

AIAA Design Competitions

Official Rules

ELIGIBILITY REQUIREMENTS

- All AIAA University Student members (hereinafter “students”) are eligible and encouraged to participate. All student participants must have a current membership with AIAA to submit a report and to receive any prizes.
- At least one Project/Faculty Advisor must be an AIAA member.
- Students must submit their intent to participate and final report via the online submission site (www.aiaa-awards.org) to be eligible to participate. **No extensions will be granted.**
- More than one design may be submitted from students at any one school. At large student members may collaborate with each other even if they do not attend the same university.
- If a design group withdraws their final report from the competition, the team leader must notify AIAA Headquarters immediately.
- Use of the competition RFPs as part of an organized classroom requirement are eligible and encouraged for competition.
- Designs submitted must be the work of the students, but guidance may come from the Faculty/Project Advisor and should be accurately acknowledged.
- Prize funds will only be awarded if at least three valid final entries are received in the category.

SCHEDULE

- The schedule for AIAA Design Competitions will be posted to the Design Competitions [program website](#) each year by mid-August. The schedule posted to the program website is the final schedule unless otherwise stated.
- A general schedule may be found below:
 - **Mid-August:** RFPs posted to website
 - **Early February:** Intent to Participate and Team Roster submitted via online submission site
 - **Mid-May:** Final Design Proposal submitted via online submission site
 - **Mid-June:** Proposals accepted or denied for judging
 - **August-September:** Results announced and winners notified

CATEGORIES/SUBMISSIONS

The number and types of categories/competitions offered in any given year is at the discretion of the AIAA Foundation.

- **Team Submissions:** Team competitions will be groups of not less than three and not more than ten AIAA Student Members per entry, unless otherwise specified in the competition Request for Proposal (RFP).
- **Individual Submissions:** Individual competitions will consist of only one AIAA Student Member per entry.
- **Graduate Category:** Graduate students may participate in the graduate and open categories only. Graduate category entries must comprise at least 2/3 graduate students.
- **Undergraduate Category:** Undergraduate entries must be comprised of all undergraduate students. No graduate students may participate in the undergraduate category.
- **Open Division:** Both graduate and undergraduate students may participate in the Open Division. Teams can be a mix of any level. Individuals or teams may participate in this category.

Team Roster and Intent to Participate:

- Team Roster and Intent to Participate (basic proposal information) indicating interest in participating in the design competitions is required before submitting a final report.
- All Team Roster and Intent to Participate Forms must be submitted through the online submission system. This only asks for basic information about your proposal and team.
- Team Roster and Intent to Participate must include the competition of interest, proposal title, student's names, emails, AIAA membership numbers and expiration dates, faculty advisor(s) names, emails, and project advisor(s) names and emails. Incomplete forms will result in the Team or Individual being ineligible to compete in the competition.

Submission of Final Design Report:

- Each team or individual must provide an electronic (.pdf) copy of their design report as outlined below, or according to the RFP instructions, to the online submission site, <https://www.aiaa-awards.org/a>. Only the person who submitted the intent to participate may submit the final design report.

- An electronic copy of the report in PDF format must be submitted to AIAA using the online submission site referenced above. Total size of the file cannot exceed 25 MB.
- Electronic report files must be named (example): “year_[name of university]_Design_Report.pdf”
- A separate “signature” page must be included with your submission and include the following:
 - All student participants, their AIAA numbers and signatures.
 - Individual or team photos are highly recommended but not required. AIAA will collect a team photo for use in their promotional materials for the winning reports.
 - Faculty and/or Project Advisors, their signatures, and AIAA number(s) as appropriate per the Eligibility Requirements.
 - If the submitting team is comprised of at-large student members, each student member needs to include the name of the university he or she attends.
- Electronic reports should be **no more than 100 pages**, double-spaced (including graphs, drawings, photographs, and appendices) if it were to be printed on 8.5”x11.0” paper, and the font should be no smaller than 10 pt. Times New Roman, unless otherwise stated in the relevant competition RFP. Default margins should be 1” on all sides.
 - Any text that is not double-spaced will incur a page-count penalty of 1.75 pages for each improperly spaced page (or portion thereof), with a minimum penalty based on ½ page. For grading purposes, improperly spaced pages will be replaced by their penalized page-count equivalent.
 - Example: An 85-page report in which 40 pages are formatted with 1.5 spacing and 45 pages are correctly double-spaced will be counted as 115 pages for grading purposes, calculated as 45 (properly spaced pages) + 70 (40 × 1.75) = 115 pages (resulting in a report that is now over the limit and thus subject to penalties, including possible disqualification)
 - NO foldouts (11”x17”) are acceptable
 - Team may adjust the landscape and portrait layout of a page at their discretion
- Failure to adhere to all the above formatting requirements may result in your report being penalized at the discretion of the judges.

