SUBJECT:	M.S. Thesis Presentation
BY:	Jay Ling
TIME:	Tuesday, May 2, 2006, 10:00 a.m.
PLACE:	MRDC Building, Room 4211
TITLE:	Managing Information Collection in Simulation-Based Design
COMMITTEE:	Dr. Chris Paredis, Chair (ME) Dr. Bert Bras (ME) Dr. Suresh Sitaraman (ME)

SUMMARY

An important element of successful engineering design is the effective management of resources to support design decisions. Design decisions can be thought of as having two phases-a formulation phase and a solution phase. As part of the formulation phase, engineers must decide how much information to collect and which models to use to support the design decision. Since more information and more accurate models come at a greater cost, a cost-benefit trade-off must be made. Previous work has considered such trade-offs in decision problems when all aspects of the decision problem can be represented using precise probabilities, an assumption that is not justified when information is sparse.

In this thesis, we use imprecise probabilities to manage the information cost-benefit trade-off for two decision problems in which the quality of the information is imprecise: 1) The decision of when to stop collecting statistical data about a quantity that is characterized by a probability distribution with unknown parameters; and 2) The selection of the most preferred model to help guide a particular design decision when the model accuracy is characterized as an interval. A separate novel approach is developed for each case in which the principles of information economics are incorporated into the information management decision.

The problem of statistical data collection is explored with a pressure vessel design. This design problem requires the characterization of the probability distribution that describes a novel material's strength. The model selection approach is explored with the design of an I-beam structure. The designer must decide how accurate of a model to use to predict the maximum deflection in the span of the truss. For both problems, it is concluded that the information economic approach developed in this thesis can assist engineers in their information management decisions.