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)

		L	T	P	C
AH2126	**SYSTEM ENGINEERING AND INTEGRATION**	**3**	**0**	**0**	**3**
	Total Contact Hours-45				
	Prerequisites				
	Nil				
PURPOSE					
To study the various system integration tools, safety and regulations.					

Top down and bottom up systems thinking for Engineering & Integration; System Engineering for xEVs: Crucial Technologies that go in to system engineering of xEV systems; new technologies that can disrupt the evolution of xEV systems; - India Specific Vehicle Population - xEV Components to System Assembly - 2W EV Vehicle Systems Engineering & Integration - 3W EV Vehicle Systems Engineering & Integration - 4W EV 1 ton class Cargo systems - Off Road vehicle Systems (in plant cargo systems, Golf Carts etc) - 4W xEV hybrid systems integration - Buses and Large Vehicle Systems Engineering Solutions.

Systems Integration and Analytical Tools

Vehicle Development Process Overview - Requirements Development - Hybrid Components and Architectures - Major components in hybrid Power Train - Controls integration - Component sizing and integration tradeoffs - Hybrid architecture overview - System Design and Development Considerations - Vehicle integration (ex. performance, drivability, NVH) - Power Train integration (ex. energy, power, efficiency, torque, thermal management) - HV/LV electrical systems (ex. safety, DC/AC voltage, charging system, efficiency, cables, connectors, fuses, - Chassis (ex. braking, vehicle dynamics, powertrain to chassis dynamics, ride and handling, steering, fuel system) - Displays/information (ex. messages, information aids, usage efficiency aids) - HVAC (ex. HV compressor, HV heater, cabin comfort, efficiency considerations) - Verification and Validation Considerations - Verification and validation test requirements and planning - Component test considerations - System test considerations - Fleet testing.

Safety, Testing, Regulations, and Standards

Standards Roadmap for Electric Vehicles - SAE; UL; IEC - Performance and Safety - Applicable Battery Standards - Battery Transportation & Safety - Battery Pack: SAE J2464/J2929 - Compare and Contrast the various industry standards - Vehicle and Charging Standards - FMVSS - Electric Vehicle Supply Equipment (EVSE) Descriptions - Governing Bodies for Regulations - Certification Requirements and Options - Performance Standards - Charging interfaces; SAE J1772 charge protocol - USABC/FREEDOMCAR - Battery Characterization and life cycle testing - Video Demonstrations - Mechanical Shock; Short Circuit; Overcharge; - Fire Exposure.

References:

Lecture notes will be prepared and given.