

2024 Fenworks Drone Racing State Tournament

We are so excited to have you and your school attend the Drone Racing State Tournament! Below, you will find all the information you will need for the two days. If you have any questions, please reach out to molly.hane@fenworks.com or at 218-526-0306 (calls or texts).

Location

We will be utilizing the Memorial Union at NDSU for all items related to the event. A map has been attached to the last page of this document as well.

Address: NDSU Memorial Union | 1401 Administration Ave, Fargo, ND 58102

Check-in

All students and GMs will check in at the Memorial Union outside of the ballrooms. At check-in, students and GMs will receive their nametags and swag bags with all items needed for the weekend.

Parking:

Parking on Friday will require a parking pass. Fenworks will be providing each school with parking passes. You will still need to find the pay machine, enter the license plate of the vehicle, and then the code (will be provided the week of the event). The parking pass will then be free for you. For any spectators, parking is \$5 for the whole day on Friday. Parking is free on Saturday.

Parking can be found on the south Union lot near the south entrance of the Memorial Union as well as the Visitor lot located one block north of the Union. Instructions for using the self-service pay stations are located at each kiosk. Parking is free from 4:30 p.m. until 7 a.m. weekdays and all-day Saturdays, Sundays, and official State holidays. A parking map can be found [here](#).

Wi-Fi:

Students and GMs will be able to access NDSU's guest Wi-Fi. Please follow the promoted instructions on your device on how to request access. All students and GMs will be responsible for following NDSU's Wi-Fi guidelines.

Dining

All meals will be up to each school/student on providing. On Friday, meals can be purchased at the Memorial Union Food Court. Hours of availability found here. The below will ONLY be open on Friday. Nothing will be open Saturday.

- Caribou: 7 - 3pm
- Twisted Taco: 10:30 - 2:30
- Hoagie Hut (Salads/Subs): 9-3

Additionally, the Memorial Union does not allow for "group orders" to be purchased and brought into the union. All outside meals that are brought into the union must be purchased by an "individual" and not a "school." An example of this includes bulk pizza orders. However, if each student purchased, for example, a sandwich, that is allowed.

Livestream

If someone cannot attend, they can check out our livestream of all the events on the Fenworks Socials. Check our website for additional streams to see if they become available.

- Facebook: [@FenworksOfficial](#)
- Twitch: [@FenworksOfficial](#)
- YouTube: [@FenworksOfficial](#)

Schedule

Please check [here](#) for the most updated schedule. Please note the schedule is updated in live time and might change. We will send out the final version the week of the event. It won't change too much between now and then.

See below for a description of each event.

Please note, all locations are in the Memorial Union. The location is the room it will be in

- Travel time to the tournament.
 - Lunch and transportation are up to the school.
- Check-in
 - Location: Legacy Lounge
 - Receive your lanyard and swag bags
- GM Meeting and Organize Students for Opening Ceremony
 - GM Meeting
 - Location: Nueta Meeting Room
 - GM's will have the opportunity to talk with Kaleb Dschaak and provide feedback about the season as well as ask any questions.
 - Opening Ceremony
 - Location: Anishinaabe Theater
 - Students will have assigned seating in the theater to help organize them for the parade of teams
- Opening Ceremony and Parade of Schools
 - Location: Anishinaabe Theater
 - All students will participate in the opening ceremony and the parade of Schools.
- Social Event
 - Location: NDSU Memorial Union Thundar's Game room (Basement Floor)
 - Students, GMs, and Fenworks staff will get a chance to socialize by utilizing the bowling alley, pool tables, table tennis, shuffleboard, foosball, and air hockey for free.
 - Please make sure students bring socks if they wish to bowl.
- Breaks/Flex Time
 - This time will be used if there are any delays with the schedule. If there are none, this will be a time for students to have free time to charge batteries for FPV races, take a bathroom break, practice racing in the esports lab (only during certain hours and with advisor supervision), walk around campus (with advisor permission) or practice more in the Ballrooms.
- Closing Ceremonies
 - Location: Anishinaabe Theater
 - Everyone is invited to attend the closing ceremonies of the event. Awards will be given to the top 3 individuals and top 3 teams of both the Simulator and FPV Racing.

State Tournament Ruleset

General Guidelines

1. All students and GMs must pay attention and listen to any and all rules by Fenworks Staff
2. Never go onto the FPV course unless a Fenworks Staff member says you can.
3. Make sure to be safe with FPV drones and only use them in the netted area. Also make sure to turn off the motors any time the drone is not in ideal use.
4. **NEVER PUT A BATTERY IN A DRONE, UNLESS SPECIFIED BY A GM OR FENWORKS STAFF.** If a drone gets plugged in, it can tamper with the radio frequency it emits and could interfere with the FPV racing.

