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Module Code:3ACM0050

Title of Module

Full Title: Motorsport Engineering

Short Title: Motorsport Eng

MODULE

3ACM0050 (A 05/6)

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Version: 1

Credit Points: 15

Level / ECTS Level: 3

First Offered: 1/9/1999 00-00-00

6. Home Department:

AAD

7. Departments(s) contributing to teaching:

9. Module Aims:

- * develop an understanding of tools required for motorsport
- * develop both a practical and theoretical understanding of a range of these tools
- * apply the techniques and skills developed to real life examples

10a. Learning Outcomes: Knowledge and Understanding:

- * analyse and understand race suspension systems and use their knowledge to prescribe/modify a set-up for certain requirements.
- * evaluate and adjust suspension systems using a four jack rig, checking for Jack Up/Down roll stiffness damping rates natural frequencies etc.
- * understand the principles of data logging
- * be able to log data in the field and provide useful data to the set-up / development engineers and drivers
- * use Pi System with the latest software along with appropriate transducers and real race car data. Also the

opportunity for some students to take part in a real top level race car test session.

- * communicate effectively and succinctly with the range of personnel in the team
- * be able to record and optimise the operating parameters of race tyres using the formula student vehicle as a test bed.
- * have an understanding of the aerodynamic properties of a race car and the role of aeromapping for aerodynamic set-up.

10b. Learning Outcomes: Skills and Attributes:

- * select and apply appropriate computational aids in order to optimize the set-up of a race car.
- * interpret data relating to the performance characteristics and make judgments and modifications accordingly.
- * possess a working knowledge of the various areas of a competition car e.g. engine, suspension, data analysis and aerodynamics.

11. Module Content

11a Module Content:

A practical and theoretical course for a potential race engineer. Many aspects of motorsport are covered many with practical examples and guest lectures from those in the industry.

This course aims to develop an understanding of tools required for motorsport, develop both a practical and theoretical understanding of a range of these tools and give the ability to apply the techniques and skills to real life examples.

It encompasses data logging and analysis, safety in race cars, engine mapping and development, tyre technology, suspension system analysis, damper analysis, aerodynamics and dynamic testing, a drivers perspective, performance modelling and 'the race'.

11b. Further details on how the learning outcomes of the module will be achieved:

Students will study a selection of topics such as the following-

DATA LOGGING AND ANALYSIS

Using real data collected from a variety of race cars and the opportunity for some to drive a competition vehicle.

SAFETY IN RACE CARS

Race cars are not a 'safe' working environment but it is the engineers task to minimise the chance and reduce the effects of any incident. You will look at the current levels of safety provided by past and current race cars and investigate future methods of protecting the driver.

ENGINE MAPPING AND DEVELOPMENT

Using an engine dyno and engine mapping you will look at the options open to the engine tuner to maximise the 'performance' of the engine. Engine performance software based prediction.

TYRE TECHNOLOGY

The four points of contact with the track, you will look at the construction of the carcass, compound and operating parameters of a race tyre along with the best way of using the tyre and monitoring its performance

SUSPENSION SYSTEM ANALYSIS

Be able to use to analyse race suspension systems. Using real examples evaluation and adjustment of suspension systems using a four jack rig, Checking for Jack Up/Down roll stiffness damping rates natural frequencies etc..

DAMPER ANALYSIS

Look at the effect of the dampers on the car, the use of a damper dyno, the interpretation of the results, the nose, bump / rebound, bleed and shim stacks etc.

AERODYNAMICS

Aero balance and optimisation drag reduction and induction enhancement. Lab/ demo work on centre of gravity measurement and suspension set-up.

A DRIVERS PERSPECTIVE

The opportunity to talk to a front line driver and get an insight into the job he has to do and what he requires from the team, engineer, data logger etc..

THE RACE

How to run your first race, ensuring all goes well and when it doesn't keeping the image up. The opportunity to take part in a 6 hr endurance race with the pressures of the preparation, set up, driver selection and 'running the race to the best of your ability.

12. Language of Delivery:

English

13. Language of Assessment:

English

14. Assessment Details (Academic):

Coursework: 100

Exam: 0

Other: Typically, assessment will consist of--

In depth analysis of real track data using latest software (45%)

Laboratory write-ups (20%)

Spreadsheet assignment on spring-damper measurements (10%)

Engine development assignment (25%)

Assessment Notes:

15. Locations(s):

UH HATFIELD

16. Pre and Co-Requisite:

Pre-Requisite

Co-Req

Prohibited

17. Subject Board of Examiner/s:

AERO/CIVIL/MECH ENG L2/3

18. Comments

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