My Math 503(Mathematical modeling). California State University, Fullerton. summer, 2007

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1 Introduction

I took this course during summer 2007, at California state univ. Fullerton. This was a required course for my MSc. In Applied Mathematics.

Instructor and course official web site here

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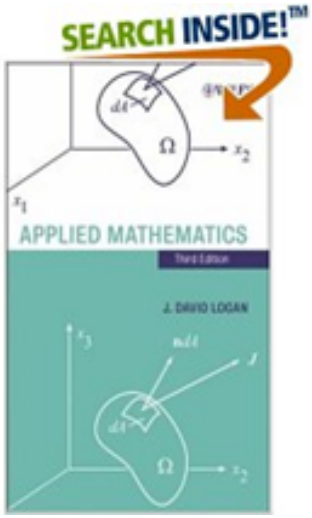
MATH 503A Mathematical Modeling I Summer 2006 , Fall 2006 , Spring 2007

Description: Prerequisites: Math 489A,B and 501A,B. Mathematical modeling concepts. Topics may include: dimensional analysis, scaling, and sensitivity; system concepts, state space, observability, controllability, and feedback; dynamical systems, models and stability analysis; optimization models.
Units: (3)

MATH 503B Mathematical Modeling II Summer 2006 , Fall 2006 , Spring 2007

Description: Prerequisite: Math 503A. Development and analysis of mathematical models in such areas as mechanics, economic planning, operations management, environmental and ecological sciences, biology and medicine.
Units: (3)



2 HW table

HW	my solution	note	my score
1	PDF HTML	Curve fitting using least square for the blast problem	2/2
2	PDF HTML	Dimensional analysis. Reduce an ODE to dimensionless form . Find ODE for ball problem with IC, then reduce ODE to dimensionless form.	2/2
3	PDF HTML	Find general solution to second oder ODE using methods of undetermined coefficients and method of variation of parameters. Wronskian formula, Verification of answer using Mathematica	2/2
4	PDF HTML	Finding stationary solution to functional Dirichlet boundary conditions, use variational method $J(y+v)$. Another one to find surface of revolution (the cosh problem). Another minimization problem (the Utility problem).	2/2
5	PDF HTML	Minimization of functional, free boundary conditions $\phi(t)$ general method. Minimzation of functional with extra $G(.)$ function after the integral. Using $\phi(t)$ method.	2/2
6	HTML	Pendulum pulled up and pendulum on hoop. Simulation using Mathematica Manipulate	2/2
7	PDF HTML	Finding expression which minimizes energy in string, weak solution. Show that classical solution implies weak solution.	2/2
8	PDF HTML	Minimization with constraint, Auxiliary Lagrangian method	2/2
9	PDF HTML	Minimization of functional over 2D. defined and free boundaries. Uses Green theorem. Normal to surface.	2/2

10	PDF HTML	Sturm Liviouel problems, finding eigenvalues and eigenfunctions, periodic B.C.	2/2
11	PDF HTML	Green Function. Using the formula method and using property method. 2 problem, both BVP	2/2
12	HTML grade	Computer assignment. Analytical part. Show $J'(y;h)=0$ implies minimum functional. Derive $J'(y;h)$ from given functional. Also FEM and Central difference implementation for solving simple second order ODE.	25/25
13	PDF HTML	Finding fundamanetal solution to second order ODE using distribution method. With Mathematica Animation	2/2
14	PDF HTML		2/2
15	PDF HTML	Using energy balance equation to find PDE. Using First Green function formula to show unique solution for PDE, energy method.	2/2