



Rules 2016

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1. Introduction

1.1. Formula Student Austria

Formula Student Austria is part of the Formula SAE Competition Series and open to entries with both conventional and electric powertrains.

This document contains the event specific rules for the Formula Student Austria Competition.

If you have any question regarding the FSA rules, feel free to contact the rules committee under rules@fsaustria.at

1.2. Formula Student Austria 2016 Rules

The Formula Student Austria (FSA) competition will comply with the Formula SAE®2016 rules. The FSA rules include some specific rule changes and additions.

These changes and additions are located within this document, and supersede the respective sections of the published Formula SAE® rules for 2016.

In case of any contradiction between the FSA and FSAE rules the FSA rules are to be considered valid.

1.3. Competition Language

The competition language is English.

1.4. Competition Date and Location

Formula Student Austria 2016 takes place from Monday, 2016-08-01 to Thursday, 2016-08-04 at the Red Bull Ring in Spielberg/Austria.

1.5. Competition Time

The Formula Student Austria official time:

From	Till	Time
2015-10-25	2016-03-27	CET
2016-03-27	2016-10-30	CEST

All dates are in the YYYY-MM-DD (ISO 8601) format.

1.6. Vehicle Classes and Scoring System

The event will be run with two classes – IC and electric – with all static and dynamic events being run together but scored separately.

2. Registration & Eligibility

2.1. FSA 2016 Registration

2.2. Registration Date

The registration for FSA 2016 starts on Friday, 2016-01-22 at 1700 CET.
Refer to the FSA website for details.

2.2.1. Registration fee

Registration fee for Formula Student Austria is 1.500 (one thousand and five hundred) Euros.
This fee includes the registration of 20 team members. Payment is accepted only by bank transfer. Bank details will be sent to every successfully registered team by E-mail. Every team has to send a confirmation of the money transfer by e-mail. Payment is due within 10 days of successful registration. Failure to do so will result in the loss of your slot and your team being placed on the waiting list.
Registration fees are non-refundable.

Note: Faculty Advisors also count as team members and have to be registered.

2.2.2. Additional Team Members

Additional team members are 25 Euros each. You can either pay up front via wire transfer or cash on site. If you chose to pay cash, please be sure to have the exact amount ready.

2.3. Registration Capacity and Waiting List

Registrations will be given out in the order in which they are received. FSA will limit the number of entries to 21 per class (Electric/IC). After this limit is reached, additional entries will be placed on the waiting list and will eventually become a registered entry if another registered team redraws or is removed. Slots may be moved between classes at a later time (i.e. if a waiting list “runs out”)

2.3.1. Slots

A certain number of slots at FSA 2016 are reserved. If a team fits more than one reserved slot it will take up the one listed higher up in this document.

The reserved slots expire twelve (12) hours after the registration opens. If they are not claimed by this time, Teams from the waiting list will move up to take them.

2.3.2. 2015 Top Finishers

Three (3) slots in each class are reserved for the top finishers of FSA 2015:

Combustion

- Global Formula Racing
- TU Graz Racing Team
- MunichMotorsport

Electric

- AMZ Racing
- Greenteam Uni Stuttgart
- Global Formula Racing

2.3.3. Austrian Teams

Four (4) slots are reserved for Austrian entries

Combustion

- TU Graz (TU Graz Racing Team)
- UAS Graz (Joanneum Racing)
- UAS Vienna (OS.car Racing Team)

Electric

- TU Vienna (TUW Racing)

2.3.4. Wildcard slots

Up to three (3) slots, independent of class, will be available as “wildcard” slots. Wildcard slots will be assigned by FSA based on the “wildcard application” which can be entered in the team account area on the FSA website. The wildcard application should be a short outline why your team should qualify for one of the wildcard spots, e.g. because of an interesting concept or transcontinental travel plans including multiple competitions. The wildcard application has to be completed before the registration starts.

2.4. Independent Teams

In case a university takes part in FSA 2016 with two cars, one conventional and one electric, then these teams may not share team members at the event. This means that no team member can be part of both teams, work on both cars or take part in any static or dynamic event for both teams.

2.5. Student Status (Specific FSA amendment to FSAE® 2016 Rule A4.2)

Only undergraduate students (seeking an MSc or lower degree) are allowed to enter. Students seeking a PhD degree/PhD Students or similar are not allowed to participate as team members.

