



Department Project Information

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| Department Name | <i>Mechanical Engineering and Engineering Science</i> | Date Submitted | <i>04/20/2024</i> |
| Project Title | <i>AIAA Design-Build-Fly Competition UNCC_ME_FLY</i> | Planned Starting Semester | <i>Fall 2024</i> |

Senior Design Project Description

Personnel

| Discipline | Number | Discipline | Number |
|-------------------|---------------|-------------------|---------------|
| Mechanical* | 5 | Electrical | 0-1 |

* Between 1-3 senior students that are actively part of the UNC Charlotte AIAA Design-Build-Fly (DBF) club should be pre-selected to join this senior design team.

Project Overview:

The AIAA Design/Build/Fly Competition was started in 1996 by the AIAA Applied Aerodynamics, Aircraft Design, Design Engineering and Flight Test Technical Committees as an opportunity for university students to apply real-world aircraft design experience by giving them the opportunity to validate their analytic studies.

Student teams will design, fabricate, and demonstrate the flight capabilities of an unmanned, electric powered, radio-controlled aircraft which can best meet the specified mission profile. The goal is a balanced design possessing good demonstrated flight handling qualities and practical and affordable manufacturing requirements while providing a high vehicle performance.

To encourage innovation and maintain a fresh design challenge for each new year’s participants, the design requirements and performance objective will be updated for each new contest year. The changes will provide new design requirements and opportunities, while allowing for application of technology developed by the teams from prior years.

Last year (2023-2024) 107 universities competed in the competition.

Approximate Timeline

Proposals: due 17 November
 Design Report: due 23 February
 Contest Fly-off: 18-21 April in Arizona

Main Website: <https://www.aiaa.org/dbf>

Project Requirements:

Students will first perform design analysis, fabrication, and testing and document this in a design report.



Design analysis will include:

- Conceptual design (mission requirements, system and subsystem requirements, sensitivity analysis, wing/tail geometry configuration selection, final concept)
- Preliminary design (sizing, aerodynamic performance and stability analysis, uncertainty analysis)
- Detailed design (structures, mechanical assembly, electrical system, weights and balance, CAD models/drawings, revised performance predictions, manufacturing plan)

The aircraft will then be fabricated and tested. Testing will be conducted at the David B. Waymer Aeromodeller Flying Field in Huntersville, NC about 20 minutes from campus (<http://www.wacama.com/>).

Students will then travel to participate in the competition in April in Tucson, Arizona.

A comprehensive list of project requirements is provided below:

<https://www.aiaa.org/docs/default-source/uploadedfiles/aiaadb/resources/dbf-rules-2024-final.pdf>

Expected Deliverables/Results:

- Proposal - 5 page (details in rules above) [Example](#)
- Design Report - 60 pages max (details in rules above) [Example](#)
- Deliverable - Aircraft and flight demo at competition in Arizona; organizers perform an inspection and flight is scored by judges (details in rules above) [Example photos from event](#)

Disposition of Deliverables at the End of the Project:

Hardware developed is the property of the AIAA DBF student club. The hardware will be housed in Duke 370 and made available to the next year's team.

List here any specific skills, requirements, specific courses, club affiliation, knowledge needed or suggested (If none please state none):

- Students that are currently affiliated with AIAA/DBF Student Club should be selected
- Most of the competition involves mechanical/aerospace design and testing. There is component of electrical design so optionally 1 student can be from electrical engineering/technology
- This will be an intense competition, similar to the NASA Student Launch / Rocketry team. It is important to fill the remaining slots with highly motivated and hard-working students for it to be successful.
- We would like this to be a recurring annual senior design team
- Other faculty will be invited to design reviews to provide input