- Minimum penalty will be 10% on the final score
- Maximum penalty will be disqualification

COPYRIGHT

- All submissions to the competition shall be the original work of the team members. Authors retain copyright ownership of all written works submitted to the competition. By virtue of participating in the competition, team members and report authors grant AIAA a non-exclusive license to reproduce submissions, in whole or in part, for all of AIAA's current and future print and electronic uses. Appropriate acknowledgment will accompany any reuse of materials. Winning reports will be posted on the AIAA website.

CONFLICT OF INTEREST

- It should be noted that it shall be considered a conflict of interest for a design professor to write or assist in writing RFPs and/or judging proposals submitted if (s)he will have students participating in, or that can be expected to participate in those competitions. A design professor with such a conflict must refrain from participating in the development of such competition RFPs and/or judging any proposals submitted in such competitions.

AWARDS

- The prize money provided for the competitions is funded through the AIAA Foundation. The monetary awards may differ for each competition, with a maximum award of \$750. The award amounts will be listed on the AIAA Design Competitions program website once per year at the beginning of each cycle. One representative from the first-place team may be invited by the Technical Committee responsible for the RFP to make a presentation of their design at an AIAA forum. A travel stipend may be available for some competitions, with a maximum travel stipend of \$750 which may be used to help with costs for flight, hotel, or conference registration to attend an AIAA forum.
- Paper certificates will be provided to each individual team member plus a faculty advisor and project advisor, only if the team or individual places first, second or third place. This does not include institutions/individuals from nations subject to US government sanction. It is the team's/individual's responsibility to provide an appropriate mailing address to AIAA HQ for the purposes of mailing these certificates.

- Participation certificates may be requested in writing to studentprogram@aiaa.org and they will be delivered in electronic format only. Teams may request participation certificates up to 01 October of the same year.

PROPOSAL REQUIREMENTS

- The technical proposal is the most important factor in the award of a contract. It should be specific and complete. While it is realized that all of the technical factors cannot be included in advance, the following should be included:
 - Demonstrate a thorough understanding of the Request for Proposal (RFP) requirements.
 - Describe the proposed technical approaches to comply with each of the requirements specified in the RFP, including phasing of tasks. Legibility, clarity, and completeness of the technical approach are primary factors in evaluation of the proposals.
 - Particular emphasis should be directed at identification of critical, technical problem areas. Descriptions, sketches, drawings, systems analysis, method of attack, and discussions of new techniques should be presented in sufficient detail to permit engineering evaluation of the proposal. Exceptions to proposed technical requirements should be identified and explained.
 - Include tradeoff studies performed to arrive at the final design.
 - Provide a description of automated design tools used to develop the design.
- All analytical modeling tools, data sources, computer codes, and technical resources used to generate, analyze, model and produce the design and associated report must be:
 - Available for inspection, download, and/or sale to all individuals and entities regardless of nationality as allowed by US export laws; OR
 - Generated personally by the students on the team without the use of codes falling under restriction or substantial material assistance by individuals or entities outside of the team.
- Teams are required to list all computer codes used along with the URL where they may be obtained under the conditions above (e.g. <https://www.mathworks.com/products/matlab.html>). Teams must agree to this provision when submitting their materials.
- The use of generative AI is discouraged in AIAA Design Competition submissions as these are learning focused competitions. Individual RFPs may prohibit AI, make sure to read the entire RFP for guidance.