2.6. Society Membership

Every participating team member must be a member of one of the FISITA (www.fisita.org) engineering societies.

2.7. First Year Vehicles

Only first year vehicles per FSAE Rules A6.5 and A6.8 are allowed

3. Dates & Documents

Note: Some of these Details might be subject to change to react to changes and requirements by other events in the FSAE series. Check <https://fsaustria.at/fsa-2016/rules/> regularly for updates

3.1. Submission Dates Summary:

Document	Date
FMEA*	2016-04-22
SES	2016-03-24
IAD	2016-03-24
ESF*	2016-04-22
EDR & DSS	2016-05-27
BP Executive Summary	2016-05-27
Cost Report	2016-05-27
Cost Addendum	2016-07-31
Fuel/Charging Type	2016-05-27
Team Member Designation	2016-06-12

*^y) for electric cars and ETC

3.2. Deadlines and grace periods

Failure to submit documents on the dates provided in this section will result in penalties detailed in the according sections. If a deadline is exceeded more than ten (10) days, we reserve the right to un-register the corresponding team from the event.

If a document is not accepted or we formally request additional information from you, you have ten (10) days to reply (if not otherwise specified) which you will also be penalized for exceeding.

Note 1: You do not need to submit your documents on the deadline - a week or month before is totally acceptable.

Note 2: Please be aware of possible issues with time zones, bounced mail, size limits, file formats etc. - make sure to have a little time to spare before the deadline to deal with those things!

3.3. Failure to adhere to file formats and nomenclature

Failure to submit your file in the correct format (e.g. MS Word docx when PDF is required) will be penalized with -5 (minus five) points, which will be taken off the team's total score. If the file cannot be opened due to an exotic or unsafe format being used, it will be counted as "not submitted" and the according penalty applied.

Note 1: The file name is not subject to regulation any more

Note 2: you will not be notified of wrong submissions

3.4. Structural Equivalency Spreadsheet

2016-03-24, 12:00

The Structural Equivalency Spreadsheet must be uploaded to the team account on the FSA website no later than 2016-03-24, 12:00. A blank copy of this form is available at fsaonline.com.

Late submissions will be penalized with -10 (minus ten) points per day, up to a maximum of -70 points, which will be taken off the team's total score.

File Format: MS Excel **.xls** or **.xlsx**

3.5. Impact Attenuator Data

2016-03-24, 12:00

The Impact Attenuator Data Form must be uploaded to the team account on the FSA website no later than 2016-03-24, 12:00. A blank copy of this form is available at fsaonline.com.

Late submissions will be penalized with -10 (minus ten) points per day, up to a maximum of -70 points, which will be taken off the team's Total Score.

File Format: Adobe **PDF**

3.6. Engineering Design Report and Design Spec Sheet

2016-05-27, 12:00

The Engineering Design Report and the Design Spec Sheet must be uploaded to the team account on the FSA website no later than 2016-05-27, 12:00.

Late submissions will be penalized with -10 (minus ten) points per day, up to a maximum of -100 points, which will be deducted from the team's Engineering Design Event score.

File Format: Adobe **PDF**

3.7. Cost Report

2016-05-27, 12:00

The Cost Report consists of two parts, the written report and an electronic report. The electronic copy must be uploaded to the team account on the FSA website no later than 2016-05-27, 12:00.

The electronic report has to consist of a full vehicle BOM with cost data derived from the Cost Tables and supporting documentation (e.g. calculations, drawing or photos).

The written report has to be present during the cost event.

3.7.1. Electronic Copy

The electronic copy must be the whole report, including parts & assemblies, not just the EBOM.

The supporting material must be separate from the cost report tables, in **one PDF** containing drawings, schematics etc. Please refer to available supporting material within the appropriate cost tables (e.g. "see drawings.pdf, p.21")

For submission pack everything (excel (**xls**, **xlsx**) cost report, supporting docs) in **ONE ZIP** file.

Filename nomenclature:

[**ZIP** archive]

└CAR#_BOM.xls (e.g. 01_BOM.xls) for the actual cost report inside the zip.

└CAR#_xxx.pdf (e.g. 01_drawings.pdf) for supporting material.

