# FIRST Robotics Introduction for Students

## St. Joseph's Collegiate Institute

# What is FIRST?

*FIRST's* goal is to inspire young people to be science and technology leaders and innovators.

- Acronym: ***F**or **I**nspiration & **R**ecognition of **S**cience & **T**echnology*
- Focus on **Coopertition** and **Gracious Professionalism**
- Founded by Dean Kamen and Woodie Flowers in 1989
- 3,900+ teams with ~97,000 students from around the world
- **$80 million in scholarships** (!!!) across 3,000+ opportunities

# What is FIRST?

> **FIRST is more than robots.** The robots are a vehicle for students to learn important life skills. Kids often come in not knowing what to expect – of the program nor of themselves. They leave, even after the first season, with a **vision**, with **confidence**, and with a sense that **they can create their own future.**

Co-Founder Dean Kamen

# Gracious Professionalism

- **Knowledge**, **competition**, and **empathy**
  - Encourage high-quality work from students
  - Emphasize the value of others
  - Teach respect for individuals and the community

> “Gracious professionals learn and compete like crazy, but treat one another with respect and kindness in the process.”
>
> Co-Founder Woodie Flowers

# Coopertition

Cooperation + Competition = Coopertition

- Cooperation produces innovation
  - Displaying **unqualified kindness** and **respect** in the face of fierce competition
  - Teams can and should **help** and **cooperate** with each other even as they compete

**Team Mentality** will always produce better results!

# So What About the Robots?

# A Yearly Competition

- Every year, a new game is announced that every team will try to tackle and come up with a solution to solve
  - 2019's game was *FIRST Deep Space*, where teams competed to outpace their opponents to place Hatch Panels & Cargo balls into the appropriate areas

# A Yearly Competition

Teams are tasked with building a robot that overcomes the game's challenges through inovative solutions

Most years have two modes; **autonomous** & **teleoperated**

- Robots are autonomous and drive on their own for the first 15 seconds of the match to score bonus points
- A human driver controls the robot for the remaining match time using teleoperated controls, like an Xbox controller

**These robots are no slouches or little toys though**

# FRC Robotics Overview

**We compete in FRC**, the highest level of FIRST competition

- 120lb robot maximum weight
- Multiple subsystems
  - Lifts, elevators, climbers, ball shooters, & more
  - Powerful motors
  - Speeds of up to 10mt/s (22 mph)
  - Pneumatics (air pistons and valves)

# What Does It Take to Build a Robot?

Robots are complicated machines that require teamwork to design, build, and perform

- Multi-disciplinary collaboration
  - Mechanical design & prototyping
  - Electrical systems
  - Manufacturing & fabrication
  - Software programming
  - And much more!

The team has 6-10 weeks to go from an idea to a fully operational robot to compete in the local competitions

# More Than Just Engineering

A robotics team takes more than just engineering. It requires individuals interested in many different non-STEM fields as well

- Public relations
  - Artwork
  - Brand design
  - Sponsorship & donation outreach
- Finance & budget management
- Competition scouting


# Wherever Your Interests Lie, There is a Spot for You

# What's the Timeline Look Like?

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There are four major "time blocks" for a FIRST robotics team

- The **Build Season** runs from January to the end of February
- **Competition Season** runs from March and April
- The **Preseason** runs from September (now!) through December, up until the Build Season starts
- The offseason runs from the end of Competition Season into the fall when the Preseason begins

# The Preseason

The preseason is used to prepare the team for the upcoming season

- Timeline: September thru December
- Duties:
  - Recruit new members
  - (Re)train on safety, machinery, and processes
  - Refresh business & art material
  - Fundraise as needed

# The Build Season

The build season is when the game is revealed, and the team designs & builds a robot to overcome the given challenges

- Timeline: January & February (potentially early March)
- Duties:
  - Understand the game rules
  - Envision robot subsystems
  - Design CAD models, build, & assemble components
  - Drive training on a practice field

# The Competition Season

The competition season is when we travel to a regional event to compete against other teams in 3 vs 3 alliances over a weekend

- Timeline: March & April
- Duties:
  - Drive the robot
  - Scout other teams for match strategy
  - Inspect & repair the robot as needed
  - Submit & present for team & individual awards

# The Competition Season (cont)

Our team's usual regional is hosted at the Rochester Institute of Technology (R.I.T.). We bring a mini-bus & a subset of the team (~15 people) to partake in the weekend-long event.

Teams that win regionals - or special awards - are invited to the **World Championships**, where they compete against the best-of-the best FRC teams in the world.

Pending budget, team size, and robot completion, the team *may* attend a second regional event, but that is unknown at this time.

# What is Expected of You?

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We will give you the tools to grow & develop across multiple disciplines

- Show up as much as you can
- Contribute your ideas, interests, and skills
- Ask questions when you don't know something
- **Be Safe** (Less injuries is good 🤕)
- Communicate with mentors in a timely fashion

We will give you as much responsibility as you want

Thanks for listening!

# Any Questions?