- Please refer to the AIAA policy on the use of AI (<https://aiaa.org/publications/publish-with-aiaa/ethical-standards-for-publication-of-aeronautics-and-astronautics-research/>). Per the AIAA research and AI policy, all submissions to the competition shall be the original work of the team members.
- Consistent with the AIAA policy, if AI has been used in the creation of the design or report in any manner, a 1-page disclosure must be included with the report (NOT included in the 100 page count). Any usage of AI shall be covered in this disclosure.
- Teams should note that if the use of AI is observed or suspected in the submissions, judges may use their individual discretion in deciding whether the use of AI has been properly acknowledged and disclosed, whether it follows the AIAA policy listed above, and whether report evaluations and scoring will be impacted.

RULES, REGULATIONS, AND LAWS GOVERNING TECHNICAL REVIEW AND FINANCIAL AWARDS

- This competition is subject to all applicable laws, including US export control laws. US law prevents AIAA from awarding prize money to, or providing substantive feedback on entries from, persons residing in sanctioned countries. Currently those countries are Iran, Cuba, North Korea, Crimea, Sudan, or Syria, but these are subject to change. Furthermore, any persons or entities on the US Department of Treasury's Specially Designated Nationals and Blocked Persons List ("SDN List") may not participate. Therefore, AIAA will not accept submissions from residents of sanctioned countries or any individuals or entities from the SDN List. AIAA is not responsible for US export laws concerning the provision of technical feedback or prize money, and AIAA will not make any exceptions to this provision and will comply with all relevant US export laws.
- **NON-HARASSMENT:** Any faculty, advisor(s), student or student(s) found to be sending or directing harassing messages to any staff member, professional volunteer, or other competition participant regarding application of the Design Competition program rules is subject to a ban on themselves and their university's future participation in this AIAA program, up to and including a permanent ban. The determination of staff and volunteers regarding the application of U.S. government rules and regulations regarding financial awards, technical feedback and review are final.

- By participating in an AIAA sponsored activity, all participants, regardless of membership status, are subject to the [AIAA Code of Ethics](#) and the [Anti-Harassment Policy](#).

BASIS FOR JUDGING

- The AIAA Technical Committee that developed the RFP will serve as the judges of the final reports. Unless other judging criteria are outlined in the relevant RFP, reports will be evaluated according to the criteria below. Please refer to the RFP for your competition to see if the criteria are different. Judges reserve the right to not award all three places. Judges' decisions are final, and candidates will be provided feedback via judging comments after the program has closed for the cycle. Points listed below are guidelines given to the judges. They are approximate as each competition varies slightly on its emphasis.
 - **Technical Content (40 points)**
 - This concerns the correctness of theory, validity of reasoning used, apparent understanding and grasp of the subject, etc. Are all major factors considered and a reasonably accurate evaluation of these factors presented?
 - Historical judging criteria
 - Requirements
 - Concept Selection
 - Quantitative Analysis of Selected Concept
 - Tools and Methods
 - Technical Soundness and Completeness
 - **Organization and Presentation (20 points)**
 - The description of the design as an instrument of communication is a strong factor in judging. Organization of written design, clarity, and inclusion of pertinent information are major factors.
 - Historical judging criteria
 - Overall neatness and style of report
 - Paper follows a logical flow, is easy for the reader to follow
 - Introduction clearly defines purpose of paper
 - Figures, graphs, tables are uncluttered and are easy to understand

