Catlin Gabel Robotics
Departments and Certifications

Certifications

While you're not guaranteed you'll get your first choice department, the best way to make yourself marketable is to be certified in the areas of interest to that department. Certifications persist from year to year so even if you don't get your first choice this year, you might the next. Once you're certified in a field, you're always certified. Of course, you can always work on advanced certification in succeeding years.

These certification criteria are a starting point. If you feel drawn to an area and can think of better things you'd like to do, talk to the mentors knowledgeable in that area.

Note: Many of these items are just objectives. You may well need to do other things along the way to understand how to accomplish an item. They are also open to modification if you have a more interesting idea of how to accomplish the same thing.

Fabrication

Mentors: Dale
Relevant Departments: Mechanical

Level I

1) Talk about safety Goggles and ear protection with a mentor.
2) Spend at least one session after school helping to disassemble a previous year's robot and filing the parts away.
3) Get checked out on the Miter Saw, Band Saw, Sanders, Drill Press, and cordless drill. You'll need to talk with the mentor about safe practices with the tool and describe what the controls do.
4) Understand how the 80/20 system works. Discuss this with a mentor or department manager.
5) Demonstrate your skills by building something simple like a table

Level II

1) Get checked out on the grinder, Dremel tool, and cutoff saw.
2) Be seriously involved building a BunnyBot. You can copy an existing robot, work from plans, or invent something on your own. This is typically done in small teams

Level III

1) Be centrally involved in building our competition robot or build something else in the fall of equal complexity.
2) Get checked out on the mill and/or lathe. Cut some keyway on the mill and turn down some shaft on the lathe.
3) Alternatively, take the PCC summer machining course for FRC.

Design

Mentors: Dale
Relevant Departments: Mechanical, Competitive Analysis
Level I

1) Earn a Fabrication II certification.
2) Design a major robot subsystem (like an arm), BunnyBot, or something else of equivalent complexity using Google SketchUp or AutoCAD Inventor.
3) Build what you designed and get it to work. Modify your plan as necessary to match what you built.
4) Talk about what you built at the weekly robotics meeting.

Level II

Do Level I (steps 2-4) again in a different area.

Level III

Take a major role in designing our competition robot.

Electronics

Mentor: Dale
Relevant Department: Control Systems
Level I

1) Current enrollment or completion of Sophomore Science. Freshmen can read and do the labs in Starting Electronics by Keith Brindley, chapters 1-3. The bottom line is you should know what a volt, amp, watt, and ohm are and be able to use ohm's law to solve some simple problems.
2) Learn how to solder and apply connectors to wires.
3) Research the various components used in FIRST robots at http://first.wpi.edu/FRC/cstechnical.html and describe their purpose to Dale.
4) Read the rules from last year's competition concerning wiring and be able to answer basic questions about them.
5) Understand how to use the Fluke multimeter and complete a verbal discussion with a mentor about its use. Discuss how you'd measure volts, amps, resistance, and continuity. Measure voltage, current, resistance and continuity at several places on a robot as directed by a mentor. Explain the readings you get. Talk about several ways you could blow the fuse in the multimeter.

Level II

1) Wire a BunnyBot robot and admire your handiwork as it drives around!

Level III

1) Solve at least four problems with robots that have been intentionally messed up by a mentor or the control systems manager
2) Draw a circuit diagram for a typical competition robot using a CAD program such as PCB123 or Eagle.
3) With a mentor, use an oscilloscope to investigate what's going on at various points on a working robot.

Software

Mentor: Andrew
Relevant Departments: Software
For all programs, please run your plan by your manager before coding. Please read the further requirements listed at the bottom of this section.

Level 01

- Have completed the Introductory course offered by the Catlin Gabel computer science department, or have gained comparable programming experience in a text-based language outside of school
- Have some familiarity with programming in either Java or C++
- Learn the basics of WPILIB, and write simple single-joystick drive code for a lab robot

Level 10

- In addition to fulfilling the requirements of a Level 01 certification…
- Write functional competition code for a robot with the complexity of a BunnyBot (using some combination of pneumatics, sensors, etc.)
- Write an autonomous mode that uses encoders to drive forward three feet, pivot ninety degrees to the right and drive forward three more feet

Level 11

- In addition to fulfilling the requirements for a Level 10 certification…
- Write a functional library to use for next year's competition code, which improves upon the library designs of previous years,
- OR complete an independent project that accomplishes something that has not been accomplished by a previous member of the software department

Pneumatics

Mentor: Dale
Relevant Departments: Control Systems
Level I

1) Research the pneumatic devices included in last years FIRST kit and be prepared to talk about the function of each with the Mentor.
2) Create a paper diagram of how these components would be connected.
3) Discuss the kinds of work these parts could be expected to do and demonstrate how much force they can produce through a mock up

Level II

1) Design and build a pneumatic machine that does something interesting, probably on a BunnyBot. It should use at least two actuators and two valves.