Late submissions will be penalized with -10 (minus ten) points per day, up to a maximum of -80 points, which will be deducted from the team's Cost Event Score. No report submitted will result in a score of zero for the Cost Event.

Note: Incomplete submissions (e.g. only the EBOM) will be counted as not submitted.

3.7.2. Written Copy

The written copy has to be present during the judging of the cost event. In case of differences between the written and electronic copy, that are not covered by addenda per FSAE Rule S4.17, the electronic copy will be judged.

3.7.3. EBOM formatting

The EBOM template available from fsaonline.com has to be used. Especially important are

- Correctness of the eight sections
- team name, car#, and event name
- Sums and formulae used are correct
- BOM complete (Material, Process, etc. filled out and correctly multiplied)
- Detail Page numbers present

Incorrect entries and non-adherence to the template may result in points deducted from the "written report" score in the cost event.

3.7.4. Add Item Requests

AIRs to be considered for the Cost Event 2016 have to be submitted by 2016-05-27 at 12:00.

3.7.5. Electric Drivetrain Attribution

All parts belonging to the tractive system of an EV have to be listed in Section 2 (Engine and Drivetrain – EN) of the EBOM. (e.g. Motors, Inverters, Batteries)

3.7.6. Cost Report Addendum

Addenda to be considered for the Cost Event 2016 have to be submitted by 2016-07-31 at 12:00.

3.8. Fuel/Charging Type Order

You must inform FSA which type of engine you will use as part of the registration process. You then must submit your Fuel/Charging type by 2016-05-27.

Available fuel types:

- RON/ROZ 100 Gasoline
- E85
- electricity (externally charged)
- electricity (charged inside car)

3.9. Team Member Designation

2016-06-12

Participating team members must be designated prior to the event. Team members can be designated as FSA participants at the team's account on FSA website.

3.10. Health Insurance Certificate

Requirement waived. See <https://fsaustria.at/fsa-2014/hic-dl/> for details

3.11. Driver licenses

Requirement waived. See <https://fsaustria.at/fsa-2014/hic-dl/> for details

3.12. Electrical Safety Form

2016-04-22, 12:00

IMPORTANT: ALL TEAMS RUNNING AN ELECTRIC CAR MUST SUBMIT AN ELECTRICAL SAFETY FORM. A TEMPLATE IS PROVIDED ON fsaeonline.com AND HAS TO BE USED.

The Electrical Safety Form must be uploaded to the team account on the FSA website no later than 2016-04-22 at 12:00.

File Format: Adobe **PDF**

Late submissions will be penalized with -10 (ten) points per day, up to a maximum of -70 points, which will be taken off the team's Total Score.

3.13. Failure Modes and Effects Analysis

2016-04-22, 12:00

IMPORTANT: ALL TEAMS RUNNING AN ELECTRIC CAR MUST SUBMIT A FAILURE MODES AND EFFECTS ANALYSIS. A TEMPLATE IS PROVIDED ON fsaeonline.com AND HAS TO BE USED.

The Failure Modes and Effects Analysis must be uploaded to the team account on the FSA website no later than 2016-04-22 at 12:00.

File Format: MS Excel **xls** or **xlsx**

Late submissions will be penalized with -10 (ten) points per day, up to a maximum of -70 points, which will be taken off the team's Total Score.

3.14. Business Plan Executive Summary

2016-05-27, 12:00

Judging will start with an Executive Summary before the FSA Competition. The principal document submitted prior to the Business Plan Presentation is an Executive Summary. The Executive Summary must not exceed one (1) page, team name and car number must be written on the Executive Summary. The Executive Summary should contain a brief description of the team's Business Plan. In the Summary the two most outstanding technical features and the anticipated production costs of the car have to be listed. The Executive Summary must relate to the specific prototype car entered in the FSA competition. Even though the Executive Summary is only judged by the presentation judges, all Engineering Design and Cost judges will have access to the file and may refer to it.

Penalties:

Up to five (5) penalty points will be deducted from your final Business Plan Presentation Score.

Late submission: up to -2 point

Team name and/or Car number missing: -1 point

Two (2) technical highlights missing: -1 point

Vehicle costs missing: -1 point

Note: Consider your Executive Summary to be the first impression of your Business Plan to the Executive Board of a major auto manufacturing company

The Business Plan Executive Summary must be uploaded to the team account on the FSA website no later than 2016-05-27 at 12:00.