- Proper grammar and spelling
- All previous relevant work cited
- Conclusions are concise and fully substantiated
- **Originality (10 points)**
 - The design proposal should avoid standard textbook information, and should show the independence of thinking or a fresh approach to the project. Does the method and treatment of the problem show imagination? Does the method show an adaptation or creation of automated design tools?
 - Historical judging criteria
 - Concepts considered show originality
 - Overall treatment and approach to the problem showed imagination
 - Unconventional approaches and concepts were considered
 - Innovation and creativity demonstrated during the design process
- **Practical Application and Feasibility (30 points)**
 - The proposal should present conclusions or recommendations that are feasible and practical and not merely lead the evaluators into further difficult or insolvable problems.
 - Historical judging criteria
 - Technical Feasibility
 - Economic Feasibility
 - Broader Impacts
- The following table highlights typical sections included in the design reports.
 - This table is for guidance only
 - This table is NOT comprehensive
 - This table does not guarantee any level of score
 - Judges typically expect these topics covered in the report and per the RFPs
 - The RFP requirements take precedence over this chart

	AIRCRAFT	SPACE	MISSILE
Executive Summary	X	X	X
Table of Contents	X	X	X
Nomenclature	X	X	X
List of Figures	X		
List of Tables	X		
Compliance Checklist	X	X	X

Introduction	X	X	X
SE-ConOps, Requirements, Schedule	X	X	X
Sizing/Vehicle Approach/High Level Trade Studies	X	X	X
Tools and Methods	X		X
Launch Facility Considerations			
Launch Platform Considerations			
Internal and External Configuration	X		X
Staging		X	
Propulsion	X	X	X
Power		X	
Aerodynamics	X		X
Performance/Orbital Mechanics	X	X	X
Stability and Control	X	X	X
Structures	X		X
Loads			
Mass Properties	X	X	X
Systems	X	X	X
Avionics/Guidance			X
Landing Gear			
Cost Analysis	X	X	X
Ordnance/Drop/Refill			
Targeting and Effectiveness			X
Acoustics, Survivability, Observability, Emissions, Environmental Considerations			
Development Plan and Manufacturing			X
Repair and Maintenance	X		
Conclusions	X	X	X
References	X	X	X
Appendices			

CONTACT DETAILS

- For more information about this program, please contact us at studentprogram@aiaa.org.
- For technical questions about the RFPs, please contact the point of contact listed in the RFP.

Request for Proposal

Design of a Navy Jet Training Aircraft

2026-27 Undergraduate Team Aircraft Design Competition

AIAA Aircraft Design Technical Committee

Aircraft Design Technical Committee, POC: David Levy dwlevy2@gmail.com

The system attributes and design constraints described in this document are derived from open-source reference material and tailored to be suitable for a student design activity. They are not official Navy requirements.

1. OPPORTUNITY DESCRIPTION

The US Navy currently uses the McDonnell Douglas (now Boeing) T-45 Goshawk for intermediate and advanced pilot training. The airframe and engines are aging, and there is a need to upgrade training capability to prepare students for fourth- and fifth-generation fighter/attack aircraft coming online and into the future.

Unlike the T-45, the new aircraft will not be required to land on aircraft carriers. To preserve training effectiveness, it will be required to perform full-stop Field Carrier Landing Practices (FCLP) on land-based runways.

2. PROJECT OBJECTIVES

The objective of this project is to develop and present a preliminary design for an affordable, effective land-based trainer aircraft for naval aviators. It will not be required to meet carrier suitability requirements but will need to meet certification standards in MIL-HDB-516C.

3. REQUIREMENTS AND CONSTRIANTS

Performance Requirements (T-Threshold, O-Objective):

Note: All calculations shall use International Standard Atmosphere

- | | | |
|--|---------------|----------------|
| • Max Operating Speed ¹ : | Mach 0.78 (T) | Mach 0.90 (O) |
| • Specific Excess Power ² : | 90 ft/sec (T) | 125 ft/sec (O) |
| • Sustained Load Factor ² : | +4.0g (T) | +6.0g (O) |
| • Takeoff Distance ³ : | 5000 ft | |
| • Critical Field Length ³ : | 6000 ft | |
| • Landing Distance ⁴ : | 5000 ft | |

Notes:

1. Weight = MTOW – 50% fuel, Altitude= 25,000 ft pressure altitude
2. Weight = MTOW – 50% fuel, Altitude= 15,000 ft pressure altitude
3. Weight = MTOW, Altitude= 5000 ft density altitude
4. Weight = MLW, Altitude= 5000 ft density altitude

Design and/or cost trade studies between threshold and objective requirements should be discussed.

