



University of Tehran
School of Civil Engineering

Course:	8102.... – Fracture Mechanics		
Course type:	Optional		Credit: 3
Level:	MSc and PhD		
Co-requisite(s):	-		
Prerequisite(s):	-		
Prerequisite by topic:	-		
Textbook(s):	<p>[1] Lecture Notes in Fracture Mechanics, V.E. Saouma, University of Colorado, 2000.</p> <p>[2] Fracture Mechanics: Fundamentals and Applications, T. Anderson, Taylor & Francis, 2005.</p> <p>[3] Extended Finite Element Method for Fracture Analysis of Structures, Wiley/Blackwell, 2008.</p> <p>[4] XFEM Fracture Analysis of Composites; S. Mohammadi, Wiley, 2012.</p> <p>[5] Discontinuum Mechanics; S. Mohammadi, WIT Press, 2003.</p>		
Coordinator:	S. Mohammadi, Professor of Computational Mechanics, School of Civil Engineering		
Goals:	The main objective is to introduce the theoretical bases and analytical approaches to fracture mechanics as well as the state of the art numerical techniques for solving the wide range of crack analysis and fracture mechanics. The course covers brittle and semi-brittle materials and include static and dynamic effects for isotropic and anisotropic materials.		
Topics:	<ol style="list-style-type: none"> 1. A historical review of available techniques. 2. A review of mathematical bases from elasticity 3. Crack analysis 4. Stress intensity factor 5. Fracture modes 6. Thermodynamics of fracture and the energy release rate 7. J-integral 8. Classical techniques for evaluation of stress intensity factors 9. Singular finite element method 10. Anisotropic fracture mechanics 11. Dynamic fracture 12. Cohesive cracking 13. Bi-material debonding 14. Extended finite element method (XFEM) 15. Plasticity based failure analysis 		

	16. An introduction to damage mechanics
Computer usage:	Necessary for assignments and final project
Assignments:	10 homework assignments (programming and theoretical)
Projects:	1 final programming project
Grading:	Assignments: 20 % Project: 35 % Final exam: 45 %
Further readings:	[1] Several papers published on the subject every year.
Prepared by:	Soheil Mohammadi
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