

NMMU Racing Formula Student

Welcome to **NMMU Racing Formula Student**: A project of object creation.

NMMU Racing was created to give students an opportunity to experience the challenges in the design and manufacturing process, which together with the theoretical principles of engineering, design and manufacture a Formula Style race car.

This will enable students to deepen their understanding of technology, cultivate their practical abilities and strive enthusiastically to achieve higher levels of accomplishment. The competition intends to nurture engineers who are rich in originality as well as allow students to experience team activities, explore their interests and experience the enjoyment of object creation.

Competition for Object Creation and Design

Formula Student allows for self-motivated students to cultivate various skills involved with object creation, and as training for those who will one day play critical roles in the future of the South African automotive industry.

The serious state of affairs where, in addition to the reduction in the number of students due to the falling birth-rate, high mortality rate, and emigration (Brain Drain) young people are shying away from scientific fields which may lead to the South African automobile industry losing its international technological competitive power in the future, reduce the competitive edge of the industry in general, and result in a shortage of talented engineers. Moreover, the curricula of engineering universities is currently lacking in practical, design/drawing elements etc., thereby resulting in a shortage of opportunities for object creation

On the other hand Formula Student provides opportunities for students to give full play to their ability and knowledge through actually creating objects. As a result, a base for nurturing human resources has been established aiming at being active in automotive technology fields.

The Competition

Formula Student is an international competition between students from all over the world, founded in 1981, where these students are required to develop and manufacture a single seat formula race car. This vehicle will then be put through rigorous testing on a racetrack, since the competition is not just based on which car can go the fastest but the best overall package with regards to the whole process of car development, which includes:

- Design
- Performance
- Financial planning
- Sales planning

For the purpose of this competition, the students are to assume that a manufacturing firm has engaged them to produce a prototype car for evaluation as a production team. The intended sales market is the non-professional Weekend-Race-Driver. Therefore, the car must have very high performance in terms of its acceleration, braking, and handling qualities. The car must be low in cost, easy to maintain, and reliable. In addition, the car's marketability is enhanced by other factors such as aesthetics, comfort and use of common parts. The manufacturing firm is planning to produce 1000 cars per year. The challenge to the design team is to design and fabricate a prototype car that best meets these goals and intents. Each design will be compared and judged with other competing designs to determine the best overall car.

The students are given additional training to give them some insight into the economic fundamentals of the automotive industry, seeing as the team will be viewed as a company that manufactures a race car for the non-professional Weekend-Race-Driver. They will be faced with the challenge of creating a complete package consisting of a well constructed race car and a sales plan to match, on which a jury of experts from the motor sport, automotive and supplier industries will base their decision.

The aim of this project is to develop, build and eventually race a single seat race car from start to finish. The SAE rules and regulations stipulate the following;

General requirements:

- 4 wheel configuration
- Wheel base of at least 1525mm
- Track width with the smaller track front/rear not less than 75% of the larger
- Minimum chassis ground clearance of 25.4mm
- Minimum wheel diameter of 203.2mm

Engine/Power train requirements:

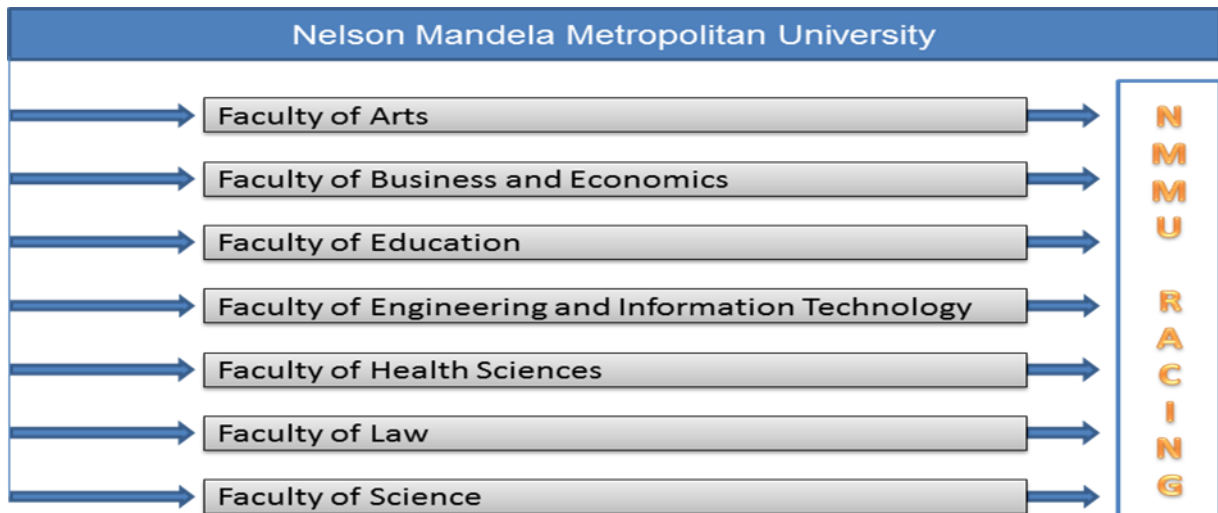
- 4-stroke engine with displacement not exceeding 610cc
- Throttle body of any size/design via mechanical (cable/rod) actuation using at least 2 return springs located on the throttle body
- Intake system restrictor (to limit power capability) between the throttle body and engine of 20mm maximum

The car must be reliable and easy to maintain while still achieving the high performance needed to race competitively. The objective of the project is not to turn a profit on the sale of the car, but rather in the development and building of the car.

