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MATH 5740/MATH 6870 Math. Modeling *(Course Outline)*

Goals This course deals with principles and examples of mathematical modeling. We discuss modeling of evolution, dynamics, transition, uncertainties, and optimization, working out a number of examples.

Course work consists of reports and presentations.

Preliminary Syllabus

1. Introduction. Types of Models.
2. Great Models: Copernicus, Newton, Einstein. Black holes. Fractals.
3. Population dynamics. Simple models and their combinations
4. Epidemics: disease spread
5. Dimensionality analysis
6. Discrete and continuum waves: domino train and traffic wave
7. Optimal design of a friction stopper
8. Thresholds: model of damage propagation
9. Stochastic Modeling for uncertainties
10. Game theory: Modeling for the worse case scenario