COURSE NUMBER: Vm418	**COURSE TITLE:** Mechanics of Composite Materials
TERMS OFFERED: Summer	**PREREQUISITES:** Vm 382
TEXTBOOKS/REQUIRED MATERIAL: "Mechanics of Composite Materials," R.M. Jones	**INSTRUCTOR:** Shane Johnson **DATE OF PREPARATION:** Nov. 30, 2012 **DATE OF UC APPROVAL:**
INSTRUCTOR(S): Shane Johnson	**SCIENCE/DESIGN:** n/a
CATALOG DESCRIPTION: An introduction to the mechanics of composite solids with an emphasis on the derivation of macroscopic constitutive laws based on the microstructure. Homogenization theory for periodic media. Effective stiffness properties of composites. Classical laminated plate theory. Failure theories and experimental results for laminates.	**COURSE TOPICS:** 1. Mechanics of Composite Materials 1.1 Introduction 1.2 Macromechanical Behavior 1.3 Elasticity Approach – Predicting Material Properties from Microstructural Constitutive Models 1.4 Classical Lamination Theory 1.5 Bending, Buckling and Vibration 1.6 Design of Composite Structures
COURSE STRUCTURE/SCHEDULE: Lecture: twice per week, 90 minutes each	

COURSE OBJECTIVES [Course Outcomes in brackets]	1. To provide the knowledge of the basic theories and experience through applying theory of mechanics of composite materials. [2-9] 2. To provide the knowledge and experience needed to communicate problems and solutions to others. [1,10-11]
COURSE OUTCOMES [Program Outcomes in brackets]	After completing Vm515, students should be able to: 1. Communicate effectively on the topic and analyze anisotropic material behavior 2. Apply lamination theory to analyze composite materials 3. Apply theory to analyze the mechanical behavior of composite plates in bending 4. Apply theory to analyze buckling behavior of composite materials 5. Analyze stress-strain in a multi-layered medium 6. Apply theory to analyze thermal stresses and strains in multi-layered medium 7. Apply Micromechanical theory to predict Macromechanical response & bound the mechanical response 8. Apply failure theories to design composite structures 9. Verify results using experimental analysis 10. Communicate effectively about engineering with composite materials, and effectively select materials for applications 11. Design a composite structure.
ASSESSMENT TOOLS [Course Outcomes in brackets]	Homework: Weekly assignments Midterm exam Project 1 , Matlab code for lamination theory[1,2,5,6,8] Project 2, Matlab code for micromechanical prediction of macroscopic material properties[7] Project 3, Design of composite structure including failure analysis [1-11] Final Exam [1-11]