CVEN 305-301

Mechanics of Solids

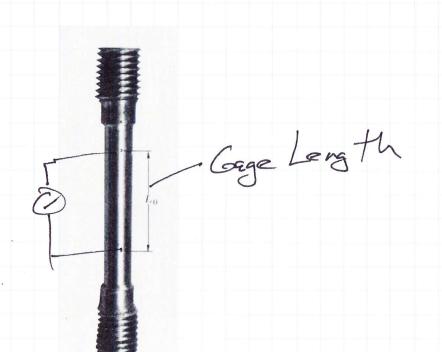
Topic

Axial Loading

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Load vs Deformation





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of	Date <u>(</u> Page		oading		ed with permission from Beer, Ferdi Topic	VEN 305-301 lechanics of Solids
N m ²	1b in	Stress Aoriginal	Engireering TAV6	ic =	nd Strain	Stress an
n	intio	7	Engineering 5-Train ===	cally Loaded	A Straight	
1.6	o str	Me 2 mic	Centage			$\frac{\delta}{\uparrow}$ C
	o stro	2 mic	entage			P P

CVEN 305-301 Mechanics of So	Topic lids	Xiq Logo	ling	nd David F. Mazurek. 2015. Med	chanics of Materials. Se 	Date 6/1//5 Page 4 of
Stres	ss vs Strain	t lotic Liv	n.t	le Cina	JUH	inate Strength
Pr	OPO	yield. O	51	rain Harder		
TEN6				Area = Under the Elastic	Mad d	oftes, lience
	F-	modolus of e Young's mad	ماريح إ	Area = Under thetotal Curve	Mod.	of long has
		elastic mod Hookes La-	10/45/			
+	1931 ic	EN6	ZoP	Plastic		

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	Elastic -	when the load is remo	ou ed the bar
	Plastic -	some of deformation is	
	Linear —	Straight line relation load and deformation Stress and Strai	Ship between
	Non-Linear -	- No straight line rela between load and	

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Behavior	of Ductile M	Materials Experience Pl	astic Deformation
		Experience Pl PerCent Elongation = -	Lorig X10070
		PerCent Reduction =	Aorig Asim X100%
		Modulus of Resilien	ce - Area under the elastic portion
(a)	(b)	Modulus of Jougha	ss-Area under the entire stress Strain diggram

Professional graphics copied with permission from Beer, Ferdinand P., E. Russell Johnston, Jr., John, T. DeWolf, and David F. Mazurek. 2015. Mechanics of Materials. Seventh Edition. McGray-Hill. Date 6 CVEN 305-301 Page Mechanics of Solids **Tangent Offset Method** 500.

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		Hooke's Law	
		most H	F= KS Spring Constant
		5 P S	P=KS T=E Hookes Law tou Uniaxia/Lording Only

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Load Deformation Relationships for Axially Loaded Member $F = k$ $F =$	Mechanics of Solids		Page/of
P = A = S $P = A = S$ $P = A = S$ $Spring Consta$	Load Deformation	on Relationships for Axially Load	
Cross-Sectional Area	$\begin{array}{c c} \hline \\ L \\ \hline \\ \hline \\ \\ \hline \\ \\ \hline \\ \\ \end{array}$	S= PL AE	F= K P= AE Spring Constant

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A	B P P2 C	DPS Porce	the internal
	SAD =	SAB + SBC + SCD	
	SAD=	PABLAB PBCLBC PCD AREFACT ACD Piliu Aifi ici	LCD

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	At dx	B	L. P. CX AE CX A(x) E(x)