



Formula Student Spain 2023
6th to 12th of August

Formula Student Spain Rules 2023
Version 1.0

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CHANGELOG

Release	Date	Article	Modification
1.0	04/07/2023	NA	First release

LIST OF ABBREVIATIONS

AAIR	ASF Add Item Request
ABF	Accommodation Booking Form
ADR	Autonomous Design Report
ASF	Autonomous System Form
ASR	Autonomous System Responsible
ASRQ	ASR Qualification
BOM	Bill Of Material
BPES	Business Plan Executive Summary
BPP	Business Plan Presentation
BPPV	Business Plan Pitch Video
CBOM	Costed Bill of Material
CRD	Cost Report Documents
CV	Combustion Vehicle
DBC	Database CAN
DBOM	Detailed Bill of Material
DSS	Design Spec Sheet
DV	Driverless Vehicle
EAIR	ESF Add Item Request
EDR	Engineering Design Report
ESF	Electrical System Form
ESO	Electrical System Officer
ESOQ	Electrical System Officer Qualification
ETC	Electronic Throttle Control
EV	Electric Vehicle
FSS	Formula Student Spain
FTO	Fuel Type Order
HIC	Health Insurance Card
IAD	Impact Attenuator Data
PreABF	Pre-Accommodation Booking Form
SE3D	Structural Equivalency 3D Mode
SES	Structural Equivalency Spreadsheet
SESA	SES Approval
TMD	Team Member Designation

ES 1 GENERAL INFORMATION

ES 1.1 FSS Competition

ES 1.1.1 Three competitions will be organized in the 13th Edition of Formula Student Spain 2023. These are for the Internal Combustion Engine Vehicle class (CV), the Electric Vehicle class (EV), and the Driverless Vehicle class (DV).

ES 1.1.2 Formula Student Spain 2023 Competition will comply with the **Formula Student Rules 2023 of FSG**.

ES 1.1.3 **Formula Student Spain Rules 2023** include some specific rule changes and additions. Those changes and additions are located within this document, which supersedes all other rules.

ES 1.1.4 Any questions or ambiguities concerning **Formula Student Spain Rules 2023** will be resolved by the Formula Student Spain Rules team.

ES 1.1.5 Specific rules-related questions should be sent by the team's captain via a contact form provided in the Competition website. Formula Student Spain Rules team will provide an answer via email.

ES 1.1.6 The officials reserve the right to revise the schedule of the competition and/or interpret or modify the competition rules at any time and in any manner that is, in their sole judgment, required for safe and efficient operation.

ES 1.1.7 Vehicles will be designated a vehicle number according to the following table:

	EV	CV	DV (EV)	DV (CV)
Vehicle numbers	001-199	201-399	401-499	501-599

ES 1.1.8 In case of Teams request a different vehicle number which is not according to the article ES 1.1.7, Formula Student Spain organization will decide if there will be exceptions or not.

ES 1.2 Competition Dates and Location

ES 1.2.1 Formula Student Spain 2023 will be held from Sunday, 6th of August until Saturday, 12th of August 2023. The event will take place at the Circuit Barcelona-Catalunya in Montmeló, Barcelona, Spain

ES 1.3 Competition Website

ES 1.3.1 The URL of the Formula Student Spain 2023 competition website is:
<http://www.formulastudent.es>

ES 1.4 Competition Official Time

ES 1.4.1 The Formula Student Spain official time will be:

From	Till	Time
26/03/2023	29/10/2023	CEST

The time of the competition is the official time for all deadlines and decisions.

ES 1.5 Competition Official Language

ES 1.5.1 Formula Student Spain 2023 official language is English only.

ES 1.6 Event Handbook

ES 1.6.1 The **FSS Event Handbook 2023** may contain schedule and other important information for the event. It must be read and understood by all event participants. It will be sent to the teams before August, 1st 2023

ES 1.7 Official FSS2023 Awards

ES 1.7.1 Best overall teams of each class (EV/CV/DV) will be rewarded with an economic prize of 1.000€. They also:

- Will be invited for the next season event,
- Will not need to do the Registration Quiz.
- Will have a 50% discount on FSS24 registration.

ES 1.7.2 2nd overall teams of each class (EV/CV) will be rewarded with an economic prize of 500€. They also:

- Will be invited for the next season event.
- Will not need to do the Registration Quiz.

ES 1.7.3 3rd overall teams of each class (EV/CV) will be rewarded with a recognition trophy. They also:

- Will be invited teams for the next season event.
- Will not need to do the Registration Quiz.

ES 1.7.4 Extra Awards powered by Sponsors or FSS organization could be announced on the **FSS Event Handbook 2023**.

ES 3 EVENT REGISTRATION

ES 3.1 On-Site Team Registration Time

- ES 3.1.1 Teams will have a time slot for the on-site registration time.
- ES 3.1.2 To facilitate the registration process, teams must be present in the Registration Area one hour before their slot finishes.
- ES 3.1.3 FSS organisation will assign registration time slots to all the teams.
- ES 3.1.4 Teams missing their slot will be reassigned by FSS Organization according to availability.

ES 3.2 On-Site Team Registration

- ES 3.2.1 Participating team members must be assigned prior to the competition. Team members can only be selected as participants by the team captain if they have submitted:
 - HIC check.
 - ABF
 - TMD
 - Driver license (only for drivers)
 - ESO Qualification (only for ESO)
 - ASR Qualification (only for ASR)
 - Self-responsibility document

ES 3.3 Dynamic Vests

- ES 3.3.1 Teams will need to pay a deposit amount to receive their Dynamic Vests. Teams which have made the payment will receive the dynamic vests at a specified time and location as it will be indicated in the **FSS Event Handbook 2023**.
- ES 3.3.2 The link to pay the deposits for Dynamic Vests will be provided by the organization. Cash will be accepted in exceptional cases.
- ES 3.3.3 The deposit for the dynamic vests will be returned through the same payment method than the participant did the payment.
- ES 3.3.4 The dynamic vests deposit will be refunded if they are given back in the same conditions as they were delivered.

