**MODULE SPECIFICATION**

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|---|---|---|---|---|---|
| **Module Title:** | Advanced Automotive Chassis and Control | **Level**: | 7 | **Credit Value**: | 20 |

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|---|---|---|---|---|---|
| **Module code**: | ENG755 | **Is this a new module?** | Yes | **Code of module being replaced**: | N/A |

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|---|---|---|---|
| **Cost Centre**: | GAPC | JACS3 **code**: | H330 |

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|---|---|---|---|
| **Trimester(s) in which to be offered:** | T2 | **With effect from:** | September 17 |

| | | | |
|---|---|---|---|
| **School:** | Applied Science, Computing and Engineering | **Module Leader:** | O.Durieux |

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|---|---|
| Scheduled learning and teaching hours | 52 hrs |
| Guided independent study | 148 hrs |
| Placement | 0 hrs |
| **Module duration (total hours)** | 200 hrs |

| **Programme(s) in which to be offered** | Core | Option |
|---|---|---|
| MSc Automotive Engineering | ✓ | ☐ |

| **Pre-requisites** |
|---|
| None |

Office use only
Initial approval February 17
APSC approval of modification N/A Version 1
Have any derogations received Academic Board approval? Yes ✓ No ☐

**MODULE SPECIFICATION**

| **Module Aims** |
|---|
| This module is designed to provide students with a detailed understanding and knowledge in automotive chassis engineering, the factors that influence stability, comfort and efficiency of vehicles. |

| **Intended Learning Outcomes** | | | |
|---|---|---|---|
| At the end of this module, students will be able to | | Key Skills | |
| 1 | Analyse the suspension dynamics performance of any conventional wheeled vehicle in low and high speed use. | KS1 | KS2 |
| | | KS3 | KS4 |
| | | KS6 | |
| 2 | Analyse the handling performance of any conventional wheeled vehicle in low and high speed steady state conditions. | KS1 | KS2 |
| | | KS3 | KS4 |
| | | KS6 | |
| 3 | Predict and improve the aerodynamic of a ground vehicle in normal use. | KS1 | KS2 |
| | | KS3 | KS4 |
| | | KS6 | |
| Transferable/key skills and other attributes | | | |
| Application of science in technology, design for efficiency. | | | |

| **Derogations** |
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| A derogation from regulations has been approved for this programme:<br><br>Students are required to achieve a minimum overall module mark of 50%, with each element of assessment (where there is more than one assessment) requiring a minimum mark of 40%. |

**Assessment:**

All intended learning outcomes will be assessed by means of one 3 hour exam.

Analytical and descriptive questions will typically be proposed, the student will not have the choice in the questions to be answered.

| Assessment number | Learning Outcomes to be met | Type of assessment | Weighting (%) | Duration (if exam) | Word count (or equivalent if appropriate) |
|---|---|---|---|---|---|
| 1 | 1, 2, 3 | Examination | 100% | 3 hrs | |

**Learning and Teaching Strategies:**

The module will be delivered through lectures, tutorials and student-driven investigative work assisted by the use of computer based design and simulation software such as ANSYS and MATLAB. Relevant video material and practical demonstrations will be used to strengthen topics from within the module.

**Syllabus outline:**

**Chassis:**
Dynamics of the chassis,
Road interactions.
**Steering:**
Low and high speed turning theory, effects of tractive forces.
Steering geometry errors.
**Suspension:**
Vibrational Analysis of quarter (and half car model (one and two DOF).
Active suspension analysis.
**Brakes:**
Braking dynamics,
Brake disk analysis,
**Vehicle Aerodynamics:**
Factors influencing
Aerodynamics of open and closed vehicles.

**Bibliography:**

**Essential reading**

Adams H. (1992); *Chassis Engineering HP1055;* HPBooks.

Hammill D. (2006); *Suspension and Brakes High-Performance Manual*; Veloce

Gillespie T. (1992); Fundamentals of Vehicle Dynamics; SAE International.

**Indicative reading**

Katz J. (2006); *Race Car Aerodynamics; Bentley Publishers.*

*Segers J (2014);* Analysis Techniques for Race Car Data Acquisition (2nd edition); SAE International.

Haney P.W. (2003); *The Racing and High-Performance Tire: Using the Tires to Tune for Grip and Balance; SAE International.*