Cockpit Accommodations:

The cockpit shall be designed to accommodate the full range of pilot weight and anthropomorphic requirements:

- Weight range (nude): 103 lb to 205 lb
- Height range: 62" to 77"
- Sitting Height: 31" to 40.9"
- Sitting Eye Height: 26" to 31.4"

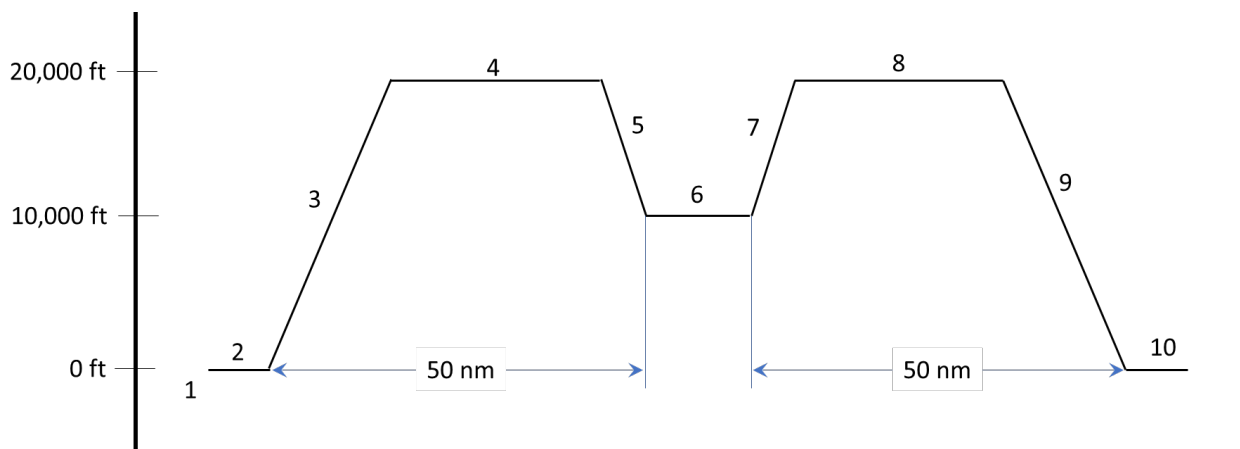
Additional requirements:

- Flight suit, equipment, and survival kit weight is 35 lb per pilot
- The cockpit shall accommodate two Martin Baker Mk 14 ejection seats, or similar
- Provisions shall include On Board Oxygen Generation System (OBOGS) or bottle oxygen
- Maximum cockpit altitude shall be no greater than 8000 ft
- FCLP over-the-nose visibility shall preserve full view of a carrier stern at an approach glide slope of 3.5° at landing approach speed

Missions:

Internal fuel shall be carried to accomplish two missions:

