



Common Rules & Regulations

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SAFMC 2025 Common Rules and Regulations CHANGE LOG

Version	Release Date	Description
1.0	27 Sept 2024	Official challenge booklet release
2.0	08 Nov 2024	Revision to description of Section 2, Category A.
3.0	06 Jan 2025	Announcement of competition venue and award ceremony venue.
4.0	19 Feb 2025	Detailed competition schedule.

SAFMC 2025 COMPETITION SCHEDULE

Date	Event	Platform/Venue
28 February 2025	Team Challenge video submission (For CAT D1, D2 and E)	Email
11 - 12 March 2025	CAT A Presentation & Challenge	Singapore EXPO Hall 2B (Address: 1 Expo Dr, Singapore 486150)
13 - 14 March 2025	CAT B Presentation & Challenge	
17 - 18 March 2025	CAT E Presentation & Challenge	
18 - 19 March 2025	CAT D2 Presentation & Challenge	
20 - 21 March 2025	CAT D1 Presentation & Challenge	
24 March 2025	CAT C3 Challenge	
25 - 26 March 2025	CAT C2 Challenge	
27 March 2025	CAT C1 Presentation & Challenge	
05 April 2025	Awards Presentation Ceremony	

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1. INTRODUCTION

The Singapore Amazing Flying Machine Competition (SAFMC) is an exciting and unique event organised by DSO National Laboratories and Science Centre Singapore and supported by Ministry of Defence (MINDEF). Open to all schools and participants who are keen to explore the science behind flight and create their very own flying machines, this annual competition promises a fun-filled learning journey with special talks, workshops and live demonstrations.

2. CATEGORIES AND SPECIFIED EDUCATIONAL LEVELS

CATEGORY A – PAPER PLANES (*Primary Schools*)

Each team should consist of TWO (2) to THREE (3) members.

Design and fold paper planes to achieve the longest, farthest or most accurate flight.

CATEGORY B – UNPOWERED GLIDERS (*Secondary Schools / Integrated Programme*)

Each team should consist of TWO (2) to FIVE (5) members.

Design and build small unpowered bungee-launched gliders to achieve the farthest and most precise flight.

CATEGORY C – RADIO CONTROL FLIGHT / FIRST PERSON VIEW (FPV) FLIGHT (NOVICE, ADVANCED)

Category C1: Radio Control Flight - Fixed Wing (*Secondary Schools / Integrated Programme / Junior Colleges / Institute of Technical Education*)

Each team should consist of TWO (2) to FIVE (5) members.

Design and build a small remote-controlled fixed-wing air platform to navigate an obstacle course.

Category C2: FPV Flight – Novice (*All Schools*)

Each team should consist of ONE (1) to TWO (2) members.

Bring, or design and build, a ducted (shielded propeller) FPV drone to compete in an obstacle course.

Category C3: FPV Flight – Advanced (*All Schools*)

Each team should consist of ONE (1) member.

Bring, or design and build, an FPV drone to compete in an obstacle course.

CATEGORY D – Man-machine Teaming/Multi-machine Teaming

Category D1: Man-Machine Teaming (*Polytechnics / Universities*)

Each team should consist of TWO (2) to FIVE (5) members.

Design and build up to three semi-autonomous small air platforms, controlled using wearables, to perform a multitude of tasks in an indoor course.

Category D2: Multi-Machine Teaming (*Polytechnics / Universities*)

Each team should consist of TWO (2) to TEN (10) members.

Design and build TWO (2) to FOUR (4) autonomous small air platforms to collaboratively perform a multitude of tasks in an indoor course.

CATEGORY E – SWARM (*Open to Public*)

Each team should consist of TWO (2) to TEN (10) members.

Bring, or design and build, a swarm of TEN (10) to TWENTY-FIVE (25) drones to compete in a search-and-rescue mission.

3. **GENERAL RULES**

1. The deadline for registration is **14 February 2025**.
2. Participants registered under a school must be a full-time student at the point of competition.
3. Home-schooled participants from Singapore and teams consisting of participants from different schools in Singapore should be registered as “Independent” teams.
4. Participants will be notified upon successful registration within two weeks of the registration deadline. The decisions made by the SAFMC organising committee are final and are subjected to the competition schedule and availability of logistics support.
5. Each person can only participate in one team within a category. However, the person can participate as a member in different categories, i.e. a person can be a member of a team in Category B and another team in Category C but the person cannot be a member for two teams in Category B.
6. Teams are allowed to take part in categories beyond the specified educational level, i.e. Primary school students are allowed to take part in Category B, C, D or E. Secondary school students are allowed to take part in Category C, D or E.
7. Participants of Category C1 are also eligible to register for either Category C2 or C3 but not both.
8. Participants of Category C2 are not eligible to participate in Category C3 and vice versa.
9. Participants of Category D1 are also eligible to participate in Category D2 and vice versa.
10. Members and immediate family members of the SAFMC organising committee are not allowed to participate in the SAFMC.