ES 3.4 Driver/ASR/ESO Registration

- ES 3.4.1 Drivers' registration will take place at the Event Control, where they are required to show their valid driver's license and their student ID.
- ES 3.4.2 ASR registration will take place at the Event Control, where they are required to show their valid ASRQ and their student ID.
- ES 3.4.3 ESO registration will take place at the Event Control, where they are required to show their valid ESOQ and their student ID.

ES 3.5 Faculty Advisor

- ES 3.5.1 Each team must have a Faculty Advisor appointed by the university.
- ES 3.5.2 If the faculty advisor accompanies the team during the competition, he/she will be considered by the competition officials to be the official representative of the university and the responsible for the behaviour of all team members during the event.
The Faculty Advisor is expected to ensure that wherever possible the regulations are always followed, and their university's Health and Safety protocols are followed.
- ES 3.5.3 If the Faculty Advisor is not present during the competition, the team captain will be considered by the competition officials to be the official representative of the university.
- ES 3.5.4 Faculty Advisors may not design, build, or repair any part of the vehicle or directly participate in the development of any documentation or presentation.

ES 4 IMPORTANT DATES

ES 4.1 Deadlines

ES 4.1.1 All required documents and information must be uploaded to the competition intranet website by the team captain by the deadlines. The documents not listed in the table 1 are not required.

DATE	DESCRIPTION	CLASS
2023-07-16 13:00 CEST	Team Member Designation [TMD]	ALL
2023-07-09 13:00 CEST	Pre-Accommodation Booking Form [PABF]	ALL
2023-07-16 13:00 CEST	ESO Qualification [ESOQ]	EV
2023-07-16 13:00 CEST	ASR Qualification [ASRQ]	DV
2023-07-16 13:00 CEST	Fuel Type Order [FTO]	CV
2023-07-16 13:00 CEST	Structural Equivalency Spreadsheet [SES]	ALL
2023-07-16 13:00 CEST	Structural Equivalency 3D Mode [SE3D]	ALL
2023-07-16 13:00 CEST	Electrical System Form [ESF]	EV
2023-07-16 13:00 CEST	Autonomous System Form [ASF]	DV
2023-07-16 13:00 CEST	Impact Attenuator Data [IAD]	ALL
2023-07-13 13:00 CEST	Final Accommodation Booking Form [FABF]	ALL
2023-07-16 13:00 CEST	SES Approval [SESA]	ALL
2023-07-16 13:00 CEST	Engineering Design Report [EDR]	ALL
2023-07-16 13:00 CEST	Design Spec Sheet [DSS]	ALL
2023-07-23 13:00 CEST	Cost Report Documents [CRD]	ALL
2023-07-23 13:00 CEST	Business Plan Pitch Video [BPPV]	ALL
2023-07-23 13:00 CEST	Business Plan Executive Summary [BPES]	ALL
2023-07-16 13:00 CEST	Vehicle Status Video [VSV]	ALL
2023-07-16 13:00 CEST	Final DBC file upload [DBC]	DV
2023-07-23 13:00 CEST	Final Team Member Designation [FTMD]	ALL
2023-08-06 ON SITE	Self-responsibility document	ALL

Table 1 – Document deadlines.

ES 4.1.2 The FSS Intranet will be available since July 5th. More information regarding the FSS Intranet login will be sent to the teams via email.

ES 4.1.3 The FSS organization will give access to the teams between 48h and 72h after the teams register on the intranet.

ES 4.2 Document Size & Formatting

ES 4.2.1 All documents must comply with a maximum size of 50 MB.

ES 4.2.2 All documents must be submitted following the nomenclature below:

CAR#_TeamName_YYMMDD_DocumentAbbreviation

Where YYMMDD is the date in Year/Month/Day format.

For instance, the Engineering Design Report must be named:

121_RacingTeam_220717_EDR

- ES 4.2.3 The documents for Cost & Manufacturing event [BOM, CBOM and DBOM] must be zipped in one file. The Cost Report Explanation file and Supporting material should be zipped together with BOM documents.
- ES 4.2.4 It is allowed to use other Formula Student event templates (e.g. FS Germany). FS Spain templates may be already present in the intranet.

ES 5 COMPETITION SITE ORGANISATION

ES 5.1 Competition Site

- ES 5.1.1 The use of quads, bicycles, motorcycles, scooters, skateboards, or other similar mobility devices as well as self-propelled devices in general by team members on competition site is prohibited.
- ES 5.1.2 Smoking is strictly prohibited in the Dynamic Area, all buildings, and the Pit Area. Smoking areas will be defined in the **FSS Event Handbook 2023**.
- ES 5.1.3 No open fires are allowed in the Pit Area as. This includes BBQ grilles, oxy-acetylene torches, heaters, etc.

ES 5.2 Welding

- ES 5.2.1 FSS does not provide a welding service for teams.
- ES 5.2.2 Welding with own equipment will be possible in the welding area at specific times as indicated by the **FSS Event Handbook 2023**. Teams must use the appropriate safety gear.

ES 5.3 Tires

- ES 5.3.1 FSS does not provide a tire changing service.
- ES 5.3.2 FSS will indicate the tire changing services closest to the Circuit Barcelona-Catalunya and their time schedules.

ES 5.4 Fuel Station

- ES 5.4.1 Open fuel containers are not permitted at the event.
- ES 5.4.2 All fuel containers must be DOT approved.
- ES 5.4.3 Refuelling is only allowed at the fuel station.
- ES 5.4.4 Waste oil must be taken in the corresponding area as it will be indicated in the **FSS Event Handbook 2023**.

ES 5.5 **Charging Area**

ES 5.5.1 The power available on each charging point will be shared by 2 charging stations. Each charging point will have a maximum of 12.8 kW output.

The available power sockets on each charging point are:
3 DIN sockets, 2PE, 230V, 16A.
2 CEE socket, 3PNE, 400V, 16A, 5-pole.
1 CEE socket, 3PNE, 400V, 32A, 5-pole.

ES 5.5.2 If a team needs to charge with the 400V–32A CEE socket, it should be specified when requesting the charging slot.

ES 5.5.3 Each team could request a maximum of 4 charging slots per day. Each charging slot allows half an hour access to a charging point.

ES 5.5.4 Inside the charging area, team members must not wear any conductive jewellery or objects of any kind which could touch the accumulator.

