

Course Title	Composite Materials Science and Engineering				
Course Code	MME 459				
Course Type	Elective Course				
Level	Undergraduate				
Year / Semester	4 th year / 7 th or 8 th Semester				
Teacher's Name	Matthew Zervos				
ECTS	6	Lectures / week	3 hours	Laboratories / week	0
Course Purpose and Objectives	An introduction to composite materials and their engineering applications with emphasis on materials. The purpose of this course is to expand the knowledge which mechanical engineering students have acquired from the materials science and engineering courses of the undergraduate curriculum in the direction of composites and their engineering applications. The objective of the course is to give students a working knowledge of composite materials science and engineering, how they are made and their engineering applications.				
Learning Outcomes	<ul style="list-style-type: none"> • Understand dimensionality and lengths scales of materials. • Have a knowledge of one-dimensional materials, how they are made. • Understand what is bottom-up versus top down manufacturing. • Understand what additive manufacturing is. • Know which matrix materials are used with one-dimensional materials • Know which naturally occurring fiber materials are important and their applications. • Know the mechanical properties of the most important fiber and composite materials. • Demonstrate use in important engineering applications including aerospace, marine, automotive. 				
Prerequisites	MME 155, MME 156	Required	None		
Course Content	Length scales, dimensionality, three, two, one and zero dimensional materials. Definition of nano, meso and macro scales. One dimensional materials: fibers, nanowires, nanorods, nanotubes; organic and inorganic e.g. carbon, polymethylmethacrylate etc. Methods of production. Ordered versus disordered networks of one-dimensional materials. Assembly, self-assembly, bottom-up versus top down approaches. Fabrication methods of ordered networks and additive manufacturing. Matrix materials e.g. metal, polymers etc. Prepreg composites. Naturally occurring fiber materials e.g. balsa wood, spider silk and their applications. Engineering applications, aerospace, marine, automotive, energy related.				
Teaching Methodology	<ul style="list-style-type: none"> • Lectures • Communicative, Collaborative • During the first week of the semester, the course syllabus is given to students, which includes information on the course content, expected learning outcomes, assessment and office hours. 				

Bibliography	<ul style="list-style-type: none">• Gajanan, B., <i>Structure and Properties of High-Performance Fibers</i>. Elsevier.
Assessment	<ul style="list-style-type: none">• Assignments and Presentations 30%• Midterm exam 30%• Final exam 40%
Language	Greek