A presentation is given of the mechanics, deformation and fracture in engineering and some biological materials, including elastic and plastic deformation from simple continuum mechanics and microscopic viewpoints, dislocation theory, alloy hardening and creep deformation, fracture mechanisms, linear elastic and nonlinear elastic fracture mechanics, toughening of metals, ceramics and composites, environmentally-assisted cracking, fatigue failure, subcritical crack growth, stress/life and damage-tolerant design approaches.

The list of lectures is:

	Introduction Continuum Deformation - beams
	Continuum Deformation – composite beam Continuum Deformation – strain, transformation of axes
	Elasticity – elastic constitutive laws Elastic mechanisms of deformation; stress concentration Plasticity - uniaxial stress-strain relationships
	Plasticity – plastic instability (necking) Micro-mechanisms of elasticity & plasticity Dislocations
	Dislocations mechanics Alloy hardening: mechanisms: strain hardening
	Alloy Hardening: mechanisms: Hall-Petch, ppt. hardening Single Crystal Slip Creep: mechanisms
	Creep mechanics Creep: life prediction Fracture Mechanics: Introduction
	Fracture: mechanisms Linear Elastic Fracture Mechanics: K fields
	Linear Elastic Fracture Mechanics: plastic zones Linear Elastic Fracture Mechanics: K_{Ic} testing Crack-resistance curves (R-curves)
	Nonlinear Elastic Fracture Mechanics: J fields Toughening Mechanisms: metals Toughening Mechanisms: ceramics
	Toughening Mechanisms: composites Biological materials: bone, skin, etc. Subcritical cracking: active path corrosion, hydrogen emb.
	Environmentally-Assisted Fracture: mechanisms Environmentally-Assisted crack growth Fatigue
	S/N curves
	Life prediction: Total life *vs.* propagation life Fatigue-crack growth Damage-tolerant design