UNIT 0

Preparing for School

UNIT OVERVIEW

UNIT NUMBER: 0 **DURATION: 5-10 hours**

SUMMARY

This unit is to help the teacher prepare for the school year by becoming familiar with the curriculum, equipment, and requirements of running a *FIRST*® Tech Challenge team in the classroom.
https://youtu.be/A_e5r1lXraY

INSTRUCTIONS

1. Design your physical classroom.
2. Gather and organize your tools.
3. Understand how to manage a FIRST Tech Challenge classroom.
4. Understand the grading system.

Gain technical experience.

STANDARDS ADDRESSED:

Full course standards alignments can be found here.

CLASSROOM REQUIREMENTS

Spatial Layout

Students need a lot of room to work. A standard row/column desk classroom will not be ideal. Large work tables for kids to gather around materials and collaborate is preferred. They will also need a significant amount of floor space to test the robot and setup portions of the field for testing.

Number of students per group/team

You will need to decide how many ***FIRST***® Tech Challenge teams to have in your classroom. A ***FIRST*** Tech Challenge team may have up to 15 people. But keep in mind that typically no more than three people can be hands on with a robot at a time and still be productive. Keeping teams smaller than 10 is preferred for classroom implementation. When the robot is occupied, other members should be working on programming, CAD (computer-aided design), planning, or organization.

Budgeting and Materials

This page of the ***FIRST***® website discusses the general cost of participating in ***FIRST*** Tech Challenge. The only *required* costs for new teams are Team Registration, Kit of Parts, and Tools.

FIRST has received generous donations to help us get more young people involved in our life-changing programs.

Grants are available for Rookie and Veteran ***FIRST*** Tech Challenge Teams. Register for this season and apply for a grant! Learn more here.

More information about need-based and other grants can be found on this page.

REGISTRATION, ORDERING KITS, AND TOURNAMENTS

Registering Teams
It is intended that students in this course will take part in at least one official *FIRST* Tech Challenge competition event. However, it is not required. If a team chooses not to compete at an official event, an in class event can be a fun alternative. Each class will need to register teams to receive the kit of parts.

Follow the steps below to create a ***FIRST*** account and register your teams.

1. Create an account with ***FIRST*** here.

2. Then register your team(s).
   https://youtu.be/1AIRgD4XBGk
3. Each team must also have two registered coaches. Watch the video below and then add a second coach to your team(s).
   https://youtu.be/I3gKOm501FM

Ordering Kits

1. Now you will need to order a Kit of Parts and pay for each of your teams.
   https://youtu.be/OoUvwScLyT8

Background Checks with Youth Protection Program

FIRST*'s** Youth Protection Program requires all ***FIRST teams to have two screened Lead Coaches/Mentors for the entire season and all volunteers screened for official events. This means that as a coach, you and any other adults working with the team (at least one) will need to be screened. Background screening is integrated into the Team Registration System. The Youth Protection Program page of the ***FIRST*** website contains additional guidance on the screening process.

https://youtu.be/Llm2mMV8WHs

Kickoff and Tournaments

FIRST® Tech Challenge season kickoff is in September! Many regions host kickoff events to get ready for the new season.
Local tournaments begin in November. You will need to register to compete in a local tournament with your region's partner. Use this page to find kickoff events and tournaments near you.
Reach out to your local Affiliate Partner in order to sign up for a tournament. Find your Affiliate partner here.

GATHERING TOOLS

Gathering Tools

Rookie teams often don't need many tools in order to build a working robot, but more advanced teams often use power tools to build more complex designs. The tools in the list of "Essential Tools" below will be required for all teams, while the "Helpful Tools" may only be useful for advanced teams.

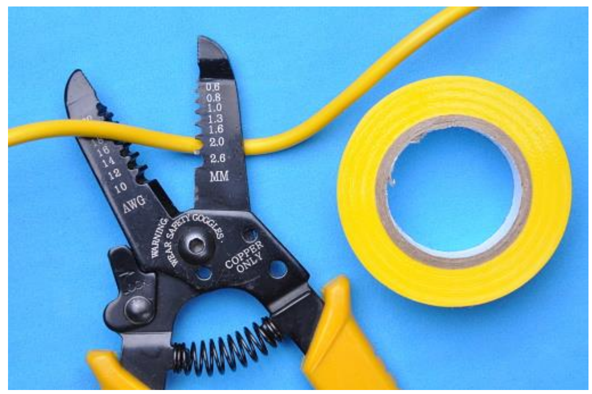
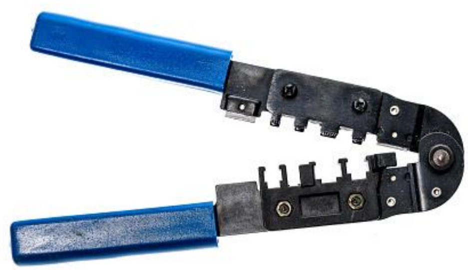
If you are working in a shop type space at your school, these tools may already be available and being used by other programs. Check to see what your school has on hand before purchasing. You may be able to acquire many of the tools through donations of used tools or from local hardware stores.