ES 5.5.5 Only three members per team may enter the charging area at the same time. One of them must be the Electrical System Officer (ESO) or the Autonomous System Responsible (ASR), respectively.

ES 5.6 **[CV ONLY] Engine Test Area**

ES 5.6.1 Engines may only be run in the designated engine test area during the opening times and only after passing the tilt test.

ES 5.7 **Team Briefing**

ES 5.7.1 Only the team leaders and drivers will be allowed to participate in the briefings. Drivers who have not attended a briefing cannot participate at the dynamic events of this specific day.

ES 5.7.2 [EV ONLY] All ESOs that are planning to take part in a dynamic event of a specific day must attend the team briefing of this specific day. ESOs who have not attended a briefing cannot participate at the dynamic events of this specific day.

ES 5.7.3 [EV ONLY] If a team wants to participate in the dynamic events of a specific day, at least one ESO must attend the team briefing.

ES 5.7.4 [DV ONLY] All ASRs that are planning to take part in a dynamic event of a specific day must attend the team briefing of this specific day. ASRs who have not attended a briefing cannot participate at the dynamic events of this specific day.

ES 5.7.5 [DV ONLY] If a team wants to participate in the dynamic events of a specific day, at least one ASR must attend the team briefing.

ES 5.7.6 Team captains must attend all the team briefings. Team captains not attending the briefings will be penalized and the team will not be able to run any dynamic event of that specific day.

ES 5.7.7 An identification system will be implemented to check the attendance of team representatives: team captains, ESOs, ASRs and Drivers on each team briefing.

ES 5.8 **Drone Prohibition**

ES 5.8.1 Flying an unmanned aircraft or drone at the event site is strictly prohibited.

ES 5.9 **Removing the Vehicle from the Site**

ES 5.9.1 All teams who remove their vehicle from the competition site after the competition has begun will be disqualified from the competition. This applies to all classes, including the removal of the tractive system accumulator in EV and DV classes.

ES 5.10 **Driving under power outside Dynamic Areas**

ES 5.10.1 Teams driving their vehicles in non-dynamic areas will be penalized in the current edition as well as in future editions.

ES 5.11 **Material Losses**

ES 5.11.1 Stealing or causing material damage on alien materials or belongings is strictly prohibited. This includes all the assets, materials, or belongings from the FSS organization, the venue, the FSS Sponsors, any participating team or any visitor.

ES 5.11.2 If it is proved that a team has stolen or caused any material damage in any of the above-mentioned cases, it will be penalized in the current competition as well as in future competitions.

ES 5.12 Team Campsite Registration

- ES 5.12.1 The campsite fee will be 120€ per person for the entire week. The maximum number of registered members for the campsite is limited to 30 people.
- ES 5.12.2 Teams can unsubscribe a maximum of 5 paying guests at no charge until FABF deadline (see ES3.1).
- ES 5.12.3 After FABF deadline, teams may enroll up to 5 more team members for 120 € per member for the entire week, depending on availability. The enrollment order will be based following a first in first out criteria. Payment must be performed within 1 week after confirmation from the organization.
- ES 5.12.4 If a team does not come to the event, the team will be refunded with 90 % of the campsite fee. If at least one member of the team comes to the event, the refund will not be granted.

ES 5.13 Campsite Area

- ES 5.13.1 The campsite area will be located close to the circuit, but outside of the circuit compound. (900m aprox. from the campsite to the main entrance of the circuit)
- ES 5.13.2 All the team members will be allowed to get inside the circuit compound 40 minutes before each morning briefing starts. Further information about the briefing schedule will be provided in the **FSS Event Handbook 2023**
- ES 5.13.3 All the team members must leave the Circuit compound 40 minutes after the pits close. Further information about the pits schedule will be provided in the **FSS Event Handbook 2023**
- ES 5.13.4 Exemptions in ES 5.13.3 will be applied in specific cases (e.g. Night Acceleration). Further information will be provided to the teams in the **FSS Event Handbook 2023**.

ES 6 TECHNICAL INSPECTION

ES 6.1 Pre-Inspection

- ES 6.1.1 The inspection will be conducted in the pits designated as Inspection Area.
- ES 6.1.2 The Inspection order will be published in FSS Event Handbook 2023., for Pre-Inspection, Accumulator, Electrical and Mechanical Inspection.
- ES 6.1.3 The teams have to be present in the queue 15 minutes before their slot in Ready-to-Inspection conditions. In case the team is not present or ready for inspection, the team will be considered as not present.
- ES 6.1.4 If a team is considered as Not Present, the team should contact the Technical Inspectors in order to program a new appointment.
- ES 6.1.5 [EV ONLY] To perform the Mechanical inspection, the cars which have not passed the Accumulator Inspection must remove the Accumulator container before entering the Mechanical Inspection Bay.
- ES 6.1.6 Pre-Inspection, Accumulator, Electrical and Mechanical Inspection must be successfully passed before Tilt Test.

ES 6.2 Inspection Documents

- ES 6.2.1 Teams will need to bring at least one electronic device (laptop, tablet, etc.) to Inspection. Teams will need to download from the intranet any document that the scrutineers may ask for, such as SES, ESF, ASF, among others. Scrutineers will need to be present when a team downloads any of these documents from the intranet during Inspection. Wi-fi in the Inspection Area will be provided by the organisation.
- ES 6.2.2 Teams are advised to bring any supporting documentation to Inspection which can smooth the inspection process. Teams are also advised to bring digital and/or paper copies of the documents uploaded to the Intranet as a back-up.

