



## MODULE SPECIFICATION

Part 1: Information			
Module Title	Motorsport Performance		
Module Code	UFMFT9-30-3	Level	Level 6
For implementation from	2018-19		
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		
Contributes towards			
Module type:	Standard		
Pre-requisites	Automotive Technology 2018-19, Motorsport Technology 2017-18		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description
<p><b>Overview:</b> 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.</p> <p><b>Educational Aims:</b> See Learning Outcomes</p> <p><b>Outline Syllabus:</b> The syllabus includes:</p> <p>Vehicle Dynamics (Chassis):</p> <p>Vehicle control and design parameters that impact on handling performance.</p> <p>Yaw and roll analysis.</p> <p>Suspension concepts and design</p>

## STUDENT AND ACADEMIC SERVICES

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.

## STUDENT AND ACADEMIC SERVICES

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 be able to:	
		<b>Module Learning Outcomes</b>
	MO1	Steady state vehicle dynamics, vehicle aerodynamics and its impact on performance
	MO2	Show detail knowledge and understanding of engine combustion and modelling
	MO3	Develop knowledge and understanding of the techniques for solving and analysing complex problems relating to vehicle dynamics
MO4	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	

## STUDENT AND ACADEMIC SERVICES

	MO5	Ability to model and simplify real problems, apply mathematical methods of analysis, and understand the capabilities of computer based modelling
	MO6	Demonstrate key transferable skills in problem formulation and decision making, interpreting experimental results
	MO7	Demonstrate the ability to progress to independent learning
Contact Hours	<b>Contact Hours</b>	
	<b>Independent Study Hours:</b>	
	Independent study/self-guided study	228
	<b>Total Independent Study Hours:</b>	228
	<b>Scheduled Learning and Teaching Hours:</b>	
	Face-to-face learning	72
	<b>Total Scheduled Learning and Teaching Hours:</b>	72
	<b>Hours to be allocated</b>	300
	<b>Allocated Hours</b>	300
Reading List	<p>The reading list for this module can be accessed via the following link:</p> <p><a href="https://uwe.rl.talis.com/modules/ufmft9-30-3.html">https://uwe.rl.talis.com/modules/ufmft9-30-3.html</a></p>	