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| --- | --- | --- | --- | --- | --- |
| Time Frame | Topic/Unit | Skills/Concepts | Major Assessments | Core Standards | Resources |
| Note: *VEX II students will have leadership roles in the class alongside VEX I students. At the beginning of the course, VEX II students are expected to construct the field and game elements, and conduct in-depth independent study of the game rules for the current year’s VEX Robotics Challenge. They should feel free to brainstorm ideas and strategies but not progress further than brainstorming (once competition teams are formed, Brainstorming can resume).*  |
| Week 1-2 | **Basic VEX Mechanics & Driving Base**  | * Basic Mechanical Construction + Vocabulary
* Standard driving base set-up
* Basic Robotic Experience
 | * “Feat of Strength” – Involves driver control challenge wherein robots compete to retrieve items and deposit them in goals.
 |  | VEX Robotics equipment and tools are required throughout the course.VEXcode V5 Programming software |
| Week 3-6 | **Programming (autonomous operation)** | * “Brain Programs” intended to introduce programming, program flow, pseudo-code, holding power, etc.
* “Motor Programs” intended to introduce programming to control physical motion
 | * “Feat of Magic” – Involves programming a robot to retrieve an item and deposit it in another location with no human interaction
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| Week 7 | **Programming (controller mapping)** | * Programming for driver control – requires conditional programming and loops
 | * “Magical Deceit” – Involves students creating driver control programs that have all functionality of the original program but in very inconvenient ways. They then compete to see who did the “worst”/best job.
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| Week 8-9 | **Accumulators & Manipulators** | * Magazine
* Chain + Sprocket Elevator
* Conveyors
* Double Reduction Joint
* Winch & Pulley
* Non-Equal Linkage
* Linear Actuator (rack + pinion)
 | * Accumulator & Manipulator Share-out + Reflection
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| Week 10-24 | **Competition Robots** | * Engineering Notebook
* Mechanical Design
* Mechanical Construction
* Wiring & Electrical
* Autonomous Programming
* Driver-Control Programming
 | * VEX Robotics Tournament(s) – register through robotevents.com
 |  | www.robotevents.com |
| Week 25-38 | **Combination of the following:*** **Penn State SEAL Challenge** *(Typically in May)*
* **Soft Robotics**
* **Torque vs. Speed mini-projects (Sumobots + Drag Race)**
 | * Engineering Documentation
* Mechanical Design
* Mechanical Construction
* Wiring & Electrical
* Autonomous Programming
* Driver-Control Programming
* Gear Ratios for Torque vs. Speed
* Principles of Soft Robotics
 | * Penn State SEAL Challenge
* Soft Robotics Share-out + Reflection
* Sumobot Competition
* Drag Race Competition
 |  | Pourable Silicone (Typically 00-30 Smooth-On) |