MODULE SPECIFICATION

Part 1: Information			
Module Title	Motorsport Performance		
Module Code	UFMFT9-30-3	Level	Level 6
For implementation from	2019-20		
UWE Credit Rating	30	ECTS Credit Rating	15
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Module type:	Standard		
Pre-requisites	Automotive Technology 2019-20		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Overview: This module introduces advanced automotive/motorsport specific content in engines, aerodynamics, vehicle dynamics and vehicle systems. The knowledge presented here will be used to extend specialist knowledge at level 4.

Educational Aims: See Learning Outcomes

Outline Syllabus: The syllabus includes:

Vehicle Dynamics (Chassis):

Vehicle control and design parameters that impact on handling performance.

Yaw and roll analysis.

Suspension concepts and design

Critical and characteristic speeds and static margin, yaw and roll.

Experimental techniques and vehicle handling performance prediction.

Chassis data acquisition and analysis.

Vehicle Dynamics (Aero):

Ground effect;

Wheel drag.

Vortices and vortex generation.

Effect of Aerodynamic force on Performance - Aerodynamic force and maximum speed; Drag effect on fuel consumption and acceleration.

Fundamental analysis of forces affecting car stability - Position of the centre of aerodynamic pressure; Side force; Aerodynamic moments about centre of gravity.

Effect of Aerodynamic forces on steady stability - Equations of equilibrium; The static margin; Turning characteristics.

Wind tunnels and Measurement techniques.

Engines (Semester 1):

Review of engine performance descriptors and terminology.

Analysis of complex problems: analytical and numerical methods.

Analytic approaches: the Air Standard cycle; review of thermodynamics.

Numerical approaches: a framework for a simulation model; validation.

Synergy of theoretical modelling and experimental testing: Willan's Line.

Properties of the working fluid; standard methods of prediction; approximations and simplifications.

Fuel-Air mixtures; stoichiometry.

The Fuel-Air cycle; improved predictive capability.

The combustion process: underlying processes, empirical models, implementation in simulation.

Ignition Timing: simulations, observations and implications.

Gas Exchange Processes: analytic and numerical approaches; throttled running, pumping work, residual gas fractions.

Teaching and Learning Methods: All group lecture supported by small group laboratory sessions that will provide experience of empirical methods.

Study time outside of contact hours will be spent on going through exercises and example problems as well as assignment preparation.

Scheduled learning includes lectures, tutorials\lab sessions.

Independent learning includes hours engaged with essential reading, assignment preparation and completion.

Contact Hours:

Activity:

Contact: 72 hours
Assimilation and skill development: 126 hours
Coursework: 34 hours
Exam preparation: 68 hours
Total: 300 hours

Part 3: Assessment

Component A: Examination
Assessed via end of year Exam (3 hours, 100%) to assess the students understanding of concepts and techniques.

Component B: Coursework
Assessed via 1 piece of coursework on vehicle dynamics in semester 1 (100%) to encourage engagement and focus on formative function and independent learning.

First Sit Components	Final Assessment	Element weighting	Description
Practical Skills Assessment - Component B		25 %	Coursework assessment for practical work semester 1
Examination - Component A	✓	75 %	Exam
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Practical Skills Assessment - Component B		25 %	Coursework assessment for practical work semester 1
Examination - Component A	✓	75 %	Exam

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will achieve the following learning outcomes:

Module Learning Outcomes	Reference
Steady state vehicle dynamics, vehicle aerodynamics and its impact on performance	MO1
Show detail knowledge and understanding of engine combustion and modelling	MO2
Develop knowledge and understanding of the techniques for solving and analysing complex problems relating to vehicle dynamics	MO3
Show cognitive skills in developing modelling and simplifying real problems, applying fundamental principles of mechanical engineering to the analysis of realistic problems and making recommendations based on analysis	MO4
Ability to model and simplify real problems, apply mathematical methods of analysis, and understand the capabilities of computer based modelling	MO5
Demonstrate key transferable skills in problem formulation and decision making, interpreting experimental results	MO6
Demonstrate the ability to progress to independent learning	MO7

Contact Hours

Independent Study Hours:

Independent study/self-guided study	228

	Total Independent Study Hours:	228
	Scheduled Learning and Teaching Hours:	
	Face-to-face learning	72
	Total Scheduled Learning and Teaching Hours:	72
	Hours to be allocated	300
	Allocated Hours	300
Reading List	*The reading list for this module can be accessed via the following link:* https://uwe.rl.talis.com/modules/ufmft9-30-3.html	

Part 5: Contributes Towards
This module contributes towards the following programmes of study: