CE 8060 – STRUCTURAL DYNAMICS
Term Project

Assigned: November 7th 2014.
Due: December 10th 2014

Additional Point of Contacts for Supervision and Guidance:
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In this research project, students are asked to form groups of two. Groups must be formed by November 11th 2014. This research project entails conducting the steps that we have discussed throughout the Literature Review project. A portal frame with steel columns and plastic beam will be provided as the experimental subject.

First, each group is asked to write a MATLAB script (referred to as the 'model') to simulate the desired behavior by November 12th. Several example scripts can be found under the Scripts folder on Blackboard. The groups will be asked to justify the choice of their analysis method. The model must be developed keeping the experimental campaign in mind (read the next paragraph!).

Second, each group is asked to complete dynamic testing on the provided specimen. Dynamic testing can be completed using a shaker (harmonic excitation), hammer (initial velocity) or step relaxation (initial displacement). Note that the associated model should be coded accordingly. Supervision and guidance regarding the equipment and software will be provided during the actual experiments. However your group is ultimately responsible for scheduling and conducting the experiments (there must be supervisor for each group during experiments, see the above list of supervisors). The groups should finish the preliminary dynamic test on the portal frame system by November 17th 2014.

The groups are asked to extract features, compare the experimental measurements with model predictions and determine the agreement (or lack thereof). The comparisons should be done in both time domain and frequency domain. These tasks must be completed by November 19th. At this point, it is very likely that your model will not match the experiments identically. For simplicity, this comparison can be done in a deterministic manner (without considering uncertainties).

The groups are then asked to identify parameter(s) to be calibrated against experimental measurement. The identification can be completed considering sensitivities of each of the parameters (recall Parameter Identification and Ranking Table). The groups are asked to comment on the agreement between experiments and measurements before and after calibration. This task must be completed by November 21st. For simplicity, calibration can be completed in a deterministic manner (without considering uncertainties).

Ultimately, the groups are asked to consider the uncertainty in the calibrated parameters (you can refer to published literature or use your engineering judgment to assume a level of uncertainty in the calibration parameters) and propagate this uncertainty forward (from input parameters to output responses). The groups are asked to comment on how the uncertainty affects the predictions. This task must be completed by November 24th.

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Students are asked to prepare a 10 minute presentation explaining each of their findings. Presentations will take place on November 25th and 27th. All project reports are due December 10th (however the reports can be submitted anytime after the presentations).

Summary of Deadlines:

Nov. 11th	Groups of 2 must be formed
Nov. 12th	MATLAB model developed
Nov. 17th	Preliminary dynamic tests
Nov. 19th	Comparison of features from model predictions and experiments
Nov. 21th	Parameter calibration
Nov. 24st	Uncertainty analysis
Nov. 25th-27th	Presentations given in class
Dec. 10th	Final report due