Marketing

Relevant Departments: Marketing
Mentor: Dale
The Marketing department promotes the team to the Catlin Gabel community and the world in general. They produce a presentation for our spring assembly including a video and still photos, yearbook photos, graphic design, etc. Team spirit is also a category the judges look for at competitions and this group takes the lead in crafting that image. They are instrumental in recruiting new students into the robotics program. Press relations and outreach are also a part of this world. Since they start immediately, no certification is necessary for some roles in Marketing. Students interested in video will want to get certified in that area.

Level I

- Design a competition flyer. This needs to have interesting graphics, as well as a list of awards won. OR
- Write up text for an information packet about the Catlin Gabel Program. AND
- In addition to one of the two above requirements, design an item of clothing for the team. Keep in mind the colors (Yellow, Red and Orange) and mascot (Flaming Chicken).

Level II

- Graphics track:
    - Work with a BunnyBot team to help name and design the side panels for their robot. OR
    - Create a new banner for the pit area or in front of a table (this needs to have our team name, number, school, city, logo, Catlin graphic, and any other appropriately-deemed graphics).
    - Using one of the two above requirements, show reasonable competency in Adobe Illustrator, InDesign, or Photoshop (preferably the first two).

- Alternatively, if you're more into writing:
    - Write a press release for one of our outreach events, the Oregon regional, or something else of importance relating to the Flaming Chickens. This should be something publication-worthy. OR
    - Write a full page of content for our website. This could be about BunnyBots, Girls' Generation, our alumni, a community project we've done, etc.
- Both tracks should find at least one published article or video about us (NOT from our own website or YouTube account), and add it to the list on the website, along with a brief summary of what it's about. (This requirement may change/go away as we start keeping better track of our publications as we go, but for now we need to find what's already out there.)

Level III

- Have done aspects of level II certifications (graphics, writing, or both tracks) multiple times and very well, as determined by a manager/mentor.
- Alternatively, design a pit area for the competition, but we already have one, so this isn't vital. Your design must be able to accommodate the robot, as well as toolboxes, printers, shelving units as well as anything else vital to the function of the pit. The pit must also be safe and aesthetically sound. You must be able to describe the advantages of your design over others.

Outreach

Relevant Departments: Outreach, Chairman's
Mentor: Dale
The Outreach department organizes our community outreach to help spread science and engineering, and share the FIRST program with other not (yet!) in the FIRST community. Working with Marketing to publicize these events, members of the Outreach department use their organization and public speaking skills to eloquently describe the benefits of FIRST and the impact of it's various programs on students.

Level I

- Level I in at least one technical department.
- Read last year's Chairman's essay, Executive Summaries, and Program Book.
- Be able to concisely and eloquently describe what FIRST is and its importance/impact to a mentor or manager.
- Be able to concisely and eloquently describe all of our major continuing outreach events (including FIRSTFare, BunnyBots, Girls' Generation, FLL coaching/tournaments, and more) and their importance/impact to a mentor or manager.
- Help with the set up and running (NOT planning) of an outreach event (like FIRSTFare, Girls' Generation, etc.)

Level II

- Level II in at least one technical department.

- Suggest a few ideas for possible new outreach events, including some basic planning (why it would be important, who you would need to contact, what sort of materials or robot transportation you would need, etc.). These events can be just one-time demos, or the beginning of a partnership with some organization. The planning you show doesn't have to be excessive, just to show that you've thought through the steps.
- Be able to eloquently describe the various features of a robot to a mentor/manager.
- Play a major speaking role in an outreach event (such as giving lab tours during FLL tournaments or presenting at Catlin Open House, for instance).

Level III

- On your own, plan (and then enact) an outreach event. This needs to involve steps for transporting a robot if necessary and coordinating with the supervisors at your event's location as well as any team members who will be there.
- Be one of the main pit spokespeople that talks to roving judges at a regional competition.

Chairman's

Relevant Departments: Outreach, Chairman's
Mentor: Dale
The Chairman's department is very intimately connected with the outreach department. To be part of Chairman's you must be in Outreach (but not necessarily vice versa). Chairman's works on compiling our submission for the Chairman's Award each year – the most prestigious award given in FIRST, for the team that best exemplifies FIRST's ideals and helps spread science in engineering and get more people involved. This department is a more writing/formal presentation intensive subset of Outreach.

Level I

- Outreach level II
- Read the Chairman's submissions of 3 Hall of Fame teams, and discuss how they compare to ours.

Level II

- Help significantly in updating/editing Chairman's materials (Executive Summaries, Chairman's essay, Program Book, presentation script…) OR
- Be on the main Chairman's Presentation Team for competitions

Level III

- Write/play a major role in writing most of the Chairman's materials OR
- Create/play a major role in creating the Chairman's video.

Video Production

Mentors: Dale
Relevant Departments: Video

Level I

1. Shoot at least a half hour of video of the team or outreach event
2. Edit the video down to five minutes and show it to the Mentor. If you pass that hurdle, show it at a meeting. If the audience gives it thumbs up, you're certified. The video should include stills and voice-over as well.

Level II

1. Create a video that might be shown at our Catlin Assembly or posted on our website that highlights our team and how far it has come or some event like Girl's Generation, FLL, BunnyBots. It should include video, stills, voice-overs, and music in an interesting and entertaining way.