Course Title	**Fundamentals of Ceramics I**				
Course Code	**MME 558**				
Course Type	**Elective**				
Level	Graduate				
Year / Semester	Fall 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 first 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 bonding, structure, and the physical and chemical properties that are influenced mostly by the type of bonding rather than the microstructure, such as defect structure and the atomic and electronic transport in ceramics.				
Learning Outcomes	• Discuss the main types of bonding found in ceramics • Identify, discuss and compare the arrangement of ions and atoms in crystalline ceramics • Discuss thermodynamic and kinetic issues related to ceramics • Discuss different types of defects, and especially point defects, found in ceramics • Discuss the phenomena of diffusion and electrical conductivity and their relation to defects and type of bonding found in ceramics • Explain why glasses form and discuss their structure and properties that make them unique				
Prerequisites	NO	Required	NO		
Course Content	This course deals with bonding, structure, and the physical and chemical properties that are influenced mostly by the type of bonding rather than the microstructure, such as defect structure and the atomic and electronic transport in ceramics. Bonding in ceramics – Structure of ceramics – Effect of chemical forces and structure on physical properties – Thermodynamics and kinetics - Defects in ceramics – Diffusion and electrical conductivity – Phase equilibria – Formation, Structure, and Properties of Glasses				
Teaching Methodology	Lectures; Projects on topics of materials and technologies related to the course; Written report; Presentations by students				

	Communicative, Collaborative 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
Bibliography	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)
Assessment	Written report (25%), Project presentation (25%), Midterm Exam (20%), Final Exam (30%)
Language	English