File Format: Adobe **PDF**

3.15. Event Handbook

The event handbook may contain special event procedures and restrictions for example regarding working on the car etc. It has to be read and understood by all event participants.

4. General Vehicle Requirements

4.1. Impact Attenuator Testing (Specific FSA change of FSAE 2016 Rule T3.21.2)

Quasi-static testing is not allowed. Only dynamic tests (drop down, sledge or pendulum test) are allowed.

4.2. Anti Intrusion Plate (AIP) Testing (Specific FSA change of FSAE 2016 Rule T3.38)

Equivalence of composite AIP to the baseline material (T3.20.3) must be shown by a physical test (T3.38.3). Results must be included in the SES

The composite AIP must be included the dynamic test of Impact Attenuator and must not fail.

A failure is defined if the IA plate is damaged in any way (e.g. broken) or the attachment points of AIP are destroyed.

4.3. Lubrication System

The lowest point of the engine lubrication system must be no lower as the line between the lowest point of the main roll hoop and the lowest frame rail behind the engine and/or lubrication system. If the engine oil sump or any other part of the lubrication system is lower than this line, it must be protected by a sufficient skid plate, or frame tubes installed longitudinally under affected part of the engine lubrication system. The engine lubrication system must be protected from surface contact in any situation while in operation on track, especially in the event of a suspension failure. The skid plate itself cannot be mounted to parts of the engine.

4.4. Driver Egress (Specific FSA change of FSAE® 2016 Rule T4.8)

The driver egress required by Formula SAE® 2016 Rule T4.8 must be possible in all steering wheel positions.

4.5. Refueling

Re-fueling must be able to be accomplished without the removal of any body parts of the car.

4.6. Fuel Lines and Connectors (Specific FSA change of FSAE® 2016 Rule IC1.8.1)

Fuel lines and hoses made from PTFE are prohibited. The use of plastic quick release connectors and plastic fittings located between the fuel tank and the engine (supply and return) is not permitted.

4.7. Fuel Rails (Specific FSA change of FSAE® 2016 Rule IC1.9.2)

The use of non-OEM fuel rails made from plastic, carbon fiber or flammable rapid prototyping materials is prohibited.

4.8. EnergyMeter LV Supply

The Energy Meter must be directly supplied from the GLV master switch.

4.9. 100ms Continuity Violations (specific FSA Change of FSAE ® 2016 rule EV2.2.4)

FSA will not punish 100ms-continuity violations.

4.10. Technical Inspection Sticker (specific FSA change of FSAE ® 2016 rule T13.4)

Technical inspection stickers will be placed on the upper nose of the vehicle (i.e. somewhere on the surface between the cockpit opening and the nose of the vehicle). Cars must have a clear and unobstructed area of at least 20x10 cm on this surface.

4.11. Driver's Underclothing (Specific FSA change of Formula SAE® 2016 Rule T14.6)

All drivers have to wear underwear (long pants and long sleeve t-shirt) certified to SFI 3.3 or FIA 8856-2000.

4.12. Transponders

Transponders will be provided by FSA. All other transponders operating in the UHF Band have to be removed from the vehicle.

4.13. Unofficial timing and telemetry equipment

No unofficial timing and telemetry equipment (e.g. IR Transmitters, radio extenders, etc.) is allowed inside the dynamic area. Exempt from this rule is the driver change/preparation area, where team members with dynamic passes are allowed to remain during the course of the dynamic events, if the equipment does not interfere with the conduct of the event.

4.14. Quick Jack

Each team must present a quick jack to lift up the car by using the jacking point during Technical Inspection. The quick jack must be able to lift up the car, so that the driven wheels are at least 10.2 cm (4 in) off the ground.

4.15. Tire and Rim Combination

During Scrutineering each team needs to present one set of tires for dry condition and one set of tires for wet conditions. Running different tire sizes, manufacturer and compounds for each wheel in a set is acceptable.

The tire type/rim type combination presented during Scrutineering must be the same during the whole event. The rims for dry tires and wet tires can be different.

4.16. Tire Usage

Only one (1) set of tires per type (dry/wet) may be used during all of the dynamic events.