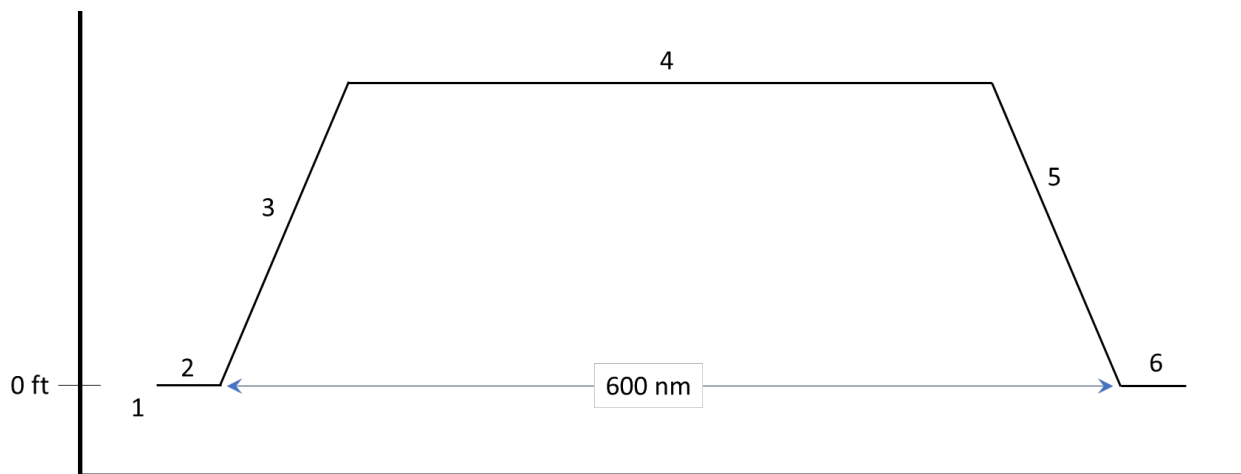
1. Training Flight:



1. Engine start, warmup, taxi: 15 minutes at idle thrust
2. Takeoff, accelerate to climb speed: 1 minute at takeoff thrust
3. Cruise climb to 20,000 ft at 250 KCAS
4. Cruise to 50 nm from departure airport: speed/thrust not specified
5. Descend to 10,000 ft @idle thrust
6. Basic maneuvers at 10,000 ft: 30 minutes @military thrust at Mach 0.60
7. Climb to 20,000 ft at 250 KCAS
8. Return to departure airport: speed/thrust not specified
9. Descend to Sea Level @idle thrust
10. FCLP touch and go landings: Fuel allowance for 30 minutes at approach speed in landing configuration (flaps as required, landing gear down)

Fuel reserve shall be equal to 30 minutes at maximum endurance speed in cruise configuration.

2. Ferry Flight:



1. Engine start, warmup, taxi: 15 minutes at idle thrust
2. Takeoff, accelerate to climb speed: 1 minute at takeoff thrust
3. Cruise climb to desired cruise altitude
4. Cruise segment: Altitude/speed as desired
5. Descend to Sea Level: Speed as desired
 - a. Total distance for segments 3-5: 600 nm
6. Approach and landing: Fuel allowance for 10 minutes at approach speed in landing configuration (flaps as required, landing gear down)

Fuel reserve shall be equal to 45 minutes at maximum endurance speed in cruise configuration.

4. ANALYSIS REQUIREMENTS AND DELIVERABLES

Mass Properties:

Calculations for airplane weight and balance shall be presented. Deliverables include:

- Estimate for total airplane empty weight, including component breakdowns for structure and systems weight
 - Weight assessment summary shall be shown at least at the following level of detail:
 - Propulsion (engine/motor, batteries, controller, wiring, heat sink, cowl, strut, propeller, spinner etc. as applicable)
 - Airframe Structure
 - Wing
 - Empennage
 - Landing Gear (including wheels tires and brakes)
 - Fuselage
 - Systems
 - Instruments and Avionics
 - Fuel/oil (battery if electric)
 - Hydraulic/pneumatic/electrical systems (if chosen)
- Center of gravity calculation for all loading cases
- Operational weight roll-up to MTOW including empty weight, pilots, payload, and fuel

Structures:

A conceptual structural layout of the configuration is required. Advanced materials may be used to reduce the empty weight of the aircraft. Deliverables shall include:

- Material type shall be specified for major components
- Strength capability of the structure and how that compares to what is required at the ultimate load limits of the aircraft
- Major load paths shall be identified

Propulsion:

Propulsion information is not provided as part of this RFP. Engine selection and data sources shall be identified and documented. Deliverables include:

- Identify engine type, manufacturer, and model
- Document installed engine thrust and fuel flow models