ES 6.3 Electric Fire Preventive Measures [EV & DV (Electric)]

- ES 6.3.1 Due to the incidents that took place during Formula Student East 2022 edition, FSS has included additional articles to the rules to increase event's safety and prevent electric fires.
- ES 6.3.2 Teams which have successfully passed the accumulator inspection will be the only ones capable of charging their TS accumulator in the charging area. Charging the TS accumulator at any other location is prohibited.
- ES 6.3.3 Teams need to notify to FSS Officials in case there is any safety concern regarding their TS Accumulator container
- ES 6.3.4 Teams will need to wait a specific period of time after charging the TS accumulator at a designated location next to the charging area. This waiting time will be communicated to teams with sufficient advance.
- ES 6.3.5 Teams which have failed the rain test will need to have their accumulator container reinspected by scrutineers.
- ES 6.3.6 Teams cannot charge their TS accumulator after 1 hour of successfully passing the rain test.
- ES 6.3.7 Opening any tractive system enclosure is only permitted if it is de-energised and disconnected from any high voltage source. If the enclosure is within the vehicle, the accumulator container needs to be removed from the vehicle.
- ES 6.3.8 Opening the accumulator container is only permitted in the charging area. Opening the accumulator container in the pits or at any other location is prohibited. The accumulator container should be placed in the hand cart when working on it.
- ES 6.3.9 Teams need to notify FSS Officials in case there is any safety concern regarding their TS accumulator container.
- ES 6.3.10 During the closure of the pits, the accumulator container must be placed in the hand cart. The officials will inform the teams where to place the handcart inside their pit when the pits are closed.
- ES 6.3.11 The car and the accumulator container must have a clear path to the closest pits' exit when working on them. No objects, tools, backpacks, etc. should be blocking the way to the nearest exit.

- ES 6.3.12 FSS organisation recommends all the EV and DV with electric powertrain to bring a CO₂ fire extinguisher to the event. This fire extinguisher should always accompany the car or the accumulator container. Furthermore, each team must have at least two dry chemical / dry powder fire extinguishers as specified in FS 2023 rules.
- ES 6.3.13 FSS organisation recommends bringing any type of electric fireproof cover with the aim of covering the accumulator container whenever it is placed in the handcart.
- ES 6.3.14 [EV Only] Only teams that have passed the Accumulator, electrical and mechanical scrutineering are allowed to turn on the powertrain, with the vehicle car lifted using the jacks, and all the driven wheels removed in the pit.

ES 7 STATIC EVENTS

ES 7.1 Business Plan Presentation

ES 7.1.1 The Business Plan Presentation event will comply with article **S 1** of **Formula Student Rules 2023**. Nevertheless, specific changes are included in this section for FSS 2023 event.

ES 7.1.2 Teams are required to submit two documents before the competition: The Business Plan Executive Summary and the Business Plan Pitch Video.

ES 7.1.3 The Business Plan Executive Summary should contain a brief description of the team's Business Plan. The Business Plan Executive Summary must not exceed one page. Any portions of the Executive Summary that exceeds one page will not be evaluated.

Furthermore, at FSS judges give a lot of importance to the financial aspects of the business plan. Teams are advised to include financial information in their executive summary, e.g., Profit & Loss Statement, Balance Sheet, Cash Flow, R&D Expenses, Material Fixed Assets, among others.

ES 7.1.4 The Business Plan Pitch Video (BPPV) should be considered the first impression of the business idea and must contain the relevant investment figures. The objective is to convince the potential investors or partners that the team's presentation is worthy of their time.

The Business Plan Pitch Video must not exceed a length of 30 seconds and must be in a common video format, e.g. .avi, .mpg, .mp4, .wmv.

ES 7.1.5 At Formula Student Spain 2023 the Business Plan Presentation judging will consist of four parts:

- I. Initial judging of all teams.
- II. The judges will rank the best Business Plans dividing teams depending on vehicle class (CV; EV; DV).
- III. From the ranked list, the judges will assign the finalist teams (3-5 teams) independently of the team's vehicle class (CV; EV; DV).
- IV. The finalist teams will present their Business Plan in front of all Business Plan judges, who will determine the final Business Plan scoring.

ES 7.1.6 **Formula Student Rules 2023** article **S 1.4** is excluded for FSS competition.

ES 7.1.7 Presentations are limited to a maximum of 25 minutes. The judges will stop any presentation exceeding that time. The Deep Dive Topic will need to be included in this 25-minute time.

The Business Plan Presentation will follow this breakdown:

- General and team introduction – 5 minutes
- Business Plan Presentation – 15 minutes
- Deep Dive Topic – 5 minutes

Furthermore, judges will follow with a series of questions to teams relating to the presentation. Judges will use at least 5 minutes for these questions and this time is independent of the 25-minute presentation time.

Finally, feedback will be provided to the teams after the questions.

ES 7.1.8 The Business Plan Presentation will be evaluated on the categories specified in the following table:

Category	Points
Content	20
Organisation	10
Visual Aid & BPPV	10
Delivery	10
Questions	15
Executive Summary	10
Deep Dive Topic	10
Total	85

Table 2 – Business Plan Presentation Scoring

ES 7.1.9 The scoring of the BPP is based on the average of the scores given by each of the judges. The scoring for the non-finalists can be a maximum of 70 points. The scoring of the BPP finalists will vary from 71 to 75 points and is scored by all BPP judges.

ES 7.1.10 The scoring for the non-finalists can be a maximum of 70 points and is calculated as follows:

$$\text{Business Plan Score} = 70 \left(\frac{P_{Team}}{P_{Max}} \right)$$

P_{Team} is the score awarded to the team.

P_{Max} is the highest score awarded to any team not participating in the finals.

A penalty of 50 points will be applied to the overall team's competition score if it does not attend their Business Plan Presentation time slot. No penalty will be applied if the team informs the organisation that it will not be able to take part on its Business Plan Presentation time slot at least 2 days before the assigned slot.

ES 7.1.11 Business Plan presentations will take place the 30th and 31st of August. Teams taking part in other FS events during these days and cannot participate in the Business Plan presentation, should contact the FSS organization to agree an additional timeslot before FSS Starts.

ES 7.1.12 Teams must be at their assigned Business Plan room 5 minutes in advance of the proposed timeslot to ensure there are no delays.

ES 7.1.13 The deep dive topic for **Formula Student Spain 2023** will be communicated to teams at least 3 weeks before the start of the competition.

ES 7.2 **Cost & Manufacturing Event**

ES 7.2.1 FSS 2023 Cost & Manufacturing Event will comply with the **Formula Student Rules 2023** except for the following rule changes.

ES 7.2.2 The BOM, DBOM and CBOM must be created following the FSS 2023 Excel templates provided to the teams by the FSS organisation. Furthermore, FSS will also accept BOM, DBOM and CBOM which have been created with other competition templates. In this case, teams need to put the appropriate car number for that team in FSS competition.

