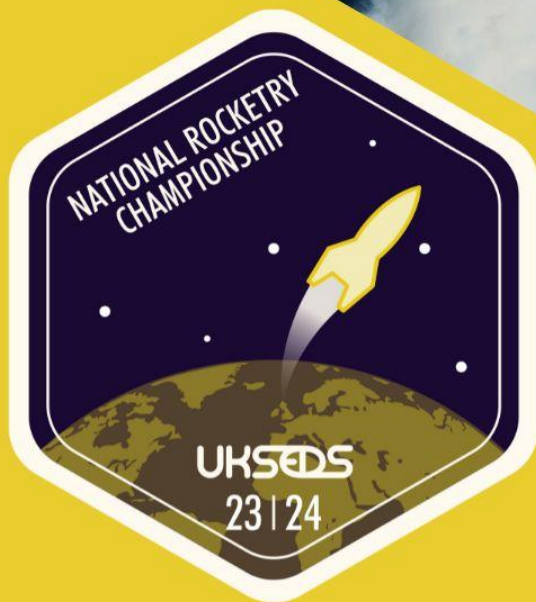


NATIONAL ROCKETRY CHAMPIONSHIP 2023-24

RULES &
REQUIREMENTS



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UKSEDS National Rocketry Championship 2023-24

Rules and Requirements



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1. Overview

Introducing the 2023-24 UKSEDS National Rocketry Championship (NRC). Teams are challenged with designing, building and launching a mid-power rocket with the primary goal of reaching a 2500 ft target. Motor selection will be limited to ensure fair competition between teams.

Teams wishing to enter the competition must [register](#). Please direct any enquiries to rocketry@ukseds.org.

1.1. Scoring Criteria

Teams will be scored on the following criteria:

- Concept design
- Flight Performance
- Payload (compulsory)
- Reports, pictures and videos documenting the project's entirety
- GPS module and flight logs
- Project management
- Presentations

1.2. Updates

This year's championship will have these changes to the brief:

- Increase in project management points
- Flight readiness review
- Initial design outline
- Changes to competition aims and objectives
- The launch report changed to a presentation
- Whole competition launch day at Midlands Rocketry Club in mid June (final dates TBC, we plan to have primary and back up days)

1.3. Key Dates

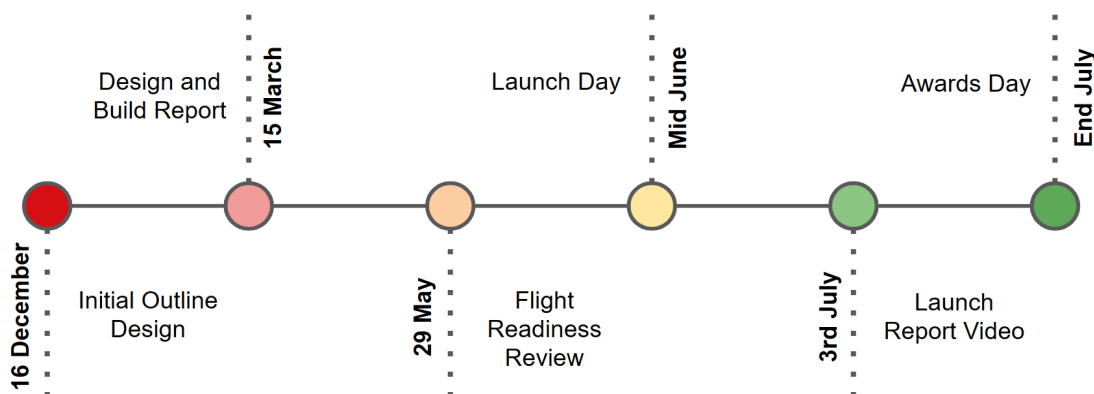




Figure 1: Key dates

2. Flight Performance

2.1. Rocket Motor Selection

Motor selection is limited to any '[2 Grain 29mm Cesaroni](#)' or '[29 mm AeroTech G](#)' class reloads less than 130Ns. Altitude will be normalised to based on the linear/normalisation function:

$$y\% = \frac{100 \times (762 - |762 - \text{Raw Apogee}|)}{(\text{Max Score})}$$

Where $y\%$ = percentage towards your overall score for flight performance

Raw altitude = apogee altitude in meters

Max Score = highest value of $((762 - |762 - \text{Raw Apogee}|)$

This is only valid from 0 feet to 3000 feet, where, from 3000 feet to 3500 feet, the scoring decreases linearly to 0.

3. Payload

The purpose of a rocket is to transport a payload to an altitude; therefore, all entries are required to carry a payload of at least **200 grams**. Structural or standard recovery components cannot be included in this mass requirement.

The integration and function of the payload are down to the individual team's discretion, given it complies with the United Kingdom Rocketry Society Safety Code and National Rocketry Competition Rules.

