FIRST® Tech Challenge
Links & Resources

GENERAL KNOWLEDGE

FTC Tutorials
http://ftctutorials.com/
Created by the Seshan Brothers of FRC 8027, this is an excellent starting point for information on a wide variety of topics, including robot building, programming and competitions.

Game Manual Zero
https://gm0.copperforge.cc/en/stable/index.html
This unofficial manual is targeted towards new teams and covers a variety of topics, especially many of the technical topics that intimidate newcomers.

GEARSinc (Phil Malone) YouTube Channel
https://www.youtube.com/channel/UCUNC_WYPngnwjLRjmTqYt8Q
There are number of videos here helpful to teams, especially new teams:
- MOTO G4 Play Setup for FIRST Tech Challenge [BEGINNER]
  - https://www.youtube.com/watch?v=X8BcFhg5R9Q
- FTC Tutorial - Part 5: First Robot Configuration (Motorola G4) [BEGINNER]
  - https://www.youtube.com/watch?v=o1weHW2N-58
- Getting Started with OnBot Java [BEGINNER]
  - https://www.youtube.com/watch?v=tRDSj2AZJuI
- FTC Java Tutorial - Part 1: MyFirstOpMode [BEGINNER]
  - https://www.youtube.com/watch?v=TKPscPqsz8s
- FTC Java Tutorial - Part 2: More on OpModes [INTERMEDIATE]
  - https://www.youtube.com/watch?v=9437L9upnpE
- FTC Java Tutorial - Part 3: Manual OpMode Registration [INTERMEDIATE]
  - https://www.youtube.com/watch?v=UaRXfU5xCl0
- FTC Vuforia Demo Code Walkthrough [ADVANCED]
  - https://www.youtube.com/watch?v=AxKrJEtfuaI

Wizards.exe (FTC 9794) Spellbooks (instructional videos)

https://wizards-exe.weebly.com/our-spellbooks.html
The website by FTC 9794 – Wizards.exe has many instructional videos, ranging from CAD to wiring to robot "vision."

TNT (Trial N' Terror – FTC 8372) FTC Getting Started YouTube Playlist

https://www.youtube.com/watch?v=DYqpaxoabp4&list=PLClsOOdZeKhlB3W9Yv2YFHa5Vqz
JAalSa&index=2
This is a series of 17 videos on getting started in FTC. You may want to skip the first video, as it deals with an outdated (Modern Robotics) control system. The link above should start you on the second video (REV Robotics control system).

REV Robotics — FIRST Tech Challenge Resources

https://docs.revrobotics.com/docs/first-tech-challenge
REV provides both general information on FTC topics and specific information on using their hardware and control equipment.

COLLABORATION

FIRST® Tech Challenge Forum (official)

https://ftcforum.usfirst.org/
The official FIRST forum for the *FIRST*® Tech Challenge program.

FIRST® Nevada Team Discussion Forum

http://www.firstnevada.org/discussion_forum.aspx
Forum for Nevada teams to collaborate, ask questions and share ideas.

FTC Share & Learn Facebook Group

https://www.facebook.com/groups/FTCShareAndLearn/
Much like its FLL counterpart, this is a fantastic place to post questions and get feedback some of the top teams, coaches mentors and volunteers.

FTC TEC Network

http://www.ftctecnetwork.org/
Long-running private Google+ community.

FIRST® Tech Challenge on Reddit

https://www.reddit.com/r/FTC/
FTC board on popular Reddit website.

ROBOT DESIGN

Brainstormers (FTC 8644) — Tips & Tricks Videos
https://www.youtube.com/channel/UCtm7Wijmxe6n85tDQIQUAwg
Many video tutorials on collection systems, linear slides, etc.

Wizards.exe (FTC 9794) — The Basics of REV
https://www.youtube.com/watch?v=7_fiFWus0xE
A very simple video introduction to building with the REV system, which is fairly different from other systems (Tetrix, Actobotics, etc.).

John V Neun's Mechanical Design Calculator — JVN DesignCalc
https://johnvneun.com/calc
This is a spreadsheet that can be used to calculate things like the stall load on a motor. (You also can find an online forum about this spreadsheet on the Chief Delphi website: https://www.chiefdelphi.com/t/paper-jvns-mechanical-design-calculator-2016/146281.)

PROGRAMMING

Programming Language Options (REV Robotics)
https://docs.revrobotics.com/rev-control-system/programming/programming-language-options
This is a good overview the three programming options available to FTC teams.

FIRST Tech Challenge Programming Resources
https://www.firstinspires.org/resource-library/ftc/technology-information-and-resources
This is official programming resources page from FIRST, including guides for each of the three programming options available: Blocks, OnBot Java and Android Studio Java.
- Blocks Programming Manual
  https://www.firstinspires.org/sites/default/files/uploads/resource_library/ftc/blocks-programming-manual.pdf
- OnBot Java Guide
  https://www.firstinspires.org/sites/default/files/uploads/resource_library/ftc/onbot-java-guide.pdf
- Android Studio Guide
  https://www.firstinspires.org/sites/default/files/uploads/resource_library/ftc/android-studio-guide.pdf

FIRST Tech Challenge Blocks Tutorials (YouTube Playlist)
https://www.youtube.com/watch?v=AKoqwqPo-Vc&list=PLEuGrYl8iBm4A4yrRcatGcK7q0od0LYov
FIRST has produced a series of video tutorials to get you started with Blocks programming.

FIRST Tech Challenge Java Tutorials (YouTube Playlist)

https://www.youtube.com/watch?v=exE0jph1HwA&list=PLEuGrYl8iBm7wW9gyxpLDhBJAOWDZid1P

FIRST has produced a series of video tutorials to get you started with Java programming.