Aerodynamics:

Analyses are required of the configuration's aerodynamic characteristics during climb, cruise, maneuvering, and for low-speed operations (i.e., takeoff and landing). At a minimum data regarding the configuration's lift and drag performance should be estimated for all flight regimes. Deliverables should include:

- Wing planform definition and airfoil selection
- Derivation of airplane lift and drag models

Aircraft Systems:

The proposal shall include description, function, location, and layout of major aircraft systems, including (as applicable) but not limited to:

- Propulsion
- Landing gear
- Electrical
- Hydraulics
- Fuel
- Pressurization, Air Conditioning, Oxygen
- Avionics
- Control system actuators
- Flight control computers

Stability and Control:

An analysis of the stability and control of the design is required for climb, cruise, maneuvering, and for low-speed operations (i.e., takeoff and landing). The configuration may be statically stable or unstable. Flight control system architecture and major components shall be specified. Deliverables shall include:

- Criteria for horizontal and vertical tail sizing
- Longitudinal static stability and trim analysis
- Longitudinal and lateral/directional dynamic stability analysis

Cost:

An estimate of the cost of engineering, manufacture, development (EMD), testing, and certification program of the aircraft is required. Cost estimates in 2030 dollars should be based on two phases of production:

1. Low Rate Initial Production (LRIP): 10 aircraft.
2. Full Rate Production (FRP): 500 aircraft.

Any design features, engineering/analytical techniques, and manufacturing processes that increase or decrease cost should be explained. Cost trades between threshold and objective requirements should be discussed. Estimates shall include unit flyaway cost for FRP and full program life cycle cost.

An estimate of direct operating cost per airplane flight hour

- Fuel, oil, tires, brakes, battery cost and other consumable quantities
- Estimate of maintenance cost per flight hour

Certification:

The aircraft shall be designed to meet certification requirements of MIL-HDB-516C. Refer to MIL-STD-3013B for definitions of speeds, performance parameters, etc.

5. DATA REQUIREMENTS

The following data are required for the final configuration:

Design Data:

1. Dimensioned aircraft 3-view drawing including the location of the neutral point and tail moment arms, a table of the aircraft areas
2. 3-D model imagery
3. Interior cockpit layout drawing showing pilots, equipment, and controls
4. Location and volume of fuel tanks
5. Inboard profile of aircraft
6. Drawing showing extended and retracted landing gear position
7. Aircraft weight statement (including min/max crew weights, single-pilot operations)
8. Aircraft center-of-gravity envelope
9. Geometric details of the wing and empennage (aspect ratio, taper ratio, thickness, sweep, etc., and a description of the high-lift devices)
10. Control surface sizes
11. Aircraft drag polars for cruise, takeoff, and landing configurations
12. Materials used in the aircraft structure

Performance Data:

1. Trade study results to determine the minimum weight aircraft
2. Flight envelope (altitude vs. speed) and a V-n diagram
3. Maximum dive speed
4. Segment-by-segment characteristics for each mission profile (aircraft weight, fuel used, time, distance, altitude, speed, etc.)
5. Takeoff and landing field length at Maximum Takeoff Weight (MTOW) and Maximum Landing Weight (MLW), respectively
6. Summary of stability and control analyses
7. Breakdown of the developmental and manufacturing costs (life cycle cost estimates are optional)

The student(s) is (are) to develop and present the alternative concepts considered leading to the down-select of their preferred concept. The methods and rationale used for the down-select shall be presented. At a minimum a qualitative assessment of strengths and

weaknesses of the alternatives shall be given, discussing merits, leading to a justification as to why the preferred concept was the best design. Quantitative justification of why the selected concept is the best at meeting the measures of merit(s) will strengthen the report. In addition, the submittal shall include the major trade studies conducted justifying the optimization, sizing, architectural arrangement and integration of the specifically selected concept. Quantitative data shall be presented showing why their concept 'works' and is the preferred design compromise that best achieves the design requirements.