

Course #

MET x651

ETM x651

Title *Mechanical Design*

Description *Introduces the principles of mechanical design, the design process, design factors, creativity, optimization and value engineering. Examines properties and selection of materials, stress concentration, combined stress, theory of failure, impact, and fluctuating and repeated loads. Design methodology is applied to products, processes and equipment. Further study includes design of fasteners, screws, joints, springs, bearings and gears.*

Outcomes	a	b	c	d	e	f	g	h	i	j	k
1. To methodically apply the principles of stress analysis and mechanics to determine the stress in a mechanical element and determine the size (length, width and depth, cross sectional area) and material for that element that enables an acceptable Safety factor for its use in an engineering application,	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. To be able to determine the proper Safety Factor for a specific engineering application of a mechanical system based on ethical engineering considerations of its intended use,	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. To be able understand the terminology of and to size and select the proper belt or chain-drive system to comply with a specific engineering specification of power transmission, input and output drive speed and/or input or output torque,	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. To be able to understand the terminology of and to size and select the proper fastener for two elements that must be fastened together and survive the application of a specific separating load,	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. To be able to understand the terminology of and to size and select a proper roller or hydrodynamic bearing that can be used for a specific shaft speed and loading,	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. To be able to understand the terminology of and to size and select the proper, common gear type (spur, helical, bevel or worm) for a stated, specific power transmission application,	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. To be able to understand the terminology of and to dimension, size and/or select the proper weld type for a specific bonding application of two mechanical elements,	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. To be able to understand the terminology of and to size and select the proper linear or torsion spring element for a stated, specific engineering application,	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. To be able to apply the column buckling formulae for a Euclid or J.B. Johnston designated column in order to determine the maximum permissible force loading,	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10 To be able to solve 'real-world' engineering applications using all of the above after determining which equations apply and present a Case Study via a concise mini-Project Report (for inclusion in the student's portfolio of course work).	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>