Learn Java

https://www.learnjavaonline.org/

Basic introduction to Java concepts, including a "live" interactive output screen for testing code techniques.

STEM Robotics 201 - Java for Robots

http://stemrobotics.cs.pdx.edu/node/4196

A great tutorial for FIRST Tech Challenge teams as it focuses on Java being used for robotics.

Java Tutorial for Complete Beginners (Udemy)

https://www.udemy.com/java-tutorial/

This is a free tutorial with the basics; Udemy offers additional paid tutorials.

Learn Java (Codecademy)

https://www.codecademy.com/learn/learn-java

This is a free tutorial; there is additional content as part of Codecademy's paid service (Codecademy Pro).

Java Tutorial (TutorialsPoint)

https://www.tutorialspoint.com/java/

Text-based, but easy to follow.

Java Tutorial for Beginners: Learn in 7 Days

https://www.guru99.com/java-tutorial.html

Some of the topics are a bit programmer-oriented (i.e., beyond the scope of programming for FIRST Tech Challenge), but the explanations are good.

Java Tutorial (SoloLearn)

https://www.sololearn.com/Course/Java/

A free tutorial (required account / sign in, though); not interactive, but it includes quizzes.

Essentials of the Java Programming Language (Oracle)

Part 1: https://www.oracle.com/technical-resources/articles/java/basicjava-programming1.html
Part 2: https://www.oracle.com/technical-resources/articles/java/basicjava-programming2.html
Guides from the official source for Java; however, they are focused more on app development than general and/or robotics usage.

Wireless Programming for FTC Robots (Jeremy Cole)

https://blog.jcole.us/2017/04/13/wireless-programming-for-ftc-robots/

Nevada's own Jeremy Cole created this guide on how to load your programs from Android Studio to your robot's Robot Controller phone (or the REV Control Hub).

CAD SOFTWARE

SOLIDWORKS by Dassault Systèmes

https://files.solidworks.com/pdf/EDU_FIRST_Flyer.pdf

SOLIDWORKS is a 3D CAD program used by many FTC and FRC teams, as well as many companies. It is a great skill to learn, and SOLIDWORKS is willing to sponsor your team members with their own copy of the program! Additionally, DriveWorks has a program to obtain certification of your CAD skills: https://www.driveworks.co.uk/education/first/.

OnShape by PTC

https://www.onshape.com/cad-blog/how-to-set-up-your-first-robotics-team-in-onshape

This is another opportunity to gain access to a commercial 3D CAD program for free.

Autodesk

https://www.autodesk.com/education/home

Autodesk also provides free access to its products through the Autodesk Education Plan.

ROBOTICS PARTS SUPPLIERS

Note: Most of the sites below sell parts for many different robotics competitions and hobbyist pursuits. You need to make sure a part is legal before purchasing it.

Actobotics (ServoCity)

https://www.servocity.com/actobotics

In addition to the Actobotics line of robotics parts, ServoCity has many parts that may prove useful in building a robot.

AndyMark

https://www.andymark.com/pages/first-tech-challenge

Beyond robotics parts, AndyMark also is the official vendor for purchasing the season field kit.

goBILDA

https://www.gobilda.com/

A relative newcomer, their linear slide kit and FTC legal linear actuators already have proven competition-ready.

PITSCO
https://www.pitsco.com/Competitions-Clubs-and-Programs/FIRST-Tech-Challenge
Primarily known for their TETRIX building system and TorqueNADO motors, as well as the entity you pay your FIRST season fee to.

REV Robotics
https://www.revrobotics.com/ftc/
They are the supplier of the only legal control system for FTC (Expansion Hub, and now the newly FTC-legal Control Hub).

GENERAL HARDWARE SUPPLIERS

SDP/SI
https://sdp-si.com/
When you are ready to expand beyond the stock parts that come in the kits, this site provides lots of useful and interesting parts that can be used on the robot.

Grainger
https://www.grainger.com/
This site has lots of basic building blocks, including things like sheet metal. Also, you can buy nuts and bolts (screws) compatible with the various kit system in bulk.

RECOMMENDED PARTS

ServoCity — Servo Staff Picks
https://www.servocity.com/servo-staff-picks/
This is a good introduction to some common servos recommended for various use scenarios.

ServoBlocks™
https://www.servocity.com/servos/servoblocks
Helps secure servos and makes them much more stable.

Aluminum Motor Mount B
https://www.servocity.com/aluminum-motor-mount-b
Helps secure motors.

Side Tapped Pattern Mount C
https://www.servocity.com/90-quad-hub-mount-c
Referred to as the "Magic Bracket" by teams, this is an excellent part to assist in mounting motors in a stable and secure fashion.

RECOMMENDED TOOLS

Roboplex — Hardware, Tools and Tips
http://roboplex.org/ftc/ftc-tools-tips-2/
This site has many resources, including this comprehensive list of recommended tools.

MISCELLANEOUS

FIRST® Fundraising Toolkit
https://www.firstinspires.org/resource-library/fundraising-toolkit
This site curates information, presentations and examples from various FIRST teams on how to raise money.

Discord
https://discord.com/
Discord can be a useful (and free!) team collaboration tool, with the ability to create separate "rooms" (think of team functions/tasks, such as robot, programming, outreach, etc). For school-based teams, you may need to confirm that your district and/or school allow use of Discord. If set up properly, however, it can be made very private with the ability for adults (coaches) to moderate activity and assign roles to participants.

Codenames
https://codenames.cards/
Codenames is a board game that was converted into an open-source online game. It can be a fun team-building activity for team members, and it can be done in-person or remotely.

Scribbl.io
https://skribbl.io/
Like Codenames above, this is a game similar to Pictionary that can be used for team building and/or fun.