

Course Title	Fundamentals of Ceramics II				
Course Code	MME 559				
Course Type	Elective				
Level	Graduate				
Year / Semester	Spring semester				
Teacher's Name	Ioannis Giapintzakis				
ECTS	8	Lectures / week	2 X 1,5 hours	Laboratories / week	NO
Course Purpose and Objectives	This is the second of the two-course series dedicated to ceramic materials. The main objective of the course is the in-depth familiarization of graduate engineering students with the science of sintering and microstructural development and with properties that are more microstructure dependent, such as fracture toughness, optical, magnetic, and dielectric properties.				
Learning Outcomes	<ul style="list-style-type: none"> • Discuss the science behind the sintering process. • Discuss the various aspects of brittle failure from several viewpoints. • Discuss the atomic processes and micromechanisms that are occurring during Creep, Subcritical Crack Growth, and Fatigue • Explain why thermal residual stresses develop and how to quantify them. • Discuss linear dielectrics from a microscopic point of view as well as the effects of temperature and frequency on the dielectric response • Discuss the basic principles and relationships between various parameters concerning magnetic and non-linear dielectric responses of ceramics • Discuss the basic interactions between electromagnetic radiation and ceramics with emphasis around the visible region 				
Prerequisites	NO	Required		NO	
Course Content	<p>This course deals with the science of sintering and microstructural development and with properties that are more microstructure dependent, such as fracture toughness, optical, magnetic, and dielectric properties.</p> <p>Sintering and grain growth – Mechanical Properties: Fast Fracture – Creep, Subcritical Crack Growth, and Fatigue – Thermal Properties – Dielectric Properties – Magnetic and Nonlinear Dielectric Properties – Optical Properties</p>				

Teaching Methodology	<p>Lectures; Projects on topics of materials and technologies related to the course; Written report; Presentations by students</p> <p>Communicative, Collaborative</p> <p>During the first week of the semester, the Syllabus of the course is given by the teacher, which includes information on the course content, expected learning outcomes, assessment and office hours</p>
Bibliography	<p>M. W. Barsoum, Fundamentals of Ceramics, McGraw Hill, New York (2003); Y. M. Chiang, W.D. Kingery, D. Birnie, Physical Ceramics: Principle of Ceramic Science and Engineering, John Wiley and Sons (1996)</p>
Assessment	<p>Project presentation (25%), Written report (25%), Midterm Exam (20%), Final Exam (30%)</p>
Language	<p>English</p>