

SRM University  
**M.Tech Automotive Hybrid Systems Engineering**  
 (Collaborative program with NFTDC, Hyderabad)  
 (Proposed syllabus from the academic year 2015-16)

**Optional / elective courses (program electives)**

		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>AH2121</b>	<b>MATERIALS AND MANUFACTURING PROCESSES FOR AUTOMOTIVE SYSTEMS</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
	<b>Total Contact Hours-45</b>				
	<b>Prerequisites</b>				
	<b>Nil</b>				
<b>PURPOSE</b>					
To study different materials and manufacturing processes used in the manufacturing of automotive systems.					

**Materials:**

Selection of Materials for design Developments in automobile technology - criteria for material selection - Functional requirements- Mechanical properties, Thermal properties, electrical properties, magnetic properties, chemical properties, -Economics, suitability for recycling and disposal after use. Need and development of lightweight materials on vehicle design, Aluminium, Magnesium and Ti wrought and cast alloys used in automotive applications. Advanced materials for automobile, power sources materials for super capacitors and electrolytic cells for automobiles.

**Processing of Composites:**

Composites- metallic, non- metallic and other specialty materials used in automotive design- Fabrication Techniques, Properties and performance. Role of Nano technology , Smart Materials, Recent development in auto components

**Conventional Manufacturing Processes:**

Auto Components made of conventional manufacturing processes. Casting and Machining Processes, Cutting and Joining Processes, Characteristics and fabrication of plastically deformed bodies. Powder Metallurgy (PM) components- Powder Metallurgy process

**Additive and Precision Manufacturing**

Working Principles, Methods, Sheet lamination processes, Stereo Lithography, Laser Sintering, Fused Deposition Method, Directed Energy Deposition (DED) - Laser engineered net shaping, directed light fabrication, direct metal deposition, 3D laser cladding Applications and Limitations, Rapid tooling, Techniques of rapid manufacturing; Ultrasonic Machining (USM), Electro Chemical Machines (ECM), Electro Chemical Grinding (ECG), Chemical Machining (CHM), Electrical Discharge Machining (EDM), Electron Beam Machining (EBM) and Ion Beam machining (IBM) processes.

**Surface engineering-** auto components subjected to wear, heat and corrosion environments. Conventional surface engineering practices- carburizing, Nitriding, carbo-nitriding - Electro plating.

Advanced surface engineering practices – HVOF, Plasma and Laser assisted microstructural modification, PVD-CVD\_Ion implantation – DLC coatings- Carbide Nitride Coatings. Characterization and performance of modified surfaces.

**References:**

1. K.K.Chwala, "Composite Materials", springer 1987
2. Sharma P.C, "A Text Book of Production Engineering", S.Chand and Co. Ltd., IV Edition, 2008.
3. Budinski.K.G and Budinski.M.K, "Engineering Materials Properties and selection", Prentice Hall of India Private Limited, New Delhi, 2004.

4. Serope Kalpakjian, "Manufacturing Engineering and Technology", Third Edition, Addison-Wesley Publishing Co., Boston, 2009.
5. Madou.M.J, "Fundamentals of micro fabrication", CRC Press, USA, 1997.
- 6.Chua.C.K, "Rapid Prototyping", John Wiley, New York, 1997.
7. Hilton.P.D and Marcel Dekker, "Rapid Tooling", New York, 2000.