The primary aim of the project is for students to gain practical knowledge in their respective fields of study, while developing skills that they will use in their later careers.

The competition will not only evaluate the technical aspects of the completed car but will also seek to evaluate the different marketing and sales plans of the competing teams. It therefore requires input from the students across the academic institution. It follows therefore that the project will aim to integrate the different academic backgrounds of the students involved to work closely on a project with a shared common outcome.

NMMU Racing



NMMU Racing will be the **only** team from Southern Africa to participate in the Formula Student competition, meaning that the NMMU and indeed Port Elizabeth will be setting the benchmark in terms of **skills development with international exposure** for the students. In doing so, we hope to gain local community support for the project by enhancing the image of the city and institution as a whole. **NMMU Racing** has a view of creating a Formula Student in South Africa and invite as many South African Universities to compete.

So if you have a burning desire to better develop your knowledge and skills or even learn more skills **NMMU Racing** will welcome your enthusiasm and commitment. And commitment may sometimes be uncomfortable. Yet it will be fun, you will learn a lot and meet and interact with some interesting people.

So if you think you may have to invest too much time to **NMMU Racing**, delete these pages and continue with your studies. Good Luck!

But if you **realise** there is more to this world than reading some books and answering some questions and be fooled by popular media into believing the instant millionaire can be created without hard work...then welcome to the Real world and Welcome to **NMMU Racing**.

The Engineering Division consists of 4 departments:

- **Engine and Drive train**
- **Suspension**
- **Electronics**
- **Frame**

The Business Division consists of 3 departments:

- **Marketing** – responsible for designing and creating mediums for communicating information about the project, creating flyers, posters, stickers, websites, corporate id, letterheads. photos, video production, merchandise, events etc.
- **Fundraising** - responsible for presenting the project to corporate and institutions to raise the funding necessary
- **Financial Control** – drawing up budgets and cost reports

The business division therefore requires individuals with different skills but enthusiasm crosses all borders. If you keen we want to hear from you.

A few sites you may want to visit to familiarize yourself with Formula Student:

www.formulastudent.de (look at registered teams for other team's links)

www.fsae.com

www.youtube.com (search for Formula Student related videos)

www.google.com (info and pics)

www.fstotal.com

www.formulastudent.com

www.wob-racing.de

Competition Category	Outline of Competition	Awarded Points
Vehicle inspection	The following tests are conducted: Compliance with vehicle safety and design requirements; Braking test (4-wheel locked state); Exhaust noise test (110 dB or less under set conditions); Tilt-table test (no fuel leakage when the vehicle is inclined at 45°, and no roll-over when the vehicle is tilted to 60° with the driver seated).	-
Cost	This competition aims to teach competitors that budget and cost management are important factors that must be considered in vehicle manufacturing activities. While comparing with the actual vehicle, checks are conducted of (1) the cost accuracy of a cost report submitted in advance and (2) manufacturing quality and workmanship, etc., of each team's vehicle. Further, the costs detailed in the report and vehicle compliance are examined. An oral question session is conducted concerning the component and manufacturing process. Based on this, the competitor's knowledge and level of understanding is assessed.	100
Presentation	This competition aims to assess the competitor's presentation skills. The hypothetical background scenario of the presentation is that the presenter must 'sell' the idea to a panel of directors of a manufacturing company the outstanding design features of their vehicle.	75
Design	An evaluation will be conducted based on pre-submitted design materials and the vehicle itself. This evaluation will look at (a) what type of technologies have been utilized in the vehicle, (b) what ingenious techniques and approaches have been utilized, and (c) whether the adopted technologies are suitable for market release. More specifically, an oral question session is conducted concerning such matters as the appropriateness of the design of the vehicle body and structural components, the degree of innovation, workability, ease of assembly and maintenance.	150
Acceleration	0-75m acceleration test. A time competition in which 2 drivers from each team run twice each (4 times in total).	75
Skid pad	Corning performance evaluation on a figure-of-eight course. A time competition in which 2 drivers from each team run twice each (4 times in total).	50
Autocross	Competitors run 1 full lap of a roughly 950m course that includes straights, bends, slalom and a chicane. A time competition in which 2 drivers from each team run twice each (4 times in total). The start order of Endurance is determined according to the team performance of Autocross.	150
Endurance	Competitors run 22 full laps of a roughly 1,000m course that includes straights, bends, slalom and a chicane. The vehicle's overall performance and reliability are evaluated based on running speed.	300
Fuel Economy	An evaluation is conducted based on the fuel consumption during endurance running.	100
Total Points		1000