

Liverpool John Moores University

Title: AUTOMOTIVE MATERIALS AND MANUFACTURING PROCESSES
Status: Definitive
Code: **5501ICBTAE** (127057)
Version Start Date: 01-08-2021
Owning School/Faculty: Engineering
Teaching School/Faculty: ICBT, Colombo

Team	Leader
Alison Cotgrave	Y

Academic Level: FHEQ5 **Credit Value:** 15 **Total Delivered Hours:** 62
Total Learning Hours: 150 **Private Study:** 88

Delivery Options

Course typically offered: Semester 1 and Summer

Component	Contact Hours
Lecture	45
Tutorial	15

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	Coursework 1500 Words	30	
Exam	AS2	Exam	70	2

Aims

This unit will provide learners with the necessary background knowledge and understanding of the mechanical properties of materials, testing of materials for their properties, selection, processing or shaping materials into components through different manufacturing processes with special emphasis to automotive applications.

This unit also aims to provide students with the appropriate set of skills in order to

design an automotive related product and select the most adequate manufacturing processes to transform raw materials into an engineered product based on economic, functional and sustainable aspects including application of machine tools.

Learning Outcomes

After completing the module the student should be able to:

- 1 Critique the differences in properties of engineering materials with the aid of composition and the structure.
- 2 Use the results of materials tests and published data to select materials for a given application and analyze the function/s of a product in terms of the material constraints on its design.
- 3 Rank suitable materials and processing methods for a specific product requirement and describe different manufacturing processes used to manufacture automotive components.
- 4 Assess the compatible materials for a selected manufacturing process considering a wide range of constraints.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Coursework	1	4
Exam	2	3

Outline Syllabus

Mechanical properties of common engineering materials used in automotive engineering applications

Structure of common engineering materials and the influence of compositions and the structure on properties

Common material testing methods to assess properties of engineering materials and testing standards

Sources of material property data and use of materials property data, property charts and selection of materials using Ashby Charts

Requirements of materials properties for a given product and selection of suitable Manufacturing processes to suit the application

Most Commonly Used Automotive Materials: High Strength Steel (HSS):High Strength Low Alloy (HSLA)Advanced High Strength Steel (AHSS)Ultra High Strength Steel (UHSS)Boron/Martensite Aluminum 5000/6000 (AL 5000/6000MagnesiumCarbon Fiber Reinforced Plastic (CFRP)

Innovative Methods and processes of Automotive Parts Manufacturing: Hot Formed Steel Warm Formed Aluminum:High Pressure Thin Walled Aluminum Die Casting Resin Transfer Molding3D Printing

Common manufacturing machines, tools, equipment

Learning Activities

Students will be supported in their learning, to achieve the above learning outcomes, in the following ways:

Through a series of lectures and tutorials and through participation within laboratory practical sessions for problem solving.

Self-managed investigative study to analyse cases related to selection of materials and failure of materials

In-class participation and case studies are key features of this module.

A recommended resource list - indicating key reading, internet support and physical learning assistance, is provided to help enable students to undertake self-directed study.

Notes

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