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| Title: | Automotive Mathematics APPROVED |
| Long Title: | Automotive Mathematics |
| Module Code: | MATH6001 |
| Duration: | 1 Semester |
| Credits: | 5 |
| NFQ Level: | Fundamental |
| Field of Study: | Mathematics |
| Valid From: | Semester 1 - 2016/17 (September 2016) |
| Module Delivered in | 3 programme(s) |
| Module Coordinator: | David Goulding |
| Module Author: | AINE NI SHE |
| Module Description: | An introduction to fundamental mathematical calculations and problem solving directly relating to motor vehicle construction and automotive principles. |
| Learning Outcomes | |
| <i>On successful completion of this module the learner will be able to:</i> | |
| LO1 | Solve problems involving basic arithmetic, algebra and mensuration relating to automotive applications. |
| LO2 | Solve equations, evaluate and transpose formulae. |
| LO3 | Apply trigonometry to solve problems with relating to automotive applications. |
| LO4 | Draw and interpret graphs relating to automotive applications. |
| Pre-requisite learning | |
| Module Recommendations <i>This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named MTU module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).</i> | |
| Incompatible Modules <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module. You may not earn additional credit for the same learning and therefore you may not enrol in this module if you have successfully completed any modules in the incompatible list.</i> | |
| No incompatible modules listed | |
| Co-requisite Modules | |
| No Co-requisite modules listed | |
| Requirements <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed. You may not enrol on this module if you have not acquired the learning specified in this section.</i> | |
| No requirements listed | |

Module Content & Assessment

Indicative Content

Arithmetic and Mensuration

Ratio and proportion, percentage calculations, tax calculations, simple and compound interest. Metric and imperial conversions. Engine capacity, compression ratio, swept volume, clearance volume and re-bore calculations. Wheel circumference, aspect ratio, speed and distance calculations. Cross-sectional area, surface area, volume, density of regular and irregular shapes.

Algebra

Laws of indices, standard form, binary and denary systems. Simple and simultaneous equations, evaluation and transposition of formulae.

Trigonometry

Trigonometrical ratios, Sine, Cosine and Tangent tables, constructing angles, Sine and Cosine waves, angle of elevation and depression, Sine Rule, Cosine Rule.

Graphs

Constructing, plotting and analysing graphs relating to automotive applications – engine power and torque curves, valve lift curve, piston movement to crankshaft rotation graphs.

Assessment Breakdown

| | % |
|----------------------------------|--------|
| Course Work | 40.00% |
| End of Module Formal Examination | 60.00% |

Course Work

| Assessment Type | Assessment Description | Outcome addressed | % of total | Assessment Date |
|------------------------|---|-------------------|------------|-------------------|
| Short Answer Questions | Series of in-class tests based on homework and lab work. These tests will be held regularly over the semester, normally once per fortnight. | 1,2,3,4 | 20.0 | Every Second Week |
| Short Answer Questions | Written Assessment | 1,2 | 20.0 | Week 7 |

End of Module Formal Examination

| Assessment Type | Assessment Description | Outcome addressed | % of total | Assessment Date |
|-----------------|-----------------------------------|-------------------|------------|-----------------|
| Formal Exam | End-of-Semester Final Examination | 1,2,3,4 | 60.0 | End-of-Semester |

Reassessment Requirement

Repeat examination

Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.

The institute reserves the right to alter the nature and timings of assessment

Module Workload

| Workload: Full Time | | | | |
|---|---|--------------|-------------------|--|
| <i>Workload Type</i> | <i>Workload Description</i> | <i>Hours</i> | <i>Frequency</i> | <i>Average Weekly Learner Workload</i> |
| Lecture | Lecture | 3.0 | Every Week | 3.00 |
| Tutorial | Based on lecture notes and exercise sheets | 1.0 | Every Second Week | 0.50 |
| Independent & Directed Learning (Non-contact) | Review lecture material, worksheets and further study | 3.0 | Every Week | 3.00 |
| Lab | Use of software packages to enhance learning | 1.0 | Every Second Week | 0.50 |
| Lecture | Lecture | 3.0 | Every Week | 3.00 |
| Independent & Directed Learning (Non-contact) | Review of exercise sheets | 3.0 | Every Week | 3.00 |
| Total Hours | | | | 14.00 |
| Total Weekly Learner Workload | | | | 13.00 |
| Total Weekly Contact Hours | | | | 7.00 |

| Workload: Part Time | | | | |
|---|-----------------------------|--------------|------------------|--|
| <i>Workload Type</i> | <i>Workload Description</i> | <i>Hours</i> | <i>Frequency</i> | <i>Average Weekly Learner Workload</i> |
| Tutorial | Tutorial | 1.0 | Every Week | 1.00 |
| Lecture | No Description | 3.0 | Every Week | 3.00 |
| Independent & Directed Learning (Non-contact) | No Description | 3.0 | Every Week | 3.00 |
| Total Hours | | | | 7.00 |
| Total Weekly Learner Workload | | | | 7.00 |
| Total Weekly Contact Hours | | | | 4.00 |

Module Resources

Recommended Book Resources

- Allan Bonnick 2008, *Automotive science and mathematics*, Butterworth-Heinemann Oxford [ISBN: 978-075068522]
- J.O. Bird 2014, *Basic Engineering Mathematics*, 6th Ed., Routledge [ISBN: 978-041566278]
- J.O. Bird 2010, *Basic Engineering Mathematics [ebook]*, 6th Ed., Newnes [ISBN: 9780080959184]

Supplementary Book Resources

- Jason C. Rouvel 2006, *Automotive Mathematics*, Prentice Hall [ISBN: 0-13-114873-7]
- John Bird 2014, *Engineering Mathematics*, 7th Ed., Newnes Oxford [ISBN: 978-041566280]
- John Bird 2010, *Engineering Mathematics [ebook]*, 6th Ed., Newnes Oxford [ISBN: 97800809656]

This module does not have any article/paper resources

Other Resources

- Website: *Module-specific Blackboard materials*
<http://cit.blackboard.com>
- Website: *CIT Maths Online*
<http://cit.blackboard.com>
- Website: *MathCentre*
<http://www.mathcentre.co.uk>
- Website: *MathTutor*
<http://www.mathtutor.ac.uk/>

Module Delivered in

| Programme Code | Programme | Semester | Delivery |
|-----------------------|--|-----------------|-----------------|
| CR_EABMT_8 | <u>Bachelor of Science (Hons) in Automotive Business Management and Technology</u> | 1 | Mandatory |
| CR_TTMGT_7 | <u>Bachelor of Science in Automotive Technology and Management</u> | 1 | Mandatory |
| CR_TTMAT_6 | <u>Higher Certificate in Engineering in Automotive Technology and Management</u> | 1 | Mandatory |