The payload will be judged on:

- System Integration
- Application and usefulness
- Novelty & Innovation

For a breakdown of points see the points table under the scoring section

Interesting examples of payloads:

- Audio Doppler effect
- Measuring vehicle dynamics with an IMU



- Measuring structural loads
- Measuring external environment properties
- Carrying a mascot or messages for public engagement

4. Altitude Requirement

This year, teams are required to target an altitude of 2500ft. A graph showing the distribution of marks vs altitude can be found below. Please note, heavy penalisation shall occur above 3000ft as this is the dual-deploment limit. As the NOTAM limit for Midlands Rocketry Club is 3500ft, a mark of 0 shall be given to any teams that breach this.

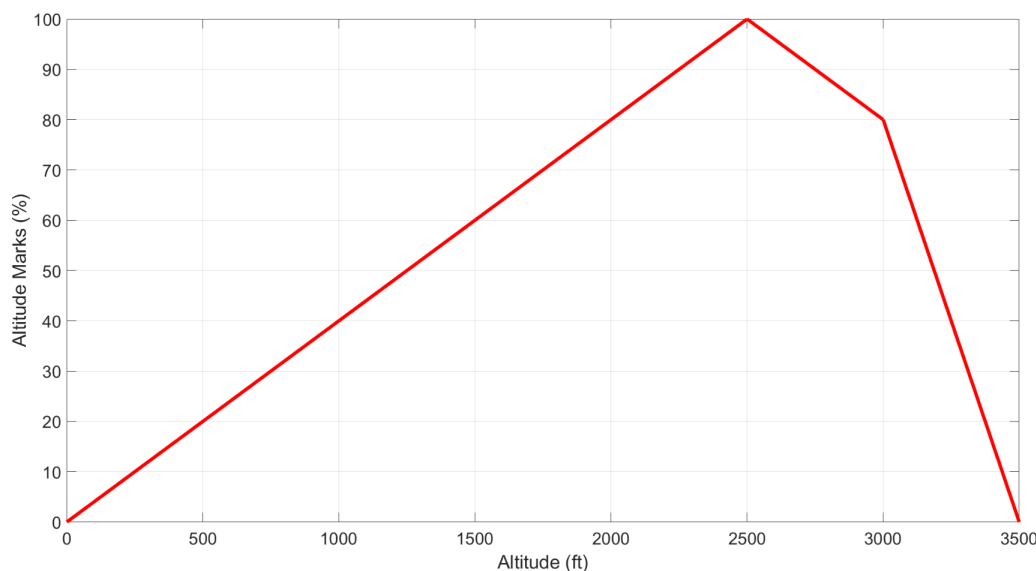


Figure 2: Altitude vs Marks distribution

5. Documentation & Deliverables

5.1. Submission

The format required for each deliverable is specified in the deliverables table below.

All deliverables this year are to be uploaded to a [Google Drive section](#) prepared for each team. If any complications occur, documents are to be sent as a .zip file to rocketry@ukseds.org, large files (>25MB) can be shared via Google Drive, Dropbox, OneDrive, WeTransfer etc.

We heavily discourage the use of emails to submit your deliverables. However, should emails be used, when submitting, please clearly state who you are



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submitting on behalf of and what you are submitting, plus any relevant notes for competition organisers. We provide folder templates and a submission email template on our resources page.

5.2. Reports and Resources

Reports are recommended to be no more than 3000 words. We have provided report and email templates, technical guidance, a brief, resources and a google drive folder where teams submit their work for the competition:

- Resource 1 - [Initial Outline Design template](#)
- Resource 2 - [Design & Build report template](#)
- Resource 3 - [Launch Report Presentation template](#)
- Resource 4 - [Design & Build report folder structure](#)
- Resource 5 - [Flight Verification Form](#)
- Resource 6 - [Student Submission Folder](#)
- Resource 7 - [Technical Guidelines](#)
- Resource 8 - [Plagiarism document](#)
- Resource 9 - [Mentor minutes document](#)

Each template breaks the report down into sections and briefly expands on what is expected plus an example of how the judges will assess how well you have met that criterion.

5.3. Images and Videos

Images and videos should be put into subfolders related to the deliverable e.g. images of rocket simulations should be in the folder 'DRB2'. We have provided template folder structures for you to use in section 5.2 of this document.

