

Course Name	Strength and Fracture of Materials		
Semester, Year	Second Semester, 2018 (Fall Term)	Number of Credits	2 credits
Course level	6000	Course Number	27102
Instructor(s) (Institution)	Kosuke TAKAHASHI (大学院工学研究院)		
Course Objectives	For proper design and safe use of machines and structures, it is necessary to acquire a deep knowledge regarding material strength. This course presents basic concepts and theories of strength and fracture of materials, and explains the criteria of failures as well as several strength properties required for important practical conditions such as fatigue loading.		
Course Goals	<ol style="list-style-type: none"> 1. Understanding the typical behaviors of failures and fractures of materials. 2. Understanding the law of failures under multi-axial stress condition. 3. Understanding the mechanism of fractures induced by crack propagation from an initial defect. 4. Understanding the general outline and evaluation methods of fatigue strength. 		
Course Schedule	<ol style="list-style-type: none"> 1. Failure and fracture behaviors of materials (1) Stress-strain relationship, Definition of failure and fracture, Ductile fracture, Brittle fracture 2. Law of failure (2) Maximum principal stress criterion, Maximum shear stress criterion, Distortion energy criterion 3. Strength properties of materials with a defect (5) Stress concentration, Stress distribution ahead of crack tip and stress intensity factor, Fracture toughness and fracture resistance, J-contour integral 4. Material strength and defect (3) Microstructure of materials, Crystal defect, Ideal shear strength and defect, Ideal fracture strength and defect 5. Strength evaluation and its application into design (4) Fatigue strength, Strength evaluation, Case studies 		
Homework	<p>Preparation: Read the part of the handout and/or reference book. It may take about half an hour.</p> <p>Review: Work on given assignments and understand the contents of lectures. It may take about an hour.</p>		
Grading System	Assignments and attitude in classes: 40%, Final reports: 60%		
Textbooks / Reading List	Fracture mechanics, Fundamentals and Applications T.L. Anderson Taylor & Francis 2005 It is preferable for students to read and study the book1 as a reference.		
Websites			
Website of Laboratory	http://labs.eng.hokudai.ac.jp/labo/MFM/		
Additional Information			