Equipment:

1. Schools must provide their own equipment for the tournament. Please make sure to bring all cords, drones, and batteries. All participants must use the VelociDrone simulator for the competition.
2. Schools will need to supply the VelociDrone Logins at the event. Please have the login info ready for the event.
3. NDSU will provide the computers.
4. Participants must use the designated racing drone model and specs listed below. Any player found to have edited the specs will be subject to disqualification. These specs are the default settings for the Tinyhawk drone.

Track Selection and Required Specs

1. Track
 - a. Simulator: All students will be using the Fenworks State Tournament Course for all rounds of racing
 - b. FPV: Students will be flying a track with dimensions roughly similar to Fenworks State Tournament Course Specs
2. Simulator:
 - i. Quad: Tiny Hawk
 - ii. Quad Settings:
 1. General
 - a. Frame Lift – Downforce: 100%
 - b. Air Mode: false
 - c. Quad Weight:100%
 2. Drag
 - a. Drag Front:100%
 - b. Drag Top: 100%
 - c. Drag Side: 100%
 3. Propellers
 - a. Propeller Size: 40mm
 - b. Propeller Power: 100%
 - c. Prop Wash: 30%^m
 - d. Propeller Profile: Profile 2
 4. Camera
 - a. Camera Angle: 30 Deg
 - b. Camera Mix Angle: 17 Deg

- iii. Students can fly in any mode Angle, Horizon, or Rate. They may also adjust any additional settings. The drone is the only thing that must be uniform across all drones.
 - iv. All courses will be set to Open Class – 3 Laps, except the final race which will be set to Open Class – Laps, with Laps set to 6. Battery Simulation will be turned off.
3. FPV:
 - a. Drones must be unmodified from their factory state. They will be inspected before races to ensure they meet this standard.

Racing Format – Simulator and FPV

1. All students will have the opportunity to race one or two times depending on the round. Their goal is to get the lowest Finishing Time.
2. All races will consist of three (3) laps around the course and only the Finishing Times will be recorded.
3. After each race, Students are to sit and wait for a Fenworks Representative to record their score.

Racing Rules – Simulator and FPV

1. All Students must start simultaneously in each race.
2. Students must follow the designated track layout and pass through all gates and checkpoints in the correct order.
3. If a student misses a gate or checkpoint, they must turn around and correctly pass through the missed gate or checkpoint before continuing the race.
4. Any intentional contact with other Students' drones, cutting corners, or taking shortcuts will result in disqualification.
5. Fenworks reserves the right to review race footage and disqualify Students for any unsportsmanlike conduct.
6. Anyone that doesn't finish a race will receive a time of 300.000.

Racing Rules - FPV Specific

1. Students must go through all obstacles based on the course map.
2. If a student misses an obstacle and doesn't go back for it or doesn't go through it based on the course map, it is a 5 second penalty that will be added to their time. Missed obstacles will be counted every lap. (ex. If they miss one obstacle on lap one, but make it lap two, it is just a 5 second penalty. If they miss it all three laps it will be 15 seconds.)
3. If your drone crashes or gets stuck, you may try and use the "Flip-over" mode to get it back to flight. Otherwise, each FPV racer may have one designated partner who is allowed to enter the field and flip over a drone if it ends up crashing. This partner must have safety goggles on and cannot interfere with the course or other racers. If they interfere, the student flying the drone will be disqualified for that race.
 - a. The other racers are not allowed to intentionally fly their drone into a partner who is picking up a drone. If this appears to be the case, that student will be disqualified.
4. All drones will start on the launch pad. Racers will start at the sound of the Whistle. If there is a false, start a racer may receive one additional change to fly if:
 - a. They started early
 - b. The drone doesn't start
 - c. They immediately crash into another drone
 - d. The FPV video feed gets significant interference and is unflyable

Ranking/Scoring

- Simulation and FPV
 - The racing map will be the same for all rounds for both simulation and FPV (placement, Rounds 1 – 3 and Finals.)
 - All students will be racing as individuals. If the students are part of a team, their individual score will also account for their team score. There are no separate races for individuals or teams. They are all counted with the same races.
- Individual:
 - Individual scores will work by students doing a placement round which will then seed them for Round 1 – 3. They will advance by having the fastest racing time out of all students (see below for more information in the Racing Structure and Advancing).
 - Simulator Finals will consist of 6 students racing and be one race of 6 laps. The final leaderboard will have ranks 1-6 seeded based on how they finish in the Final race. All other students will be ranked based on their fastest time from rounds 1 – 3.
 - FPV Finals will be between the final two students. They will be flying in a best of 3 faceoff. They will be ranked accordingly. All other students will be ranked based on their fastest time from rounds 1 – 3.
- Team for both Simulation and FPV:
 - Since the map is the same for all rounds, the team score will be the fastest race time added together from rounds 1 – 3 from two different students. That time will then be ranked against all other teams. Some students will be eliminated after round 1, however, this scoring system still allows for their score to be considered for team time. By advancing on, students will have more opportunities to get faster race times. See below for an example.