Essential Tools

• Allen wrench set (comes with the Kit of Parts)	
• Small Phillips head screw driver	
• ANSI Z87.1 certified safety glasses for every student - mount them in a prominent location near the entrance to the class to encourage students to get them as they come in	

Helpful Tools

• Wire cutters	

	
• Wire strippers	
• Powerpole Crimping tool	
• Powerpoles	

• Extra power wires	
• Hack saw	
• Drill	
• Vice	

• Vice grips	
• File (for smoothing metal edges)	

Storing Tools
Designate a place to store and lock the tools to keep them safe and to keep people from using them at unauthorized times or without supervision. A closet or locked room is preferable.

MANAGING THE CLASS

Understand Your Role

The main role you will play as the teacher is facilitator. You will walk around from group to group throughout the class checking on their progress, pointing them to scaffolding resources when necessary, and making sure they stick to their timeline. You will rarely, if ever, be standing in front of the class imparting information upon students.

Be sure to establish norms that support students in framing the class as a privilege, and their work as their responsibility.

Project-Based Learning

This curriculum is designed in a project-based manner. If you are unfamiliar with project-based learning (PBL), managing a PBL course is very different from managing a traditional teacher-driven classroom. Here are a few resources to help you get up to speed on running a PBL class.

- What is project-based learning?
- Why should we use project-based learning?
- How do I run a project-based class? - See the attached document entitled "BIE Project-Based Teaching Practices."

A big part of project-based learning and the ***FIRST***® experience is failure. Students will not have all the answers at the beginning, and neither will you. Learning comes through trying, failing, iterating, and trying again. That's okay! The traditional classroom does not make room for failure, but in this class you must. You cannot get discouraged when your students mess up, and you cannot prevent them from doing so (unless there is physical danger, of course). To do so would be to rob them of valuable learning opportunities. See the following articles about the importance of failure:

1. Inspired by: Thomas A. Edison
2. Making Friends with Failure

Goal Setting

Set aside time at the beginning of the week to have students designate their priorities for the week. Have every student do it at the same time to make sure they complete it. The next time they set goals, have them check to make sure they achieved their previous goals.

The document attached to this page entitled "Project Team Work Plan" can help teams write out tasks, and assign responsible parties and due dates.

Class Period Duration

Robotics takes time. The longer your class period, the better. Many teams may need to supplement their class time with after school work sessions. Ensuring that students have a clear work plan for the week helps maximize the use of class time.

Budget at least 5 minutes at the beginning and end of each class period to setup and clean up the work space.

ASSESSMENTS

This material in this class includes a lot of technical skills, but the class as a whole focuses heavily on design thinking, problem solving, critical thinking, and collaboration. Some students will learn more about programming than others, while some will learn more about mechanical engineering. That's okay. But every student will learn to think, design, solve problems, and work in a team. The assessments in this class have been designed likewise.

The assessments for this class are designed to focus on the process of learning, rather than the product. We want students to think about their process and be able to articulate it and refine it. We want them to be able to recognize both their successes and their failures and analyze why they happened. We want to give them the freedom to make mistakes and the tools they need to learn from them.

Assessments in this class will include:

1. Weekly Engineering Notebook entries
2. Weekly Self & Peer Evaluations
3. Design Presentations
4. Occasional Quizzes

GAIN EXPERIENCE

The students will be doing the work and driving their own learning and you will be learning along with them but it never hurts for you to have some prior knowledge or experience! Try things out yourself ahead of time. It might be useful (but not required) for you to be familiar with the Kit of Parts and programming so that you can help clarify concepts and facilitate student learning. It is recommended to view the tutorials in the Introduction to Robotics unit ahead of time.

Programming

The following tutorials can help you become familiar with Java programming. These can be provided to students as well for those who want to learn more about Java.

- Codecademy
- Learn Java Online

Engineering Notebook Weekly Assessment

The ability to reason, problem-solve, develop sound arguments or decisions, and create new ideas by using appropriate sources and applying the knowledge and skills of a discipline

INITIATING THE INQUIRY

What is the evidence that the student can formulate questions and develop designs related to solving a problem?

	EMERGING	E/D	DEVELOPING	D/P	PROFICIENT	P/A	ADVANCED
ASKING QUESTIONS	• Formulates a general question • Provides limited or irrelevant content information		• Formulates a specific question • Provides general content information that is related to the question		• Formulates a specific and testable question related to the problem • Provides specific and relevant content information to support the question		• Formulates a specific, testable, and challenging question related to the problem • Provides specific and relevant content information to provide insight into the inquiry
DEVELOPING AND USING MODELS	• Drawings, diagrams, or models relevant to the problem include major conceptual or factual errors, or are missing • Discussion on limitations or accuracy of model as a representation of the system or process is flawed or missing		• Constructs generally accurate drawings, diagrams, or models to represent the process or system to be investigated • Makes note of limitations or accuracy of model as a representation of the system or process		• Constructs accurate drawings, diagrams, or models to represent the process or system to be tested • Explains limitations and accuracy of model as a representation of the system or process		• Constructs accurate and detailed drawings, diagrams, or models to represent the process or system to be investigated and provides an explanation of the representation • Explains limitations and accuracy of model as a representation of the system or process and discusses how the model might be improved

PLANNING AND TESTING PROTOTYPES
What is the evidence that the student can plan and test prototypes to explore design strategies?