11. The SAFMC organising committee reserve the right to amend the rules and regulations. In the event of changes, all teams will be informed at least **FOUR (4)** weeks prior to the start of the competition.
12. Prizes will be issued to the Team Manager.
13. Prizes may not be given out if the minimum standard is not met or if there are insufficient participants. The SAFMC organising committee will have the final say and the decision made is final.
14. A safety perimeter net will be set up around the play field at the competition venue. This includes a top net at **EIGHT (8) metres** above the ground, which will limit the maximum flight altitude of flying machines. During the challenge attempts, teams are encouraged to fly their flying machine(s) away from the net to avoid accidental entanglement.
15. The SAFMC organising committee will not be held responsible for any damage to or the loss of any flying machine(s) throughout the entire competition.
16. Participants are responsible for their flying machine(s) for the duration of the entire competition. The SAFMC organising committee reserve the right to ground the flying machine(s) of any team at any point in the competition.
17. For queries regarding the competition, please send an email with the title stating the category in question (e.g.: *[CAT C1] - Clarification about task locations*) to the following email address: SAFMC@science.edu.sg

4. FORMAT OF COMPETITION

1. Once the teams have confirmed their registrations for the competition, they are expected to start work on the different segments of the competition - the Challenge and the Presentation. For Categories C2 and C3, there will be no presentation segment.
2. Teams are encouraged to provide equal attention to both the challenge and the presentation segments.
3. The top team from each category will be presented with the Championship Award at the SAFMC 2025 Awards Presentation Ceremony.
4. Similar to real-world scenarios, teams may face unexpected issues during the challenge segment. They should not expect the conditions or layout of the challenges to be fully defined beforehand or to remain identical for each attempt between competitors. Factors such as venue conditions and other uncontrollable elements can also influence competition results.

4.1. PRESENTATION SEGMENT

1. Teams will be allocated a specific time slot to showcase their flying machine(s) physically during the challenge day. Teams will present their flying machine design and learning journey to a panel of judges and be assessed for several awards.
2. The presentation segment is essential for teams who wish to compete for the SAFMC Championship Award. Teams that do not show their flying machines during the presentation segment may be disqualified immediately. The detailed requirements for the presentation segment can be found in the challenge booklets of the respective categories.
3. The Chief Referee or Judge for each category reserves the right to deduct points if the flying machine(s) used in the challenge segment are drastically different from the flying machine presented at the presentation segment.

4.2. CHALLENGE SEGMENT

1. Teams are required to design, build and fly their flying machines to overcome various challenges for the different SAFMC categories. The challenge segment constitutes the actual in-venue flight on the challenge day. For Categories D and E, it will also consist of a team video challenge.
2. The team video challenge serves as a prelude to the team's flying machine(s) capabilities and flightworthiness. The challenge day allows teams to accomplish the mission tasks in a live capacity in front of an audience.

3. On the challenge day, tables will be provided within the main competition venue for teams to work on their flying machines. Alternatively, teams may be assigned a designated area instead.
4. Teams should expect the following during the challenge day:
 - a. Only registered team members of the participating teams can enter the team booths/holding areas.
 - b. Only members of the participating team can be allowed to be at the pilot booths and inside the play field.
 - c. Teams are expected to fully comply with safety rules. Failure to comply with safety rules after the initial warning will result in **immediate disqualification** and potential blacklisting from the competition. The SAFMC organising committee will not be responsible for any injuries or mishaps if any participant has disregarded the safety rules.
 - d. No trial flights will be allowed in the play field unless specified by the officials.
 - e. By registering for the competition, the participants acknowledge that there will be variations in environmental conditions between teams, despite best efforts to control them.
 - f. For all Category C, D and E participants, all flying machines and their transmitting devices must be presented to SAFMC officials for inspection upon arrival.
 - g. For all Category C, D and E participants, no video transmitting devices, including spares, should be powered on in the competition venue unless specified by the SAFMC officials. Teams may request for approval from the Chief Referee or the Category Technical Chairperson to perform power-on checks.

