

CE 5963 – Undergraduate Research Thesis

Potential Thesis Topics

Fall 2015 to Winter 2016

Specific to Students under Supervision of

Dr. Alan Lloyd

Topic	1
Title	Material properties of concrete under high strain rate at extreme service temperatures
Type	Experimental
Description	Testing of concrete cylinders using a drop mass impactor to measure strength and stiffness at temperatures ranging from -70°C to +200°C. This would explore the change in material properties that occur due to two phenomenon: Temperature variation and rate of loading.
Topic	2
Title	Analysis of yielding brace element for retrofit of structures for seismic resistance
Type	Analytical possibly Experimental
Description	Analysis and design of a specially designed yielding link that would absorb seismic energy through yielding. There is a possibility of having the project include an experimental component depending on the timeline and the progress of analytical work.
Topic	3
Title	Design of laboratory explosive simulator
Type	Analytical
Description	Use of computational fluid dynamics (CFD) to analyse and design a laboratory testing facility that can rapidly release compressed gas into a confined space and load a test specimen with a mechanism that approximates blast loads.
Topic	4
Title	Development of software to for dynamic analysis
Type	Analytical
Description	Writing a software that can be used to analyse specific types of dynamic systems including impact and explosive loads on structures. The software would solve the equation of motion for coupled spring-mass systems in series.
Topic	5
Title	Design and analysis of energy absorbing connections for building facades.
Type	Analytical
Description	Assessing different concepts for connections of building facades (precast panels, masonry, windows, etc) to buildings. The connections would be designed to absorb energy from a blast or impact and reduce force transferred to the building.
Topic	6
Title	Analysis of infill masonry wall and structure interaction under blast
Type	Analytical
Description	Analyse how unreinforced masonry contacts and loads columns of structures when under blast loads. Verify model with experimental data from blast testing.