
MONDRAGON UNIBERTSITATEA FORMULA STUDENT TEAM

This document describes the objectives of the Formula Student team in Mondragon Unibertsitatea, eMUF, and how will be structured.

1. BACKGROUND

Formula Student is an international engineering series of competitions between international Universities which aims to conceive, design, fabricate, develop and compete with small, formula style, vehicles. Teams are to assume that they work for a design firm that is designing, fabricating, testing and demonstrating a prototype vehicle for the nonprofessional, weekend, competition market.

The competition is divided into two big events:

- Static events: these events represent the administrative and business aspects of such a project: financing and accounting, sponsorship, fabrications costs, marketing, ... Note that it is possible to compete in an event without having a car but just presenting to the static events.
 - Presentation: to evaluate the team's ability to develop and deliver a comprehensive business case that will convince the executives of a corporation that the team's design best meets the demands of the amateur, weekend competition market, and that it can be profitably manufactured and marketed.
 - Design event: to evaluate the engineering effort that went into the design of the car and how the engineering meets the intent of the market both in terms of vehicle performance and overall value.

- Cost and manufacturing: teach the participants that cost and budget are significant factors that must be considered in any engineering exercise, to make trade off decisions between content and cost based on the performance advantage of each part and assembly, gain experience with creating and maintaining a Bill of Material (BOM), and to learn and understand the principles of Design for Manufacture and Assembly, lean manufacturing and Minimum Constraint Design.
- Dynamic events: the objective of these events is to prove the performance, handling and reliability of the designed and fabricated prototype. The following are the different events
 - Acceleration: longitudinal acceleration capability.
 - Skid-pad: steady state lateral cornering capability.
 - Autocross: tight technical course race to test handling.
 - Efficiency
 - Endurance: long race to prove reliability of the car.

2. OBJECTIVES

The objective of this project is to build up a team that will initially build an electric formula from the ground up and create the basis for a continuous participation of Mondragon Unibertsitatea students in the Formula Student competition series.

The main objective for short term is, as mentioned, to conceive, design, build and race a formula stile electric car regulated by the FSAE rules (<https://www.fsaonline.com/content/2017-18%20FSAE%20Rules%209.2.16a.pdf>).

Since MU does not have any background and experience in this competition, the idea is to attend to the FS Spain event on 2020 to learn how the competition works and present to judges our initial ideas. Then on 2021, having learned from the previous year, we will go full on to both the static and dynamic events in the FS Spain event.

3. BASIC STRUCTURING

As it can be seen in the *Background* section of this document, the evaluation of this project is very wide, and it requires the involvement of many different profiles, being engineers or not.

There is need for engineers of different backgrounds, experts in management and business, designers, audiovisual technicians, ... The main two divisions of the team will be the following ones:

- Engineering division: responsible of the technical development of the prototype as well as the industrialization.
- Business division: in charge of the accounting-financing, sponsorship, costs, logistics,...
- Additional profiles: experts in audiovisuals and communication tools are welcome and for sure will have a task in the team, as well as, designers, artists,

ENGINEERING DIVISION

Since one of the objectives is to design, fabricate and build an electric formula car, many engineers will find a place in this team: Mechanical, Electrical and electronical, Embedded systems, Telecommunication, Mechatronics, Biomedical, you name it ...

This engineering disciplines apply both to bachelor's degree but preferably to master students.

The engineering division will be divided into three groups:

- Dynamics and chassis: chassis design, suspension, steering, braking,
- Powertrain: batteries, motor, inverter, ECU and control, sensorization, ...
- Bodywork and design: aesthetics, livery, cockpit, user friendliness, ...

BUSINESS DIVISION

- Management engineering

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4. FIGURES IN THE TEAM

The team requires dedicated people who believe in the project and, within the possibilities of each individual, will give everything for it. We know that due to the way MU works, its hard to join such a big task. We also know that some figures in the team will have different workloads throughout the development of the project and that not everyone involved will have to work full time in the project.

Those are the reasons why there are two key figures in the team:

- Core team member: this is a member of the team that will work with a routine in the team in its specialty. Each one will decide how much it works depending on each individual situation and availability.
- Assistance member: this is a figure that in its field is willing to take specific jobs without being continuously involved in the core team. These figures will carry out smaller scale projects or specific tasks. This way people that don't have a continuous availability can help the core team relief workload. Also, tasks that are sporadic and require a different profile to carry out, can be done by a more suitable person outside the core team.