Student name	Team	Round 1 - Race 1	Round 1 - Race 2	Round 2 - Race 1	Round 2 - Race 2	Round 3 - Race 1	Round 3 - Race 2
John Doe	Team Narwhale	59.648	60.169	55.164	46.089	45.198	44.198
Jane Doe	Team Narwhale	48.649	50.019	46.146	45.948	44.014	43.197
Jim Doe	Team Narwhale	53.134	60.089	55.168	64.048	DNQ	DNQ
Blue Johnson	Team Dinos	69.149	40.493	50.149	46.481	DNQ	DNQ
Red Johnson	Team Dinos	40.135	40.498	40.494	42.098	39.998	42.794
Monday Peterson	Team Dogs	100.990	90.489	DNQ	DNQ	DNQ	DNQ
Wednesday Peterson	Team Dogs	70.166	69.146	DNQ	DNQ	DNQ	DNQ

In the above situation, the two slowest race times from Round 1 did not qualify the students to move on, so their Team score was able to be calculated. By taking the fastest two times from two different individuals and adding them together for their Team Total Time.

For round 2, the two slowest race times also didn't qualify them for round 3, so Jim Doe and Blue Johnson were also eliminated. This allows us to input Blue's fastest time from rounds 1 – 3 as 40.493 for

his team fastest time. We still must wait for team Narwhale as they have three teammates and it's the fastest time of two of the three teammates.

After round 3, we can finish calculating the team scores. For team Narwhale, out of the three students, John and Jane had the fastest times from rounds 1-3 so they will be used (see above highlighted.)

Rank	Team	Fastest Time 1	Fastest Time 2	Total Time
	Team Narwhale	44.198	43.197	87.395
	Team Dinos	40.493	39.998	80.491
	Team Dogs	90.489	69.146	159.635

Racing Structure and Advancing

Simulator

- Placement Round:
 - Students will be placed in pods of 4-6 students. They will race two times. Each race will be three laps. Their fastest race time of the two races will be used to seed them for round 1. All students will then be ranked from fastest to slowest. The pod assignments for the placement round will be sent out before the event.
- Round 1:
 - Students will be placed in pods of 5-6 students based on their rank from the placement round. The top 6 will be pod 1, the next 6 will be pod 2 and so forth. They will race two times. Each race will be three laps. Their fastest race time of the two races will be used to seed them for round 2. All students will then be ranked from fastest to slowest. The top 18 students will advance.
- Round 2:
 - Students will be placed in pods of 5-6 students based on their rank from Round 1. The top 6 will be pod 1, the next 6 will be pod 2 and so forth. They will race two times. Each race will be three laps. Their fastest race time of the two races will be used to seed them for round 3. All students will then be ranked from fastest to slowest. The top 12 students will advance.
- Round 3:
 - Students will be placed in pods of 5-6 students based on their rank from Round 2. The top 6 will be pod 1, the next 6 will be pod 2. They will race two times. Each race will be three laps. Their fastest race time of the two races will be used to seed them for the finals. All students will then be ranked from fastest to slowest. The top 6 students will advance to the finals.
- Finals:
 - The final 6 students will race 1 race of 6 laps to determine the final winner.
- Structure
 - 0 - 5 minutes: Students get ready for the race
 - 5 – 15 minutes: Race 1
 - 15 – 25 minutes: Race 2
 - 25 – 30 minutes: Clean up Station

FPV

- Placement Round:

- Students will be placed in pods of 2-3 students. They will race two times. Each race will be 3 laps. Their fastest race time of the two races will be used to seed them for Round 1. All students will then be ranked from fastest to slowest. The pod assignments for the placement round will be sent out before the event.
- Round 1:
 - Students will be placed in pods of 2-3 students based on their rank from the placement round. The top 2 will be pod 1, the next 2 will be pod 2 and so forth. They will race two times. Each race will be three laps. Their fastest race time of the two races will be used to seed them for round 2. All students will then be ranked from fastest to slowest. The top 6 students will advance.
- Round 2:
 - Students will be placed in pods of 2 students based on their rank from Round 1. The top 2 will be pod 1, the next 2 will be pod 2 and so forth. They will race two times. Each race will be three laps. Their fastest race time of the two races will be used to seed them for round 3. All students will then be ranked from fastest to slowest. The top 4 students will advance.
- Round 3:
 - Students will be placed in pods of 2 students based on their rank from Round 2. The top 2 will be pod 1, the next 2 will be pod 2. They will race two times. Each race will be three laps. Their fastest race time of the two races will be used to seed them for the finals. All students will then be ranked from fastest to slowest. The top 2 students will advance to the finals.
- Finals:
 - The final 2 students will race in a best of 3 series to determine the final winner.
- Structure
 - 0 - 5 minutes: Students get ready for the race
 - 5 – 15 minutes: Race 1
 - 15 – 25 minutes: Race 2
 - 25 – 30 minutes: Clean up Station