Punctured tires may be replaced upon request.

Brake Test, Practice Area and the Static Events are specifically excluded from this regulation.

4.17. Alternate Frame Rules

Alternative Frame Rules are NOT allowed for FSA 2016.

AFR documents will, however, be accepted if the team can prove that the document passed review at another event of the 2016 FSAE Competition Series.

5. Electric Cars

5.1. FSE inspection sheet

It is recommended that you prepare your car for the technical inspection according to the FSE inspection sheets.

5.2. Energy Meter LV Supply

The Energy Meter must be directly supplied from the GLV master switch.

5.3. Clarification on Accumulator Monitoring Systems (Specific FSA addition to FSAE® 2016 Rule EV3.6)

The AMS must keep the accumulator cells within their safe operation limits with respect to charge and discharge currents, voltages and temperatures according to the manufacturers' data sheet.

Failure to obey the given limits may result in a penalty ranging from point deductions up to disqualification.

The AMS must be able to read and display all cell voltages e.g. by connecting a laptop to the AMS. This must be demonstrated during E-Scrutineering.

5.4. Cockpit-Mounted Shutdown Button (Specific FSA addition to FSAE® 2016 Rule EV5.3.5)

The international electrical symbol consisting of a red spark on a white-edged blue triangle must be affixed in close proximity to this switch.

It must be located to provide easy actuation by the driver in an emergency or panic situation.

It must be located within easy reach of the belted-in driver, alongside the steering wheel, and unobstructed by the steering wheel or any other part of the car.

5.5. Reset of AMS/IMD failures via Master Switches (Specific FSA change of FSAE® 2016 Rule EV5.1.4)

It is allowed to use the GLV Master Switch to reset pending AMS or IMD failures.

5.6. Specific FSE change of Formula SAE® 2016 Rule EV2.2.4

FSE will not punish 100ms-continuity violations.

5.7. Interlocks (specific FSE change of Formula SAE® 2016 Rule EV3.3.6)

An interlock / pilot signal is always needed for EVERY tractive system connection unless the connection is made within a housing.

Note: Housings only used to avoid interlocks will be considered bad engineering practice.

6. Static Events

6.1. Business Plan Scoring Formula

The scoring of the event is based on the average of the two or three presentation judging forms. There is a maximum of seventy-five (75) points from the FSG Presentation Judging Form.

Non finalist:

$$\text{PRESENTATION SCORE} = 70 \cdot \frac{P_{your}}{P_{max}}$$

Where:

“Pmax” is the highest score awarded to any team not participating in the finals

“Pyour” is the score awarded to your team

Finalists:

- 1st Place 75 points
- 2nd Place 74 points
- 3rd Place 73 points
- 4th Place 72 points
- 5th Place 71 points

It is intended that the scores will range from near zero (0) to seventy-five (75) to provide good separation. The Presentation Event Captain may at his/her discretion; normalize the scores of different judging teams.

6.2. Cost Event Scoring

Note: this supersedes several FSAE Rules Items, e.g. S4.8, S4.18ff ...

At FSA only Penalty Method A as per FSAE Rule S4.19 will be used.

The Cost Event Score is compiled from the following items:

$\left(20 \cdot \frac{\frac{P_{max}}{P_{your}} - 1}{\frac{P_{max}}{P_{min}} - 1} \right) \cdot \frac{S_{your, Visual Inspection}}{40}$	20 Pts.	Lowest Cost: Each Team will be ranked according to the total BOM price of their vehicle, corrected by the Visual Inspection Score as a measure of correctness, according to the formula on the left, where P_x is the BOM Price and $S_{inspection}$ is the score on the Visual Inspection part of the Cost Event.
(Points determined by Judges)	40 Pts	Real Case Situation
(Points determined by Judges)	40 Pts	Visual Inspection and Report Accuracy

6.3. Addenda (Specific FSA change of Formula SAE® 2016 Rule S4.17)

For changes in your corrections made after the submission of the cost report please use the FSAE cost addendum form given in the FSAE Rules Appendix S-5. Supporting material for newly added manufactured parts has to be included. The addendum incl. all drawings must be uploaded to the team area on the FSA website no later than 2016-07-31, 12:00 in **PDF** format.

