# ME 360 *Modeling, Analysis and Control of Dynamic Systems*

<procedure.ps, pdf>

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## General Steps to Develop a Model

1. Define the modeling goal(s) based on the engineering objective(s).
2. Define the system. Isolate the part to be modeled (the system) from the environment (that which is not modeled. Define the input/output variables. Those variable that cross the boundary between the system and the environment.
3. Divide and Conquer. Separate the System into essential components -- then into basic elements (e.g., having properties of mass, compliance, etc.).
4. Define the interconnections between the elements defined above.
5. Quantify element behavior. Use general laws (e.g. p=mv for linear momentum) when possible, do experiments, otherwise.
6. Derive governing equations. These are the model.
7. Analyze the model. Analytical solutions, numerical simulation, and frequency response.
8. Validate model by comparing model output to measured data. Use common sense to evaluate ability of model to predict "obvious" results when measured data is not available.
9. Return to any of the above

Keep tracks of **Assumptions, Idealizations and Limitations** of the model. Document!

As of 2002 steps 6 and 7 can be accomplished by a variety of commercially available software. The rest you have to do yourself!