5. IMDA REGULATIONS

5.1. REMOTE CONTROL (RC) RADIO

1. Based on the Singapore Spectrum Management Handbook (Chapter 7, Issue 1 Rev 2.16, June 2022) from Infocomm Media Development Authority (IMDA) Singapore for short range devices, the following RC frequency ranges are allocated for RC cameras / toys / miscellaneous devices:
 - a. 26.96 – 27.28 MHz \leq 100mW Effective Radiation Power (ERP)
 - b. 34.995 – 35.225 MHz \leq 100mW ERP
 - c. 40.665 – 40.695 MHz \leq 500mW ERP
 - d. 40.77 – 40.83 MHz \leq 500mW ERP
 - e. 72.13 – 72.21 MHz \leq 500mW ERP
2. The following RC frequency ranges are allocated for RC aircraft:
 - a. 29.700 - 30.000 MHz \leq 500mW ERP
 - b. 26.96 - 27.28 MHz \leq 500mW ERP
3. Please refer to the *Singapore Spectrum Management Handbook* on the IMDA website for more details on the spectrum allocation and for the latest approved range of frequencies.

5.2. DATALINK / VIDEOLINK / WIRELESS LINK TYPES

1. The following frequencies are approved by IMDA for radio telemetry:
 - a. 433.05 - 434.79 MHz \leq 10mW ERP
 - b. 866 - 869 MHz \leq 500mW ERP
 - c. 920 - 925 \leq 2000mW ERP

2. Wireless Wi-Fi routers will be allowed in this competition. Participants are to bring their own wireless routers.
3. Setup of external wireless device(s) is / are allowed. However, teams can only turn on their wireless routers and transmitters during the setup and flight phases (same restriction as RC transmitters).
4. The following frequencies are approved by IMDA for wireless data communications / video transmitters / LAN:
 - a. 72.080, 72.200, 72.400, 72.600 MHz \leq 1000mW ERP
 - b. 158.275 / 162.875 MHz \leq 1000mW ERP
 - c. 158.325 / 162.925 MHz \leq 1000mW ERP
 - d. 453.7250 / 458.7250 MHz \leq 1000mW ERP
 - e. 453.7375 / 458.7375 MHz \leq 1000mW ERP
 - f. 453.7500 / 458.7500 MHz \leq 1000mW ERP
 - g. 453.7625 / 458.7625 MHz \leq 1000mW ERP
 - h. 2.4000GHz - 2.4835GHz \leq 200mW Equivalent Isotropically Radiated Power (EIRP)
 - i. 10.500 – 10.550 GHz \leq 117dB μ V/m @ 10m
 - j. 24.000 – 24.250 GHz \leq 100mW EIRP
 - k. 5.725GHz – 5.850 GHz \leq 4000mW EIRP
 - l. 5.150GHz - 5.350GHz \leq 200mW EIRP
 - m. 5.470GHz - 5.725GHz \leq 1000mW EIRP
 - n. 57 – 66 GHz \leq 10W EIRP

5. Please refer to the *Singapore Spectrum Management Handbook* on the IMDA website for more details on the spectrum allocation and for the latest approved range of frequencies.

5.3. ULTRA-WIDEBAND (UWB) DEVICES

1. The following frequencies are approved by IMDA for UWB devices:
 - a. 3.4 – 4.8 GHz
 - b. 4.2 – 4.8 GHz
 - c. 6 – 8.5 GHz
2. The following are the allowable radiated emission limits by IMDA for UWB devices:

Frequency Range (GHZ)	Max mean e.i.r.p. density (dBm/MHz)	Max peak e.i.r.p. density (dBm/50 MHz)
Below 1.60	- 90	- 50
1.60 – 2.70	- 85	- 45
2.70 – 3.40	- 70	- 36
3.40 – 4.20	- 70 (2)	- 30
4.20 – 4.80	- 41.3	0
	(To be replaced by more restrictive conditions beyond 31 Dec 2010.)	
4.80 – 6.00	- 70	- 30
6.00 – 8.50 (1)	- 41.3	0
8.50 – 10.60	- 65	- 25
10.60 – 21.65	- 85	- 45
21.65 – 29.50	- 41.3	0
29.50 – 77.00	- 85	- 45
77.00 – 81.00	- 3	55
Above 81.00	- 85	- 45

- (1) The extension of this band from 6.0 to 9 GHz is also acceptable in the light of potential new applications.
 - (2) UWB devices with mitigation techniques are allowed to operate at a level of -41.3 dBm/MHz in the band from 3.4 to 4.2 GHz (with peak level emissions in 50 MHz bandwidth not exceeding 0 dB e.i.r.p.). Otherwise, the emission limit is capped at 70 dBm/MHz.
3. Please refer to the Technical Specification for UWB Devices on IMDA website for more details on the spectrum allocation and for the latest approved range of frequencies.

6. CAAS REGULATIONS

1. Participants are to ensure that they have registered their aircraft if the weight exceeds 250g.
2. For educational purposes, if the total weight of the aircraft exceeds 1.5kg, but is less than 7kg, a UA Basic Training Certificate or a UA Pilot License is required.
3. Please refer to the UA Regulatory Requirements on the CAAS Website for more details on Unmanned Aircraft regulations.