WASHINGTON STATE UNIVERSITY
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School of Engineering and Computer Science

Mech 477: Manufacturing for Polymer Composites

Catalog Data:	**477 Manufacturing for Polymer Composites** 3 Course Prerequisite: MECH 309. Polymeric materials and their composites; various manufacturing processes; transport phenomena in composite manufacturing; process modeling and design. Typically offered Fall.
Class Schedule:	Three 50-minute lecture sessions per week, for one semester.
Laboratory Schedule:	None
Prerequisites by Course:	MECH 309
Prerequisites by Topic:	1. Structure of materials, phase equilibrium, phase transformations 2. Knowledge of mechanical failure, and mechanical properties 3. Materials testing methods
Required Texts:	A. Brent Strong, *Fundamentals of Composites Manufacturing: Materials, Methods and Applications*, SME, ISBN 13: 978-087263854-9.
Course Coordinator:	Dr. Hua Tan
Course Objectives:	1. Demonstrate the fluency in the language (terminology, nomenclature, etc.) of polymer materials and processing. 2. Ability to compare typical properties of composites with those of metals and ceramics. 3. Ability to predict mechanical, chemical, and physical properties of various common polymers based upon their molecular, micro, and macro structures. 4. Ability to understand major processes for polymer-based materials and compare the merits and demerits of these processes for making specific parts.
Topics Covered:	1. Introduction to polymer composites 2. Matrices, fiber reinforcement, and their properties 3. Composite design-laminate theory 4. Process fundamentals 5. Prepreg layup, wet layup, Compression molding, Liquid composite molding, Filament winding, Pultrusion 6. Thermoplastic Composites processing 7. Testing, machining and cutting of composites
Lab Experiments and Activities:	None
Course Outcomes:	Students will be able to:
	Assessed for Student Outcomes: 1-a. Understand fundamental principles underlying composites manufacturing processes. 1-b. Compare typical properties of plastics and composites with those of metals and ceramics.

	Other	1-c. Use proper transport models to solve the resin flows for specific composite manufacturing processes. 1-d. Use curing reaction chemical kinetics to properly select processing parameters for specific thermosetting materials. 3-a. Write reports that analyze a composite manufacturing process appropriate for a given part within various constraints. 3-b. Deliver well-organized and logical presentations related to composite manufacturing. 5-a. Develop project tasks and timelines with team members. 5-b. Contribute to the project effectively in a team.
Required or Elective Course:		Elective
Relationship of Course to Program:		Meets: Educational Objectives 1, 2, 3, 4 Student Outcomes 1 ,3, 5
Prepared by:		Dr. Hua Tan — Date: 04/09/2018 (4/9/18 mb)
Approved by USC:		4/9/2018