ECE 580 Optimization by Vector Space Methods Spring, 2008

About the Term Project

Prof. Sean Meyn, meyn@uiuc.edu Mon. & Weds., 11-12:30, 106B6 Engg. Hall

For the term project, you have two options:

Option 1 Choose three references (published after 1970) on a topic of your choice, which have a common theme of relevance to the subject matter of this course. Read these three papers, digest their contents, and write a report (to run 15-20 type-written pages) explaining (in your own words) their contributions. The report should be a critical survey on the contents of the papers as they relate to the common theme, and should indicate possible directions for extensions as you see them.

Option 2 Present (in a written report) results of some original research (carried out by you) on any one of the topics listed below — you may also suggest to me some other topic. Or develop a numerical algorithm based software package for optimization, again on one of the topics covered in the course. In this case you will submit a report that explains the package, and illustrates it on a number of numerical examples (optimization problems).

> **Due Date for the Report**: May 5, 2008 (Monday)
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> **Another deadline**: By Monday, April 7, you should let me know (by email or in person) of your choice (between the two options above), and in case of Option 1 clear with me your selection of the three references. *It is in your interest to send feedback early so you can have first-choice on references.*

Some possible topics for the project

1. Optimal control.
2. Optimal state estimation.
3. Convergence analysis of optimization algorithms.
4. Infinite-dimensional optimization.
5. Distributed-parameter systems.
6. Realization theory.
7. Hardy spaces, and their role in worst-case (H^∞) controller and estimator designs.
8. Stability and stabilizability of infinite-dimensional linear systems.
9. Filtering, smoothing, and prediction for stochastic processes.
10. Realization theory for stochastic systems.
11. Hypothesis testing.
12. Wavelets.
13. ℓ_1-regularization.
14. Chaotic motion.
15. Equilibria in games.
16. Differential games.
17. Image reconstruction from noisy data.
18. Neural networks.
19. Advanced topics on duality in constrained optimization.