

## Suggested Curriculum Outline and Time Structure

Wk	BB IQ Lessons	Lectures	Lab Work/Demos	Assignment	Management	Milestones
1 to 2	<p><b>Intro to the Course Objectives</b></p> <p><b>SCANS</b></p> <p><b>Safety</b></p> <p>Tools</p> <p>Note Book Setup</p>	<p>SCANS</p> <p>Shop Safety and behavior</p> <p>Using Measuring and Layout Tools</p> <p>Note Book and Student Evaluation</p>	<p>Inventory existing tools and materials</p> <p>List and order necessary Robot tools and materials</p>	<p>Take the online Safety Quiz</p> <p><b>SCANS Activity</b></p> <p><b>Math Pretest</b></p>	<p>Review The BBIQ Curriculum</p> <p>Shop Organization and Tool Inventory</p> <p>Begin a team web page to disseminate information</p> <p>Create a list of possible sponsors. Develop fund raising strategy.</p>	<p>Set up notebook</p> <p><b>Complete Safety Test</b></p> <p>Tool Inventory and ordering</p> <p>Create Team Meeting Schedule.</p>
2 to 4	<p><b>Materials Basics</b> Weight/Cost Strength /Procurement</p> <p><b>Motor Basics</b> Weight/Cost Strength /Procurement Mounting</p> <p><b>CAD Basics</b> The interface and basic tools</p> <p><b>Soldering Basics</b> Soldering Slide Show</p> <p><b>Solderless Connectors</b> Solderless Connectors slide show</p>	<p>Robot Budgets TIME POWER WEIGHT MONEY STUFF KNOWLEDGE</p> <p>Density/ weight Volume</p> <p>Orthographic Sketching and dimensions</p> <p>Horsepower and Torque</p>	<p>Demonstrate Cutting aluminum and polycarbonate on a table saw.</p> <p>Cutting Steel on a horizontal band saw and an abrasive cut off saw.</p> <p><b>Soldering Demo</b></p> <p><b>Solderless Connector Demo</b></p>	<p>Download the BattleBot Rules and Regulations Read and discuss them.</p> <p>Create three quiz questions about the rules and combine them into a class quiz.</p> <p>Investigate the cost of motors/aluminum /polycarbonate/ wire/ wire connectors wheels/ batteries/ control system components. Sprockets Chains Mechanical fasteners Nuts and Bolts</p> <p>Take the online Science Pretest</p>	<p><b>Designing a Team Lesson</b></p> <p>Think hard about budgets TIME POWER WEIGHT MONEY KNOWLEDGE</p> <p><b>Create a GANNT Chart</b></p> <p>Create a Vendor Data Base for vendors of:</p> <p>DC Motors and Gear head Motors Chains/Sprockets Bearings/Aluminum/Ply wood/Batteries/Wire and Connectors/Fuse Panels/Auto Resetting Fuses/ Tools/</p> <p>Order catalogs ASAP Obtain Reference Books/CHEM/MATH/PHYSICS/ELECTRONICS/HOW TO</p>	<p>Develop a working Vendor data base.</p> <p>Batteries Tools Electronics Controls Mechanical Motors Fasteners Adhesives Wheels Sprockets/chain Bearings Materials Steel Aluminum Wood Plastic</p> <p>Organize a Vendor Catalog library</p> <p><b>Develop and finalize a Robot Budget Amount</b></p>

					manuals Identify corporate contact persons and develop "sponsorship plan".	
Wk	Engineering	Lectures	Manufacturing	Assignment	Management	Milestones
5 to 6	<b>Battery Basics</b> Lead Acid/Gel Cells Charging Discharging and Testing  Sketching  <b>The Design Process</b>  <b>More Time on CAD</b> Intro to 2D and 3D CAD and drawing basics	Amps/Volts/Ohms/ Watts and Power budgets  Reading resistance with a meter  Radio Shack Meter Book  <b>Design Process Slide Show</b>	Sketch and Build a Battery Load Tester from supplied plans  Intro to Fasteners. Drilling and tapping  Adhesives  Tapes	Read Vendor Catalogs to acquire technical literacy Physics lessons  Measure resistance of fixed resistors.  Download a use Etia electronics trial software.  Measure motor armature resistance and calculate stall current	Create a Battery Work Station using an appropriate desk/Cabinet or Wheeled Cart.  Make up battery discharge data sheets	Build a Battery Test Station and charging / storage facility.  Develop Criteria for who attends the Games. Who is in the Pits.  List Necessary "Team Positions"  CAD Designers Web Authors Programmers Welders Fabricators Drivers Fundraisers Graphics Designers
Wk	Engineering	Lectures	Manufacturing	Assignment	Management	Milestones
7 to 9	2D/Orthographic Electronic Symbols Pneumatic Symbols Dimensioning  3D Solid Models Creating Otho's from 3D models  <b>The Design Process again</b>	Specifics of CAD Software Interface  Sketching  Orthographic Projection Theory  Control System Basic set up and	Obtain materials and equipment and build a motor test bench  Lathe and turning basics  Bread Board a working control system Operator IF	Draw electronic schematic symbols  Draw ISO pneumatic symbols  Battery Tester print reading Work sheets.  Battery Load testing work sheet	Create Team Name and address Lists/ School Permissions Slips/field trip forms BB Registration  Perfrom a cost analysis for team travel including shipping bot(s)/ tools/ participants travel/ room and board. Do this via the internet	Be capable of creating and using electrical/ electronic and pneumatic symbol libraries.  Test Batteries  Research and obtain one or

