Learn To Win 2019 - Welcome

Andrew Deakin – Formula Student Chairman
Formula Student History

• Formula Student (FS) started in 1998 as a Demo Event at MIRA
• Grown to have annually ~100 cars plus ~30 design only entrants from Universities from all round the world
• Typically engages 4000 students/year and has engaged over 40,000 students over the last 21 years
• Embraces New Technology and really encourages innovation
• Well developed rules - safety is taken very seriously throughout and is a core part of the student learning experience
• Alternative Fuel Rules Introduced in 2008. These days typically 30% are EV’s
• In future we want to increase the number of UK EV teams
Formula Student and Formula SAE

• Formula Student is part of a global competition series with >1000 teams worldwide
  • >200 Universities in America
  • >400 Universities in Europe
  • >400 Universities in Asia
• 10 competitions recognised as part of the Formula Student and Formula SAE competition series
• >20 competitions in total globally each year
• You are joining something that inspires thousands of engineers around the world every year

Official Competition Series
Formula SAE Michigan USA
Formula SAE Lincoln USA
Formula SAE Electric USA
Formula SAE Australasia
Formula SAE Brazil
Formula SAE Italy
Formula Student UK
Formula Student Austria
Formula Student Germany
Student Formula Japan

Unofficial Events Include
China, India, Netherlands, Hungary, Spain ...
What’s in it for you?

• Whilst the Formula Student is an exciting challenge based on motorsport the objective is to provide better education for engineers

• What will you get out of this?
  • Engineering understanding to be put into practice
  • Learning from mistakes
  • Use of practical skills
  • Exposure to real project planning
  • Team work
  • Development of commercial and marketing skills

• Not just a race; tests design/engineering knowledge, understanding of cost of manufacture and presentation skills

• Develop skills that are very relevant to the engineering industry – FS alumni are highly sought after by industry
Formula Student Format

• Static Events
  • Design
  • Cost
  • Business Presentation

• Performance Events
  • Acceleration – 75m
  • Skidpad – Lateral Acceleration Test
  • Sprint / Autocross – Single Timed Lap

• Endurance and Fuel Efficiency
  • 22km with driver change
  • Energy or Fuel used is measured
Formula Student Scoring for 2020

• Point distribution adjusted
• Aim to put slightly more emphasis on statics
• Justified due to rigorous moderation of marks

• Less on driver skill
• More on engineering

<table>
<thead>
<tr>
<th>Static Events:</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Plan Presentation</td>
<td>120</td>
</tr>
<tr>
<td>Cost and Manufacturing</td>
<td>120</td>
</tr>
<tr>
<td>Engineering Design</td>
<td>160</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dynamic Events:</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skid Pad</td>
<td>75</td>
</tr>
<tr>
<td>Acceleration</td>
<td>75</td>
</tr>
<tr>
<td>Autocross / Sprint</td>
<td>100</td>
</tr>
<tr>
<td>Efficiency</td>
<td>100</td>
</tr>
<tr>
<td>Endurance</td>
<td>250</td>
</tr>
</tbody>
</table>

Total Points: 1000
Formula Student Format

Formula Student uses Silverstone Track Around the National Circuit Paddock

Teams Use National Circuit Pits

Sprint and Endurance Uses Copse Corner

Acceleration

Practice Area

Skidpad

FS-AI
Formula Student 2020 - Rules

- Class 1 and Class 2 are now FSUK and FS Concept
- Business Logic Case requirements to be reduced
- EV 4WD upped to 80kw (aligned with FSG)
- Two set of driver equipment required (minus arm restraints and helmet)
- No power aero cars (now legal in FSG)
- Number of SES related changes on submissions including grading, first year chassis checks and alignment with FSG and FSAE
- BSPD now required for all cars (aligned with FSG)
- Fuel filler necks can be outside Primary Structure Envelope above 350mm from ground but must be inside surface envelope (relaxation of FSG to align with FSAE)
- Clarification of battery fire access rule to make it easier for monocoques (by using access tube)
- Clarification of TSAL rules for EVs
- Plus other targeted relaxation of the FSG rules to align with FSAE, with intention of removing barriers to FSAE teams.
- Running with car could result in car being impounded ‘sin binned’ with Chief Scrutineer for 1hr
Formula Student AI – ADS-DV

• Only a few UK teams have a suitable EV to convert to Autonomous
• In 2018, Formula Student commissioned an Autonomous Vehicle Platform for University Teams to use including sensors and the AI computer
• Edinburgh University were successful in developing software to navigate the trackdrive course
Formula Student – AI 2019

• In 2019, the vehicle was developed further
• Used by Coventry, Oxford Brooks and Edinburgh University at FS2019
• All teams competed in the dynamic events
• Scores below
• Approx 30 students this year have gained CAV experience and will be sort after graduates with skill sets that industry needs

<table>
<thead>
<tr>
<th>Position</th>
<th>University Name</th>
<th>Penalties</th>
<th>Design</th>
<th>Cost</th>
<th>Presentation</th>
<th>Accel</th>
<th>Skidpad</th>
<th>Autocross</th>
<th>Trackdrive</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>University of Edinburgh</td>
<td>0</td>
<td>250.00</td>
<td>69.00</td>
<td>33.08</td>
<td>52.26</td>
<td>0.00</td>
<td>78.11</td>
<td>250.00</td>
<td>732.44</td>
</tr>
<tr>
<td>2</td>
<td>Coventry University</td>
<td>0</td>
<td>103.55</td>
<td>55.00</td>
<td>26.96</td>
<td>100.00</td>
<td>0.00</td>
<td>100.00</td>
<td>234.28</td>
<td>619.79</td>
</tr>
<tr>
<td>3</td>
<td>Oxford Brookes</td>
<td>0</td>
<td>224.85</td>
<td>90.00</td>
<td>74.09</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>100.00</td>
<td>488.94</td>
</tr>
</tbody>
</table>
Formula Student – AI 2020

• 2 additional cars are in production
  • One for IMechE
  • One purchased by Coventry University
• Engaged with a potential OEM to supply the vehicles
  • If this can work, they will look after final assembly, sales and warranty
Formula Student AI – ADS-DV Spec

- Simple CNC folded/fabricated aluminium chassis with carbon fibre body supplied by DJ Racecars
- 60V electric drivetrain driving twin Saietta motors through differentials to provide 4WD supplied by Hypermotive Ltd
- Full progressive brake by wire
- Car sold in ‘computer ready’ and ‘sensor ready’ state, adding to the challenge for the students
- Vehicle Control Unit will accept steer angle, motor torque and braking control requests
FS-AI Dynamic Events

- Acceleration
  - Straight line acceleration test
- Skidpad
  - Lateral acceleration test
- Sprint
  - Single lap of track
- Trackdrive
  - 10 laps of the track
FS-AI Taking Part

• Ideally commit to purchase a vehicle
• Option to share one of the two pool cars
• Use available data to develop your AI technology in the virtual world
• Select the AI system (may need to share platform for pool cars)
• Develop the software for your AI computer
• Compete
FS-AI – For Industry

• Over the next decade targets as follows
  • > 25 UK universities taking part
  • > 5000 UK students benefitting

• Train the engineering talent of the future to meet industry’s requirement for CAV skills

• We want as many of you as possible to develop CAV skills for your future careers

• If you are interested in learning more come to the FS-AI workshop
Overview

• Today is for you to learn
• We want you all to succeed this year and to produce fantastic Formula Student Cars.
• Have fun whilst learning

• All the volunteers here today are judges and officials who want to help

• Make the most of the day
• Set your direction for a successful Formula Student.