ES 7.2.3 For FSS 2023 a DBOM (see article **S 2.5** from **Formula Student Rules 2023**) for the "Engine and Drivetrain" must be submitted.

ES 7.2.4 For FSS 2023 a CBOM (see article **S 2.6** from **Formula Student Rules 2023**) for the "Brake and Steering System" must be submitted.

ES 7.2.5 At FSS 2022, the cost and manufacturing Event will consist of two steps:

- I- Initial judging of all teams.
- II- The judges will rank the teams for the Cost & Manufacturing event dividing teams depending on the team's vehicle class (CV; EV; DV).
- III- From the ranked list, the judges will assign the finalist teams (3-5 teams) independently of the team's vehicle class (CV; EV; DV).

ES 7.2.6 The scoring will comply with article **S 2.10.4** from **Formula Student Rules 2023** with the difference that teams will be ranked together, no matter what their vehicle class are.

ES 7.2.7 The scoring of the cost and manufacturing finalists will vary from 100 to 97 points.

ES 7.2.8 A penalty of 50 points will be applied to the overall team's competition score if it does not attend their Cost & Manufacturing time slot. No penalty will be applied if the team informs the organisation that it will not be able to take part on its Cost & Manufacturing time slot at least 2 days before the assigned slot.

ES 7.2.9 The cost and manufacturing event will be evaluated on categories specified in the following table:

Category	Points
Format and Accuracy of Documents	5
Knowledge of Documents and Vehicle	5
BOM and BOM discussion	35
Discussion Part 2 “Cost Understanding”	35
Part 3 “Real Case”	20
Total	100

Table 3 – Cost and Manufacturing scoring

ES 7.2.10 The part 3 “Real Case” will be notified to teams prior to the start of the competition.

ES 7.3 **Engineering Design Event**

- ES 7.3.1 The engineering design event complies with the **Formula Student Rules 2023** article **S 3**, except for the following changes which supersede the prior.
- ES 7.3.2 CV, EV and DV will each have a separate engineering design event.
- ES 7.3.3 The overall engineering design event maximum scoring is 150 points for CV/EV and 300 points for DV.
- ES 7.3.4 Teams are required to submit an Engineering Design Report (EDR) with no more than 5 pages of content and 3 pages of drawings as described in section **S 3.2** from **Formula Student Rules 2023**. If the number of pages is exceeded a penalty of 10 points is applied in the final Design Event Scoring.
- ES 7.3.5 [DV ONLY] The EDR for teams competing in the DV category can have two additional content pages that should be devoted to the Autonomous Systems components. If a team uses a single vehicle to participate in both CV/EV and DV the team only needs to submit a single EDR in accordance with this rule.
- ES 7.3.6 The time duration for the Engineering Design Event will be 50 minutes. Teams must be ready 5 minutes in advance of the proposed timeslot to ensure there are no delays.

ES 7.3.7 The maximum scores listed in the following table apply for the engineering design event of CV, EV and DV Hence, article **S 3.7.2** from **Formula Student Rules 2023** is no longer valid.

Category	Area	Points	Total
CV+EV Evaluation	Engineering Design Report (EDR)	5	150
	Aerodynamics & Cooling	25 (15*)	
	Electronics	20	
	Powertrain	25 (30*)	
	Structural	25	
	Technical Management	25	
	Vehicle Dynamics & Suspension	25 (30*)	
DV Evaluation	Engineering Design Report (EDR)	5	300
	Aerodynamics & Cooling	25 (15*)	
	Electronics	20	
	Powertrain	25 (30*)	
	Structural	25	
	Technical Management	25	
	Vehicle Dynamics & Suspension	25 (30*)	
	Sensor Perception	30	
	Localization & Mapping	30	
	Planning and Control	30	
	Overall Autonomous System Concept	60	

*No aerodynamic package

Table 4 - Engineering Design Scoring.

ES 7.3.8 A penalty of 50 points will be applied to the overall team's competition score if it does not attend their Engineering Design event time slot. No penalty will be applied if the team informs the organisation that it will not be able to take part on its Engineering Design event time slot at least 2 days before the assigned slot.

ES 8 DYNAMIC EVENTS

ES 8.1 Dynamic Events General Considerations

- ES 8.1.1 Practice tracks are also considered dynamic areas.
- ES 8.1.2 No tents, pavilions, tarps, and brooms are allowed in dynamic areas. Only handheld umbrellas are allowed.
- ES 8.1.3 “Ready to Race” means entering the area after inspection with driver belted, car adjustments done, cameras on, no tyre protections, tyres cleaned (if needed), etc. Vehicles which are not in “Ready to Race” conditions will be sent back to the end of the queue.
- ES 8.1.4 “Ready to Race” area will close at the Event End Time indicated at the event entrance. Only cars that are inside the “Ready to Race” area will be allowed to start the event after the Event End Time.
- ES 8.1.5 Cars inside the “Ready to Race” area at the Event End Time can make two runs only if the driver decides to do the second run immediately after its first run.
- ES 8.1.6 Tool carts are not allowed after the inspection area.
- ES 8.1.7 After any run, the driver must leave the course and drive slowly back to the start line for the second run, to the driver change area or to the exit lane.

ES 8.2 Dynamic Events Duration

- ES 8.2.1 The event duration for Skidpad, Acceleration and Autocross will be determined by the number of teams that have passed the technical inspection.
- ES 8.2.2 The Event Start Time will be published in the **FSS Event Handbook 2023**. The preliminary Event End Time will be notified by the organization to the teams in the Team Briefing of the event day.
- ES 8.2.3 The Event End time may be updated during the event if the number of cars that passed the technical inspection increases. Updates will never shorten the actual Event End Time