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5.4. Deliverables Tables

5.4.1. Design & Build Deliverables Table

Deliverable	Document #	Requirements	Format
Rocket design drawings	DBR 1	Please submit design drawings of your rocket. Images from Rocksim or OpenRocket or any other rocketry simulation software are suggested. Drawing from CAD software is also accepted	Images
Launch simulations	DBR 2	Please submit launch simulations of the rocket's predicted flight. Including data and graphs of altitude, speed and acceleration vs. time with clear scales and units, plus time to apogee and velocity at parachute deployment.	Images
Recovery system schematics	DBR 3	Please submit details of any electrical onboard recovery systems.	Include in the report (DBR5)
Payload system schematic	DBR 4	Please submit details of your payload such as its function, how you designed and integrated it into your rocket etc. Include an image of your payload being weighted for minimum mass verification.	Images Include details in the report (DBR5)
Design and build process validation	DBR 5	Please submit a document detailing your design decisions and build process of your rocket i.e. what you did and how you did it. Include details of the construction of the motor mount, fins, payload bay, and airframe as well as project management. Pictures and videos are recommended.	Report, Images & Videos
Launch Ready Rocket	DBR 6	Please submit pictures of your rocket showing construction is complete.	Images & Videos

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5.4.2. Launch Deliverables Table

Deliverable	Document #	Requirements	Format
Launch summary	LR 1	Please provide details of your launch flight and experience i.e. discuss flight data, what when well? What did not? Improvements you would make. Include any key data such as maximum altitude reached etc. Please include project management details.	Report
Flight Data	LR 2	Please submit raw and/or post-processed data of your flight data. Include maximum altitude, GPS (if applicable) and any other Recovery data recorded during the flight.	Images .csv .xls*
Rocket Preparation Summary	LR 3	Images of rocket preparation before launch such as engine retention with the loaded motor, payload, packing of the recovery systems and rocket on the launch pad.	Images & Videos
Recovery Operations Summary	LR 4	Images of the undisturbed rocket at the landing site, deployed parachutes, airframe, & any damage.	Images & Videos
Flight Verification Form	LR 5	The person certifying your flight must be a registered Range Safety Officer (RSO) and sign the flight verification form, found here .	Image

5.4.3. Initial Design Outline

6. Initial Design Outline

Requirements	Team Roles	Design Outline	Gantt Chart	Financial Plan	Risk Assessment
Format	Table	Write-up	Image	Table and Write up	Table

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7. Scoring

7.1. Scoring Breakdown Table

Scoring Component	Points
Flight Performance	290
Launch	50
Target altitude	140
Successful parachute deployment	50
Successful recovery with minimal damage*	50
Payload	140
Novelty & Innovation	50
System integration	40
Application & Usefulness	50
Documentation	310
Design & Build Report	80
Launch Report	50
Videos and Picture	50
Project Management	130
Presentation	60
Total	800

* Minimal damage shall be defined as being able to be flown again on the same day with minor repairs and effectively 'motor ready'. The team and the certifying person (RSO) must document successful recovery.

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8. Rules & Regulations

The UKSEDS NRC is organised in the spirit of healthy competition. Rules & regulations have been drawn up to maintain a high standard of safety and fairness for all participants.

1. This competition is open to all UK Students for the Exploration and Development of Space branches. Other teams wishing to participate are welcome but must get consent by emailing rocketry@ukseds.org.
2. All rocketry activities must abide by the United Kingdom Rocketry Association (UKRA) Safety Code, which can be found [here](#).
3. All rockets must be original designs and scratch-built by members of the team. Commercial kits are not permitted.
4. All designs must be capable of measuring altitude. The altimeter needs to be tested and calibrated prior to installation to ensure it is in working condition. This process should be documented in the build and design report. Teams can make their own altimeter or buy a commercially available device. Contact us if you need any assistance.
5. Submissions should be the team's own work and any plagiarism will not be tolerated.
6. The competing team is responsible for organising a suitable launch venue. It is required to have a Range Safety Officer (RSO) present at any launch, the easiest way to meet this condition is to attend one of the [UKRA affiliated rocketry club](#) launch days. Teams should contact UKSEDS at rocketry@ukseds.org if they require assistance in identifying a suitable site.
7. A certified Range Safety Officer (RSO) must certify any launches. Should one not be available, the competing team is responsible for having the launch certified.
8. All launches must be performed entirely through the motor's own power. No speciality launch systems (i.e., Rockoon, projectile launching) are permitted.
9. All rockets must be successfully recovered with minimal damage. Minimal damage shall be defined as being able to be flown again and effectively 'motor ready'. The team and the certifying person (RSO) must document successful recovery.
10. All teams must take video and/or photographs of the design and construction of their vehicle, as well as its launch, which should be submitted with the relevant documentation.

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11. All teams and launches must abide by local laws and CAA regulations for unmanned rocket launches. Safety must take the highest priority in launch preparations and flight operations. UKSEDS retains no responsibility for the launch rules and regulations that the competing teams shall be required to follow.
12. If a group wishes to use their own telemetry system, then the equipment to be used at the launch site must be certified by the Radio Standards Authority and subsequent documentation submitted to the RSO on the day of the launch as part of the pre-launch checklist.
13. No external structural metal components are to be placed on the rocket.