

Course Title	Processing of Polymers and Composites		Course Code	MExxxxx			
Dept./ Specialization	Mechanical Engineering / Materials and Design		Structure (LTPC)	3	1	0	4
To be offered for	UG/PG		Status	Core		Elective <input type="checkbox"/>	
Faculty Proposing the course	Dr. Venkata Timmaraju Mallina		Type	New		Modification <input type="checkbox"/>	
Recommendation from the DAC: Yes			Date of DAC	01-06-2021			
External Expert(s)	Prof. R. Velmurugan, IIT Madras						
Pre-requisite	Basic engineering materials and manufacturing processes courses		Submitted for approval		46 th Senate		
Learning Objectives	<ul style="list-style-type: none"> To impart the knowledge on flow properties and behavior of polymers and processing methods of polymers To apprise the features of composite materials and specific manufacturing processes for manufacturing composite products To explore the process parameters for manufacturing of wide variety of polymer and composite products 						
Learning Outcomes	<p>After completion of the course, students will be able:</p> <ul style="list-style-type: none"> To correlate the properties of polymers and composites with processing parameters To find effective and suitable manufacturing process for various polymer and composite products To define process parameters for manufacturing various polymer and composite products 						
Contents of the course <i>(With approximate break-up of hours for L/T/P)</i>	<p>Fundamentals of polymer engineering: Identification of polymers, arrangement of polymer molecules, copolymers and polymer blends, polymer additives, thermal properties of polymers, rheology of polymer melts. (L8+T3)</p> <p>Processing of polymers: Extrusion, mixing processes, injection molding, special injection molding processes, thermoforming, calendaring, rotational molding, compression molding, transfer molding, Case studies – Define process parameters to manufacture various polymer products. (L13+T4)</p> <p>Fundamentals of composite materials: classification of composite materials, Raw materials for composite part fabrication, reinforcements, matrix materials, fabrics, prepregs, performs, molding compound, honeycomb and other core materials. (L6+T2)</p> <p>Manufacturing processes for thermoset composites: Prepreg lay-up, Wet lay-up, Spray-up, Filament winding, Pultrusion, Resin transfer molding, Structural reaction injection molding, Compression molding, Roll wrapping, Injection molding, Case studies – Define process parameters to manufacture various thermoset composite products. (L7+T3)</p> <p>Manufacturing processes for thermoplastic composites: Tape winding, Pultrusion, Compression molding, Hot pressing, Autoclave processing, Diaphragm forming, Injection molding, Case studies – Define process parameters to manufacture various thermoplastic composite products. (L6+T2)</p> <p>Manufacturing processes for carbon matrix composites: Pyrolysis and Chemical vapor deposition. (L2)</p>						
Text Book	<ol style="list-style-type: none"> T. A. Osswald and G. Menges, Material Science of Polymers for Engineers, 3rd edition, Hanser Publications, Cincinnati, 2010. ISBN: 978-1-56990-514-2. R. J Crawford, Plastics Engineering, 3rd edition, Butterworth-Heinmann, 2006, ISBN: 978-81-312-0174-9. S. K. Mazumdar, Composites Manufacturing: Materials, Product and Process Engineering, 1st edition, CRC Press LLC, New Delhi, 2002. ISBN: 0-8493-0585-3. K. K. Chawla, Composite Materials - Science and Engineering, 3rd Edition, Springer-Verlag NY, 2011, ISBN: 978-0-387-74365-3. 						
Reference Books	<ol style="list-style-type: none"> T. A. Osswald, Polymer Processing Fundamentals, 1st edition, Hanser / Gardner Publications, 1998. ISBN-13: 9781569902622. B. Strong, Fundamentals of Composites Manufacturing: Materials, Methods and Applications, 2nd edition, Society of Manufacturing Engineers, Michigan, 2008, ISBN: 978-087263854-9 						