ES 8.3 [EV & CV ONLY] Acceleration Event

- ES 8.3.1 The acceleration event will be performed after sunset, therefore with no sunlight. FSS organisation will provide appropriate external lighting equipment to have a safe event.
- ES 8.3.2 FSS organisation recommends teams to use night helmet visors to ensure good visibility during the event.
- ES 8.3.3 Teams will be allowed to mount lights on the vehicle just for this dynamic event provided that the following requirements are achieved:
- Lights and its wiring must be securely attached to the vehicle.
 - Lights should not be attached to the roll hoop or main hoop.
 - Lights should be supplied from the LVS system or an auxiliary supply system.
 - Acceleration Event Pre-Inspection and Post-Inspection will verify the security of the lights and its wiring.
- ES 8.3.4 [EV ONLY] If a team obtains the LVS supply from the TS system an additional auxiliary supply system must be mounted on the vehicle to provide the supply for the lights. This applies to teams that only plan to mount the lights during the Acceleration event.
- ES 8.3.5 [EV ONLY] If a team obtains the LVS supply from the TS System and cannot mount an auxiliary supply system will need to mount the lights throughout the event and pass all the stages of the technical inspection.
- ES 8.3.6 Special equipment may be used to notify each driver of the start of a run, instead of using a green flag.
- ES 8.3.7 If a team's best time including penalties is below T_{max} , additional points based on the following formula are given:

$$ACCELERATION_SCORE = 71.5 \left(\frac{\frac{T_{max}}{T_{team}} - 1}{0.5} \right)$$

T_{team} is the team's best run time including penalties.

T_{max} is 1.5 times the time of the fastest vehicle including penalties.

ES 8.4 [EV & CV ONLY] Skidpad Event]

ES 8.4.1 If a team's run time including penalties is below T_{max} , additional points based on the following formula are given:

$$SKIDPAD_SCORE = 71.5 \left(\frac{\left(\frac{T_{max}}{T_{team}} \right)^2 - 1}{0.5625} \right)$$

T_{team} is the team's best run time including penalties.

T_{max} is 1.25 times the time of the fastest vehicle including penalties.

ES 8.5 **Autocross Event**

- ES 8.5.1 There will be a course walk prior to the Autocross Event start, which will be mandatory for all teams competing in the Autocross Event.
- ES 8.5.2 The time to perform this course walk will be limited and it will be informed during the event briefings.
- ES 8.5.3 Failure to obey this course walk time limitation could end up in a penalization at the discretion of the officials.
- ES 8.5.4 The organization will clarify which equipment is allowed to use during the autocross track walk on that day's team briefing.

ES 8.6 **Endurance Event and Efficiency Event**

- ES 8.6.1 There will be a course walk prior to the Endurance Event start.
- ES 8.6.2 The time to perform this course walk will be limited and it will be informed during the Event briefings.
- ES 8.6.3 Failure to obey this course walk time limitation could end up in a penalization at the discretion of the officials.
- ES 8.6.4 The organization will clarify which equipment it is allowed to be used during the endurance track walk on that day's team briefing.
- ES 8.6.5 If a team's corrected elapsed time (including any penalty times) is below T_{max} , additional points based on the following formula are given:

$$ENDURANCE_SCORE = 300 \left(\frac{T_{max} - 1}{\frac{T_{team}}{0.333}} \right)$$

T_{team} is the team's corrected elapsed time.

T_{max} is 1.333 times the corrected elapsed time of the fastest vehicle.

ES 8.6.6 Efficiency points based on the following formula are given:

$$ENDURANCE_SCORE = 100 \left(\frac{EF_{max} - EF_{team}}{EF_{max} - EF_{min}} \right)$$

with

EF_{team} is the team's efficiency factor

EF_{min} the lowest efficiency factor of all teams which were considered for efficiency

EF_{max} is defined as $1.5 \cdot EF_{min}$.

The efficiency factor is calculated based on the following formula:

$$EF = T^2 \cdot E$$

With

T uncorrected elapsed driving time

E [CV ONLY] corrected used fuel mass / [EV ONLY] used energy

ES 8.7 Endurance Running Order

- ES 8.7.1 The Endurance Running Order will be published the day before the Endurance event.
- ES 8.7.2 The Running Order will be classified in three different rounds per each isolated group: slow, fast, and final. Rounds will start with the slowest vehicle and end with the fastest vehicle that take part of each round.
- ES 8.7.3 The number of teams that will run in each round will be notified in the Teams Briefing.
- ES 8.7.4 Teams that rated DNF or have not run the Autocross event will be considered the slowest vehicles and will run at the beginning of the slow round.
- ES 8.7.5 Teams must visit the Endurance Team Order Tool to know when they must attend the Endurance Entrance. This tool is updated in real time so that teams will be able to always know in which queue position they are. Further information about the Endurance Team Order Tool and how to access to it will be published in the Event Handbook.
- ES 8.7.6 Teams must be present at the Endurance Entrance when they are in the Upcoming Teams status. This means they can be picked to get into the Endurance Queue area at any moment.
- ES 8.7.7 The first 6 teams will get into the Upcoming Teams status automatically. This means they must attend the Endurance Entrance at the Event Start Time. The teams will enter the Endurance Queue area and will be allowed to prepare the car to “ready to Race” status.
- ES 8.7.8 The team must inform the Scrutineers when the car is in “Ready to Race” Status. Scrutineers will tell the team when the car can proceed to the Inspection Area.

- ES 8.7.9 If a team in Upcoming Teams status is not present when the Marshall tries to inform them to proceed to the entrance, this team will be rescheduled after the end of its own round and a penalty of 120 seconds will be applied.
- ES 8.7.10 Teams running later will be ordered according to the Autocross results.
- ES 8.7.11 Teams must attend the Endurance in the scheduled session. The session is concluded when the last team with no penalties ends the Endurance.

ES 8.8 [DV ONLY] Driverless Dynamic Events

ES 8.8.1 Rules regarding Driverless Dynamic track marking are based on the **FSG Competition Handbook 2023** article **DE 6.4**. Nevertheless, specific changes are included in this section for FSS 2023 event.

ES 8.8.2 The markings of all dynamic events will have the following characteristics:

- The track is marked with cones.
- The left borders of the track are marked with small blue cones.
- The right borders of the track are marked with small yellow cones.
- Exit and entry lanes are marked with small orange cones.
- Big orange cones will be placed before and after start, finish, and timekeeping lines.
- If not defined otherwise in chapter D of the rules, the maximum distance between two cones in driving direction is 5 m. In corners, the distance between the cones is smaller for a better indication.
- There are no track limits lines for acceleration and Emergency Brake System (EBS)-test.

