UNIVERSITY OF CALIFORNIA AT BERKELEY
College of Engineering
Departments of Materials Science & Engineering and Mechanical Engineering

DEFORMATION AND FRACTURE OF ENGINEERING MATERIALS

MSE C212 – ME C225 (9:00 – 11:00) Prof. R. O. Ritchie

SCHEDULE OF CLASSES (updated 1/23/12)

COURSE OUTLINE

PART I: DEFORMATION

Jan.	T 17	Introduction. Continuum Mechanics: stress, strain
	Th 19	Linear Elasticity: beam theory, invariants, etc.
	M 23	stress concentrations, buckling, energy methods
	~~T 24~~	*no lecture*
	Th 26	Plasticity: yield criteria, deformation and flow theories
	~~T 31~~	*no lecture*
Feb.	~~Th 2~~	*no lecture*
	M 6	constitutive laws, Prandtl-Reuss equations
	T 7	limit analysis (lower bounds)
	~~Th 9~~	*no lecture*
	M 13	limit analysis (upper bounds)
	T 14	deformation processing
	Th 16	Rate-Dependent Plasticity: creep deformation, creep rupture

PART II: FRACTURE MECHANICS

	M 20	Linear Elastic Fracture Mechanics: K_I singularity
	T 21	plasticity considerations, K_{Ic}, CTOD
	Th 23	resistance curves, plane-stress analyses
	T 28	Nonlinear Elastic Fracture Mechanics: HRR singularity
Mar	Th 1	J_{Ic}, $J_R(\Delta a)$ resistance curves, T_R, CTOA
	T 6	Non-stationary crack-growth analysis

PART III: SUBCRITICAL CRACK GROWTH

	Th 8	Environmentally-Assisted Fracture: stress corrosion
	T 13	hydrogen embrittlement
	Th 15	corrosion fatigue
	T 20	Cyclic Fatigue Failure: mechanistic aspects
	Th 22	crack propagation, damage-tolerant analysis
Apr.	T 3	variable-amplitude loading, small cracks, crack closure
	Th 5	stress-strain/life analysis
	T 10	ceramics, intermetallics
	Th 12	biological materials, e.g., bone

PART IV: MODELING, STATISTICS, ETC

T	17	Physical Basis of Toughness: intrinsic toughening - metals
Th	19	extrinsic toughening – ceramics, composites
T	24	fracture statistics
Th	26	****** *Presentation of project reports* ******

NOTE: **Dates in red represent cancelled or rescheduled classes. Three further dates in blue - Mar. 13,15 (TMS) & Apr. 10 (MRS) - will have guest lecturers or will be rescheduled**.