.

Hardware/Reusable Material	Recommended Unit	Cost/Unit
V5 Competition Starter Kit (276-7030) OR V5 Competition Super Kit (276-7040) (more advanced)	1 per 3-4 students	\$1149.99 or \$1899.99
Storage Bin, Lid & Tray	1 per 3-4 students	\$34.99
Tool Kit V2	1 per 3-4 students	\$8.99
<b>Software (Each student needs access to a computer)</b>		
VEX Code V5 (Must include Text Based Programming)	1 per student	Free

2. Required software, networking access, and access to LSU servers

VEXCode software will need to be installed in computers. *A Chromebook version is available but has limitations.*

3. Required teacher collaborations

Teachers will communicate with LSU instructors via email and shared Google Drive folder.

4. Required administration of course content, pre/post test, and research instruments

All required materials and instruments will be either posted in a Google drive or their location announced via the Google group for this course.

5. Other

As this is a project-based learning class, we strongly suggest that each section of the course be limited to a *maximum* of 20 students. If the course is overloaded with students, they will not receive adequate instruction.