ES 8.8.3 All lines may be spray painted or painted with chalk.

ES 8.8.4 If a team's best time including penalties is below T_{max} , additional points based on the following formula are given:

$$ACCELERATION_SCORE = 71.5 \left(\frac{T_{max}}{T_{team}} - 1 \right)$$

T_{team} is the team's best run time including penalties.

T_{max} is 2 times the time of the fastest vehicle including penalties.

ES 8.8.5 If a team's run time including penalties is below T_{max} , additional points based on the following formula are given:

$$SKIDPAD_SCORE = 71.5 \left(\frac{\left(\frac{T_{max}}{T_{team}} \right)^2 - 1}{1.25} \right)$$

T_{team} is the team's best run time including penalties.

T_{max} is 1.25 times the time of the fastest vehicle including penalties.

ES 8.8.6 The cones used at the competition are equal to the cones listed in the table below:





			
Big orange cone Two white strips WEMAS 307.610500.00.00	Small orange cone Single white strip WEMAS 400.000013. 00.00	Small yellow cone Single black strip WEMAS 400.000013.01. 10	Small blue cone Single white strip WEMAS 400.000043. 00.00
285mm x 285mm x 505mm 1.05 kg	228mm x 228mm x 325mm 0.45 kg		

Table 5: Cones specifications

ES 8.8.7 The manufacturer WEMAS (<https://www.wemas.de>) does not sell the cones to end customers, but they may be purchased from baustellenabsicherung24.de (<https://baustellenabsicherung24.de/leitkegel-titan-180-1934.html>).

ES 8.8.8 There are the following limitations mainly resulting from the track conditions and organizational/authorization issues:

- The lines may not be perfectly and continuously drawn.
- There may be further markings, to those mentioned above, that are not part of the track (e.g., markings, including cone position markings, lines from other events or different coloured surface, etc.) on or close to the track which will not be removed by the officials.
- There may be (stacked) spare cones standing at the trackside at distinguishable distance.
- No special artificial landmarks are provided by officials. The team must not place additional landmarks on the track or inside the dynamic area.
- No map data is provided by the officials.

ES 8.8.9 Figures 1, 2 and 3 visualize the track layout descriptions given in **Formula Student Rules 2023** articles D 4.3, D 5.1, and D 8.1.

- Yellow/Blue Cone
- ▲ Small/Big Orange Cone
- ◁ Red TK Marking & TK Equipment (Shape undefined)

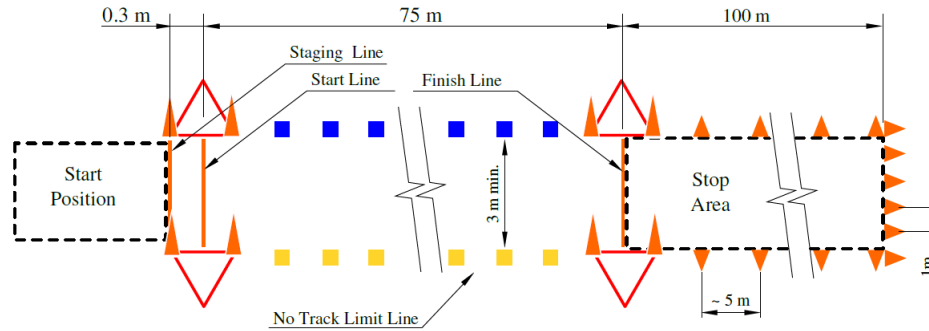


Figure 1: Acceleration

- Yellow/Blue Cone
- ▲ Small/Big Orange Cone
- ◁ Red TK Marking & TK Equipment (Shape undefined)

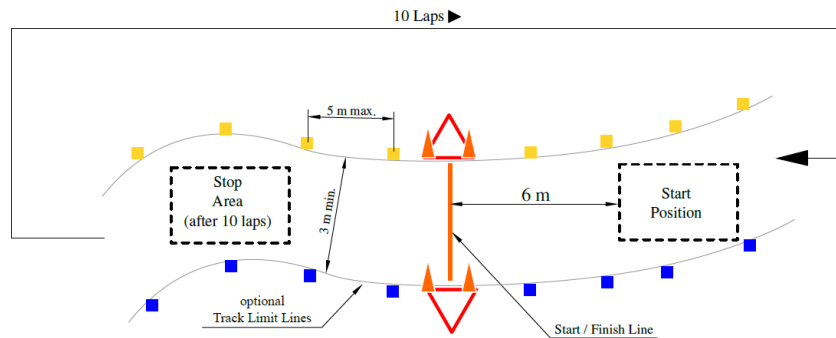


Figure 2: Track drive

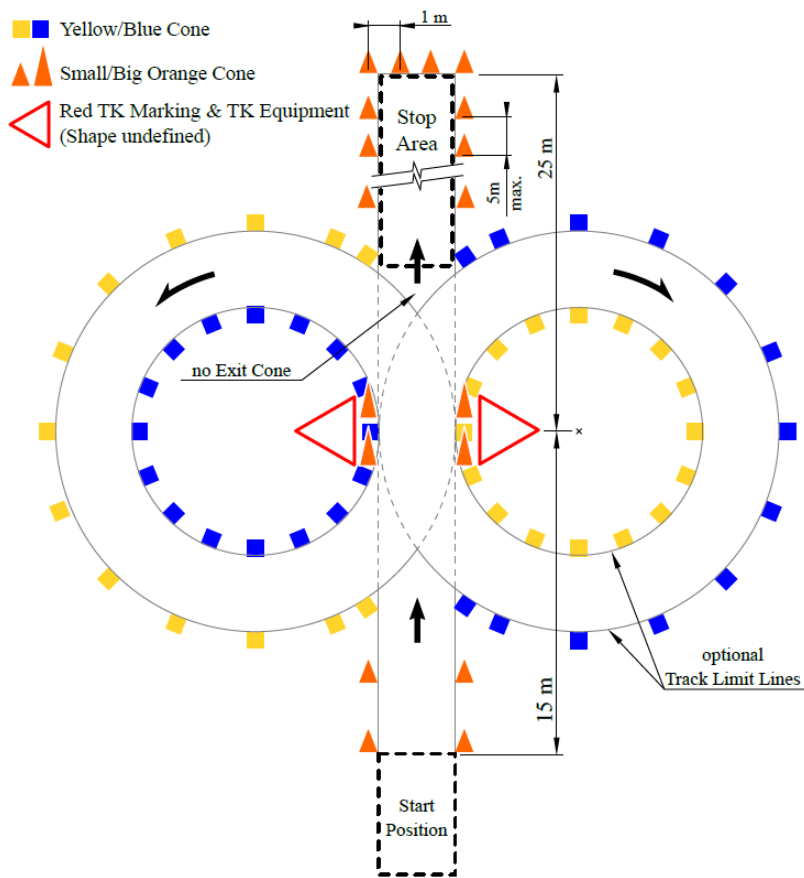


Figure3: Skid pad base configuration.