7. Dynamic Events

7.1. Dynamic Event Score Distribution

The maximum scores for the dynamic events are as follows, with the formulae for the individual Events adjusted accordingly:

	Maximum score	Minimum score
Skid Pad	75	3,5
Acceleration	75	3,5
Autocross	100	4,5
Efficiency	100	0
Endurance	325	25

7.2. Ready to drive sound (specific FSA change of FSAE 2016 rule EV4.14)

The car has to make a characteristic sound, once not continuous for at least 1 second and a maximum of 3 seconds, when it is ready to drive.

The car is ready to drive as soon as the motor(s) will respond to the input of the torque encoder / accelerator pedal.

The sound level has to be a minimum of 70dBA, fast weighing, in a radius of 2m around the car.

7.3. Efficiency scoring

The Efficiency is based on a metric of the amount of CO₂ released and the lap time on the Endurance course, averaged over the length of the event.

Teams are advised that the Efficiency score is based only on the distance cars run on the course during the endurance event. Although the starting line, exit line and the driver change zone increase the actual distance a car must drive during the event, those distances are not factored into the efficiency calculations. Additionally efficiency adjustments will not be made for engine running in the entry/exit lines, during driver change, in the penalty box or for any on-course incidents.

7.3.1. Efficiency Scoring (Specific FSA change of FSAE 2016 Rule 8.22.3)

The time threshold factor to be considered in the efficiency scoring is 1,333 (133,3%) instead of 1,45 (145%).

The endurance times considered for Efficiency scoring shall be the actual running time of the team, (i.e. excluding penalties).

7.3.2. Energy Meter Data

Before the endurance event, every energy meters memory storage may be cleared by an official. The energy meter data is read out when the car is in Parc Fermé.

7.3.3. Efficiency scoring for electric class(Specific FSA change of Formula SAE® 2016 D8.22.3, D8.22.4, D8.22.5 and D8.22.6)

$$Eff. Factor = \left(\frac{\frac{T_{min}}{Lap_{totalTmin}}}{\frac{T_{your}}{Lap_{your}}} \right) \cdot \left(\frac{\frac{E_{min}}{Lap_{totalEmin}}}{\frac{E_{your}}{Lap_{your}}} \right)^2$$

$$Eff. Score = 100 \cdot \frac{\left(\frac{Eff. Factor_{min}}{Eff. Factor_{your}} - 1 \right)}{\left(\frac{Eff. Factor_{min}}{Eff. Factor_{max} - 1} \right)}$$

Where:

T_{min}/Lap will be the lowest corrected Endurance time **per completed lap** of the fastest team of the event.

T_{yours}/Lap will be the corrected Endurance time **per completed lap** of the team being scored. Vehicles whose corrected time exceeds 1.333 times the corrected time of the fastest team, will receive zero (0) points for Efficiency.

E_{min}/Lap is the lowest consumed Endurance energy **per completed lap** by any competitor.

E_{yours}/Lap is the consumed Endurance energy **per completed lap** of the team being scored.

The consumed Endurance energy is calculated as the time integrated value of the measured voltage multiplied by the measured current logged by the energy meter. Regenerated energy will be multiplied with 0.9 and subtracted from the used energy, as long as the fed back currents remain within the maximum values given in the cell data sheet.

EfficiencyFactor_{min} is fixed at 0.1, to suppress the influence of the worst competitor on the scaling of scores.

EfficiencyFactor_{max} is the maximum EfficiencyFactor reached by any team.

7.4. Endurance Scoring (Specific FSA change of FSAE 2016 Rule 8.20.2)

T_{max} will be 1.333 times T_{min}

7.5. Endurance Minimum Speed Requirement (specific FSA change of FSAE rule D8.15)

If a car is unable to maintain lap times within 133,3% of the fastest lap time for the course, then it may be removed from the course (black-flagged).

7.6. Personal Transport – (specific FSA change of FSAE Rule D11.6)

Use of small vehicles on-site is allowed but teams are reminded to use them responsibly, especially regarding pedestrian safety and loud noise.

8. Document History

VersionChanges

Date	Version	comments/changes
2016-01-10	1.0	Initial Version
2016-01-13	1.0.1	Typo: 2014->2015; revised pagination
2016-01-16	1.0.2	Fix: Inconsistent event fee (1500)