	EMERGING	E/D	DEVELOPING	D/P	PROFICIENT	P/A	ADVANCED
DESIGNING THE PROTOTYPE	• Design is not aligned to the testable question • Discussion of how the model can guide or inform the design or an aspect of the design is missing		• Design is related but not explicitly aligned to testable question • States in general terms how model was used to guide, inform, or test the design or an aspect of the design		• Aligns design with testable question • Explains how model was used to guide, inform, or test the design, or an aspect of the design		• Explains the alignment between the design and the testable question • Explains how model was used to guide, inform, or test the design, or an aspect of the design
TESTING PROTOTYPES	• Includes vague or incomplete testing procedures; or uses inappropriate tools, instruments, or types of measurement		• Describes testing procedures including tools/ instruments used, but is not clear or detailed enough to be replicated		• Describes detailed, clear, and replicable testing procedures including tools /instruments and types of measurements gathered		• Describes detailed, clear, and replicable testing procedures including rationale for using the tools /instruments and types of measurements gathered
DOCUMENTING TESTS	• Gathers data from a single test of the design • Limitations of the tests are not mentioned		• Documents results from several tests of the design that are not comprehensive of all circumstances • Mentions limitation of the tests		• Documents results from several tests of the design that explore some extraneous or unexpected circumstances • Explains limitations of the tests		• Documents results from several tests of the design that explore extensive extraneous and unexpected circumstances • Explains limitation of tests and impact on future designs

 Adapted by New Tech Network, June 6, 2013

REPRESENTING, ANALYZING, AND INTERPRETING TEST RESULTS *What is the evidence that the student can organize, analyze, and interpret test results?*								
	EMERGING	**E/D**	**DEVELOPING**	**D/P**	**PROFICIENT**	**P/A**	**ADVANCED**
ANALYZING THE RESULTS	• Analyzes data using inappropriate methods or with major errors or omissions • Consistency of outcome with initial expectations, when appropriate, is not compared		• Accurately analyzes data using appropriate methods with minor omissions • Compares consistency of outcome with initial expectations, when appropriate		• Accurately analyzes data using appropriate and systematic methods to identify patterns • Compares consistency of outcome with initial expectations when appropriate and identifies possible sources of error		• Accurately analyzes data using appropriate and systematic methods to identify and explain patterns • Compares and explains consistency of outcome with initial expectations, when appropriate and explains possible sources of error and impact of errors
GENERATING INTREPRETATIONS	• Inferences drawn from results are absent • Makes no mention of design adjustments needing further investigation		• Draws inferences from results without discussing strengths or weaknesses • Makes note of design adjustments that need further investigation		• Explains the strengths OR weaknesses of the inferences drawn from results • Suggests design adjustments worth further investigation		• Explains the strengths AND weaknesses of the inferences drawn from results • Suggests design adjustments worth further investigation and poses new analysis or design

CONSTRUCTING EVIDENCE-BASED ARGUMENTS AND COMMUNICATING CONCLUSIONS

What is the evidence that the student can articulate evidence-based explanations and effectively communicate conclusions?

	EMERGING	E/D	DEVELOPING	D/P	PROFICIENT	P/A	ADVANCED
COMMUNICATING RESULTS AND NEXT STEPS	• Attempts to use multiple representations to communicate results with inaccuracies or major inconsistencies • Implies results with no discussion of next steps		• Uses multiple representations (words, tables, diagrams, graphs and/or mathematical expression) to communicate results with minor inconsistencies • States results and general discussion of next steps		• Uses multiple representations (words, tables, diagrams, graphs, and/or mathematical expressions) to communicate clear results • Explains results with specific discussion of next steps		• Uses multiple representations (words, tables, diagrams, graphs, and/or mathematical expressions) to communicate clear and specific results • Explains results and impact on next steps
FOLLOWING CONVENTIONS	• Uses language and tone inappropriate to the purpose and audience • Attempts to follow the norms and conventions of scientific writing with major, consistent errors, for example in the use of technical terms, quantitative data, or visual representations		• Uses language and tone appropriate to the purpose and audience with minor lapses • Follows the norms and conventions of scientific writing with consistent minor errors, for example in the use of technical terms, quantitative data, or visual representations		• Uses language and tone appropriate to the purpose and audience • Follows the norms and conventions of scientific writing, including accurate use of technical terms, quantitative data, and visual representations		• Uses language and tone appropriate to the purpose and audience • Consistently follows the norms and conventions of scientific writing, including accurate use of technical terms, quantitative data, and visual representations

 Adapted by *FIRST*, January 26th, 2016

What went well in your team’s work?

How could you have improved your team’s performance?

How could others on your team have improved your team’s performance?

Please use this area to write about your own participation in the last competition.