ES 8.8.10 The final position of the cones may not correspond exactly to the figures 1, 2 and 3.

ES 8.9 Dynamic Event Penalties

ES 8.9.1 The penalties applied to teams will follow **Formula Student Rules 2023**, although officials have the right to perform modifications to the rules as stated in **Formula Student Spain Rules 2023** article **ES 1.1.6**.

ES 8.9.2 Teams will be penalised if during a dynamic event they intend to communicate or make a verbal complaint to any official controlling the dynamic event or the timekeeping staff. The final penalty will be decided at the discretion of the officials.

ES 8.9.3 Teams will be penalised if team members inside the dynamic area of a dynamic event don't follow the instructions of the officials, marshals, or other organisation staff. This includes team members with a Media vest inside the dynamic area, which must follow the instructions of the FSS staff to guarantee the event safety. The final penalty will be decided at the discretion of the officials.

ES 8.10 Driver Limitations

- ES 8.10.1 In total, a minimum of two and a maximum of four drivers will be allowed for each team.

- ES 8.10.2 [DV ONLY] DV teams need to register at least one driver for manual brake test but may register up to three drivers for testing in manual mode.

ES 9 VEHICLE REQUIREMENTS AND RESTRICTIONS

ES 9.1 Technical Inspection Sticker

- ES 9.1.1 For the competition technical inspection sticker, a space 50 mm tall x 180 mm wide must be made available on the nose of the vehicle directly in front of the cockpit opening.

ES 9.2 [EV ONLY] Cell Temperature Monitoring Device (CTMD)

- ES 9.2.1 At FSS articles **EV 5.8.6** and **IN 3.1.2** of the **Formula Student Rules 2023** will not be applied.

ES 9.3 [EV & DV ONLY] Data Logger

- ES 9.3.1 A Data Logger will be used and provided by the officials as an official measuring system according to **Formula Student Rules 2023** article **EV 4.6**

ES 9.3.2

ES 9.4 [DV ONLY] Remote Emergency System (RES)

- ES 9.4.1 At FSS article **DE 7.4** of the **FSG Competition Handbook 2022** will be applied, except for article **DE 7.4.3**.

ES 9.5 Transponders / Timekeeping

- ES 9.5.1 The **FSS Event Handbook 2023** will provide further information regarding the allowed mounting position and orientation to mount the transponder.
- ES 9.5.2 Live timing is provided at <https://www.formulastudent.es>. The shown data is unofficial.

ES 9.6 Transponder & Data Logger Deposits

- ES 9.6.1 Teams will need to pay a deposit amount to receive their transponder. Teams which have made the payment will be delivered the transponder at a specified time and location as it will be indicated in the Event Handbook.
- ES 9.6.2 The link to pay the deposits for the transponders and data loggers will be provided by the organization Cash will be accepted in exceptional cases.
- ES 9.6.3 [EV & DV ONLY] Teams will need to pay a deposit amount for the data logger. Teams which have made the payment will be delivered the data logger at a specified time and location as it will be indicated in the **FSS Event Handbook 2023**.

ES 9.6.4 The transponder and data logger will be returned at a specified time and location as it will be indicated in the **FSS Event Handbook 2023**.

ES 9.6.5 The deposit for the transponders and data loggers will be returned through the same payment method than the participant did the payment.

ES 9.6.6 The transponder and data logger deposits will be refunded if they are returned in the same conditions as in the delivery moment.

ES 9.7 **Vehicle Status Video (VSV)**

ES 9.7.1 All teams must upload a video showing the vehicle driving prior to the competition. The video must comply with **Formula Student Rules 2023** article **A 5.6**.

ES 9.7.2 Those teams who are not able to present the VSV before the deadline will not be able to participate in the competition.

ES 9.7.3 The VSV must be uploaded before the deadline specified in article ES 4.1 of the **Formula Student Spain Rules 2023**.

ES 9.7.4 The FSS Organization will study individually the cases in which the video uploaded by the team does not fulfil article **A 5.6** in **Formula Student Rules 2023**. It also reserves the right to decide whether the team can compete.

ES 9.7.5 In the case that a team does not accept the decision of the FSS Organization related to article **ES 9.7** of **Formula Student Spain Rules 2023**, the team will be de-registered and the inscription to the event will not be refunded.

ES 10 SCORING

ES 10.1 Static and Dynamic Events Scoring

- ES 10.1.1 The scoring of both Static and Dynamic events will comply with **Formula Student Rules 2023**, except for the specific changes of **Formula Student Spain Rules 2023** as presented in articles **0** and **ES 8**.

ES 10.2 Scoring Publication

- ES 10.2.1 The scoring of both static and dynamic events will be published during the competition in the Event Control and in the FSS website.
- ES 10.2.2 Publication times will be presented in the **FSS Event Handbook 2023** or during the competition briefings.

ES 10.3 Scoring Penalties

- ES 10.3.1 The penalties applied to teams will follow **Formula Student Rules 2023**. In addition officials have the right to perform modifications to the rules as stated in article **ES 1.1.6** of **Formula Student Spain Rules 2022**.

ES 10.4 Scoring Complaint Procedure

- ES 10.4.1 Teams will have one hour to submit a scoring complaint for a static or a dynamic event from the event scoring publication. The organisation will provide teams with Complaint Forms at Event Control.
- ES 10.4.2 If the complaint does not prosper, the team will receive a 25 points penalty.