

Course Name	Fracture Mechanics of Composite Materials		
Semester, Year	First Semester, 2019 (Spring Term)	Number of Credits	2 credits
Course level	5000	Course Number	027025
Instructor(s) (Institution)	Takashi MATSUMOTO 大学院工学研究院		
Course Objectives	Fracture and fatigue are one of important degradation mechanisms in infrastructure maintenance. This course describes how to treat fracture and fatigue of construction materials and composite materials with the use of fracture mechanics. Firstly, fundamentals of linear elastic fracture mechanics are introduced. Stress approach and energy approach are explained together with fracture criterion. Secondly, nonlinear fracture mechanics is introduced. The use of nonlinear fracture mechanics is explained for construction materials and composite materials. Finally, two approaches to fatigue are described. Factors affecting fatigue of construction materials and composite materials are explained.		
Course Goals	To understand the fracture and fatigue phenomena in construction materials and composite materials and to utilize fracture mechanics theory to prevent fracture and fatigue in infrastructure maintenance.		
Course Schedule	<p>(1) Introduction (1 class) History and importance of fracture and fatigue accidents in infrastructure</p> <p>(2) Linear elastic fracture mechanics (5 classes) Stress field, stress approach, energy approach, stress intensity factor, energy release rate, fracture criterion, crack stability, superposition principle</p> <p>(3) Nonlinear fracture mechanics (4 classes) Plastic zone correction, cohesive traction, J-integral</p> <p>(4) Fatigue (4 classes) Stress-life approach, fracture mechanics approach</p> <p>(5) Advanced topic (1 class)</p> <p>(6) Final examination (1 class)</p>		
Homework	Reviews of class materials are necessary.		
Grading System	In-class exercises (20%), reports (20%) and final examination (60%)		
Textbooks / Reading List	<p>No textbooks. Handouts and references will be given in the course.</p> <p>Elementary Engineering Fracture Mechanics D. Broek Fatigue of Materials S. Suresh Fundamentals of Metal Fatigue Analysis Julie A. Bannantine 線形破壊力学入門 岡村 弘之</p>		
Websites			
Website of Laboratory			
Additional Information	Basic knowledge on the subjects below is necessary: mechanics of materials, structural mechanics		