		operation and downloading default code for tank drive or single joystick	Robot Controller Joy Sticks Speed Controllers motors actuators spikes etc.	Battery Testing  Stall a motor connected to an appropriate power supply and measure the stall torque.  Complete the motor work Sheet.  Geometry Lessons  Physics lessons	and phone.	several motors/budget for spares
Wk	Engineering	Lectures	Manufacturing	Assignment	Management	Milestones
9 to 11	Develop CAD Skills  Draw and models Chain and sprocket assemblies	Working Drawings  <b>Using Pneumatics</b>  <b>Pneumatic Theory</b>  <b>Pneumatic Safety</b>  <b>Pneumatic Design</b>	Milling Machine Basic operation  Wire Gages and reading Resistance /Voltage Amperes  Soldering and solderless connectors techniques	.Create an assembly Drawing with at least 10 parts Pneumatic lessons Pneumatic safety quiz.  Breadboard and safely operate a working pneumatic system.  <b>Math lessons</b>	Create an electrical/ electronics work center. Obtain tools, cardboard sheets and foam board for prototyping.  Begin setting up appointments to discuss corporate sponsorship.	Begin Drawing Identified Components in 3D from vendor Catalogs  Team Logo Defined and artwork OK'd by Screen Printer
Wk	Engineering	Lectures	Manufacturing	Assignment	Management	Milestones
12 to 14	CAD  Develop BB design solutions  Solid Model several of your design concepts.  Draw or download models of the BattleBox	Drawing Objects your team will use to create BattleBots. Use vendor catalogs for size/wgt. data	Fastening Systems  Taps and dies in various materials.	Based on motor Research, determine approximate BattleBot Power Budget.  Perform Bicycle Gearing Lab.	Create and maintain a 3D Library of selected Robot Parts  Create and maintain a storage are for sheet stock, tubing and extrusions  Develop Driver Selection Process	Be capable of creating 3D solid Models and or  Have the shop facility organized and ready for robot fabrication.  Talk to and visit fabrication shops in your area.

						Develop a data base of outsourcing resources: welding/machining etc.
15	Designing a BattleBot  Understanding the problem (game)	The design Process and identifying the problem	Layout and Drilling holes	The Straw Structure. Recognizing that math, physics and reasoning wins.  Physics lessons	Develop a fund raising strategy and travel plan/ budget/Book rooms/flights	Make a scale model of the BattleBox
16	Develop Solutions  Brainstorms and best ideas	Putting Ideas into words and pictures  Draw a gear train using pitch diameters and correct center distances and bronze bushings	Electric Welding/ gas cutting	Create and justify a design solution in terms of time/ power/ weight/ money  Create a slide presentation of your BB design solutions and present it.  Math lessons	Contact Shippers and make robot and tools shipping arrangement	Travel arrangements solidified  Team Uniforms (T-Shirts printed)
Week	Engineering	Lectures	Manufacturing	Assignment	Management	Milestones
17	Commit to a design  Final (major) Component analysis and selection using applied physics and or empirical testing	Designing and drawing chain and sprocket assemblies	Sheet metal layout cutting forming fastening techniques.  Build and operate a mobile robot platform.	Create detailed sub assembly drawings and begin scaled "Block" Models of your robot design using foamboard  Physics lessons	Cost analysis/purchase records/materials usage associated with your design  Develop BB Rules quiz. Develop Manual dexterity assement tool using modified RC Cars.	Design locked
18 to	Build a fully controlled operational platform.	Broaching and keyways  Making hole templates	Breadboard a basic working weapons system	Review the Building a BattleBot Team Chapter	.  Finalize travel plans Create student room assignments	Finalize Fundraising  All BattleBot sub assemblies

19		with 2D CAD				defined and prototyped
Week	Engineering	Lectures	Manufacturing	Assignment	Management	Milestones
20 to 24	Building the BattleBot  Create solid models of the weapon system weapon system	Cutting materials  Aluminum/ Polycarbonate Wood and steel.	Select Drivers  Select Pit Crew	Using and Programming the IFI Controller	.Create Parent Student travel information package.	Final Drive system engineered and parts drawn and sent to manufacture  All assemblies defined, tested and in process of final fabrication.
24 to 26	Integrate drive systems weapons systems and control systems.  Drive and test Robot  Repair malfunctions and damage  Evaluate and modify and complete the BattleBot  Battle Hardness	Dimension Working Drawings	Breadboard the Complete On Board Control system			Completed
Week	Engineering	Lectures	Manufacturing	Assignment	Management	Milestones
27 to 29	Make Spare Parts	Team meetings for travel.	Make Shipping Container	List all possible items needed for the BattleBot pits	Create a final list of everything your team will need at the games.	Publish the comprehensive list of required items
30						
16						All engineering and drawings complete
17		Making				

		Patterns				
18						
19						
20						Machine built ready for test and debug
21						
22						
23						Machine done, and ready for shipping