**Operational Requirements**

1. Take off time limit
   1. 180 seconds (3 min) to accomplish successful take off
   2. Multiple attempts allowed within time limit but aircraft must not become airborne during aborted attempt
2. Take off Zone
   1. Take off into wind
   2. Aircraft must remain on runway during takeoff roll
   3. Must become airborne within 200 ft
3. Competition circuit
   1. Aircraft must complete one 360 deg circuit of field
   2. Stay out of no-fly zones
   3. Fly past departure end of takeoff zone before turning 180 deg
   4. Fly past approach end of takeoff zone before turning 180 deg to begin landing
4. Landing
   1. Controlled return to ground inside landing zone
      1. Controlled rollout allowed
      2. Controlled runoff allowed
   2. Must land and stop within 400ft

**Design Requirements**

1. No lighter than air or rotary wing aircraft
   1. Limited to fixed wing
   2. No lighter than air or rotary wing (helicopter/autogyro)
2. Aircraft Dimension Requirement
   1. In takeoff configuration, L+W+H ≤ 175
      1. Length – maximum distance from front to the aft of aircraft
      2. Width – span or max distance from wingtip to wingtip
      3. Height – max distance perpendicular to ground to highest part of aircraft (propeller not included)
   2. Gross weight ≤ 55 lbs with payload and fuel
3. Material restriction
   1. Use of fiber-reinforced plastic prohibited
   2. Use of lead is prohibited

**System Requirements**

1. Electric motor requirements
   1. No restrictions on make or model
   2. Only single motor configuration allowed (no multiple motors)
2. Gear boxes, drives, and shafts
   1. Allowed as long as propeller RPM:engine RPM = 1:1
   2. Prop must rotate at motor RPM
3. Aircraft batteries
   1. Must be commercially available LiPo
   2. Homemade battery not allowed
   3. 6 cell (22.2 volt) LiPo
   4. Must be at least 3000 mah
   5. Must be at least 25C
4. Power limiter
   1. Must use new 2015 1000 watt power limiter
5. Gyroscopic assist prohibited
6. Red arming plug
   1. Use red arming plug to arm and disarm system
   2. Must be in circuit between battery and ESC
   3. Must be physically located 40-60% of A/C length from propeller
   4. Must be located on top of fuselage
   5. Must be external of the A/C surface
7. Payload requirements
   1. Must consist of support assembly and payload plates
   2. All payload must be carried within payload bay
   3. Payload must be carried as homogeneous mass
   4. Payload must be secured to airframe
   5. Total payload consists of plates plus support assembly
   6. Payload bay must be a “closed” payload bay
      1. 4 sides, bottom, and top
      2. Top can be hatch or wing once installed on A/C
   7. Bay must be fully enclosed within the fuselage
   8. A/C must be structurally airworthy with and without payload bay installed
   9. Payload bay must be removable
   10. “Closed” payload bay dimensions must be 4x4x10 in +1/8, -0
   11. Team must be able to load and secure payload in ≤ 1 min
   12. Team must be able to unload payload in ≤ 1 min
   13. Payload must not contribute to the structural integrity of airframe
   14. Bay must be secured to airframe within cargo bay to avoid shifting in flight
8. Ballast
   1. Ballast must not be located in payload bay
   2. Must be indicated on 2D drawings
   3. Ballast must be secured to avoid shifting in flight
9. General requirements
   1. Radio must be 2.4 GHz
   2. All aircraft must utilize either spinner or rounded safety nut (for prop)
   3. A/C control surfaces must not feature excessive slop
10. Servo sizing
    1. Analysis and/or testing of servos must be described in design report that demonstrates servos selected are adequately sized to handle expected aerodynamic loads during flight

**Regular Class Scoring**

|  |  |  |
| --- | --- | --- |
| FFS  T  Rn  Bn  Pp  Pa | =  =  =  =  =  = | Final Regular Class Flight Score  Penalty Points  Round Flight Score (Payload weight – lbs)  Payload prediction bonus Payload prediction  Actual payload carried |

**Design Report Requirements**

1. Must not exceed 30 pages
   1. Double-spaced
   2. Including appendices, cover page, table of contents, and payload prediction graph
   3. Does not include statement of compliance and 2D CAD drawings
2. Report Format
   1. Must be submitted electronically
   2. Font must be 12 pt proportional or a 10 character per inch non-proportional
   3. Margins must be 1” left, 0.5” right, top, and bottom
   4. All pages must be ANSI A (8.5”x11”) page format
   5. Design report must have cover page with team name, school, and team number (will be counted against 30 page limit)
   6. File must be in PDF format
3. Design Plans requirements (CAD)
   1. Must be ANSI B size (11”x17”)
   2. Must be PDF format
   3. Must be on one page
   4. Must have US-standard 3-view or 3rd order projection
      1. Right side view in lower left with nose pointing right
      2. Top view above the right side view also with nose pointing right
      3. Front view in lower right
   5. All A/C must have the required dimensions clearly marked and dimensioned on drawing
      1. Length
      2. Width
      3. Height
      4. CG location
      5. Main wheel diameter
   6. All dimensions must be in inches and decimal inches to an appropriate level of precision (4 decimal places is too many)
   7. Plans must also include table with summary of pertinent A/C data
      1. Wingspan
      2. Empty weight
      3. Motor/engine make and model
   8. Plans must also include weight and balance table with a summary of pertinent A/C data
      1. Motor/engine
      2. Battery
      3. Payload
      4. Ballast
      5. Location from datum in inches
      6. Moment arm
      7. Resultant moment of CG
   9. Must be marked on drawing
      1. A/C datum
      2. Forward CG limit
      3. Aft CG limit
      4. Empty weight CG (weight and balance worksheet should correspond with static margins on 2D drawings)
   10. Plans must be marked with team name, school name, and team number
4. Payload prediction curve requirements
   1. Must be included with design report (counts against 30 page limit)
   2. One electronic copy of the payload prediction “EQUATION ONLY” must be provided on face of 2D drawing
   3. Page must be 8.5”x11” ANSI A in PDF format
   4. Must be marked with team name and school across top of the graph with team number marked in the bottom right corner
   5. Graph must include formula used to calculate the curve
   6. The curve must present the payload capacity of the A/C in pounds as a function of density altitude in feet

**Technical Presentation**

1. Each team must give 10 minute technical presentation of design (exceed 15 min = -5 points)
2. The presentation must be the same information provided in the design report in oral form
3. Must give detailed explanation of why A/C is best and how that conclusion was made
4. A/C must be present at the oral presentation
5. Must demonstrate capabilities to quickly load/secure and unload payload
6. Teams must provide a single sheet (8.5”x11”) marketing/promotion piece to further detail A/C feature, capabilities, and unique design attributes