News:

Theme: The course is on linear multivariable control with a particular emphasis on controller synthesis using linear quadratic (LQ) methods. The LQ methodology is one of the cornerstones of system and control theory from various point of views, including its historical significance, practical relevance, computational tractability, as well as its mathematically beauty. In this course we will aim to touch upon some of the facets of LQ methods in order to gain a better understanding of the theoretical, computational, and practical challenges of dynamic system analysis and control synthesis.

Syllabus

EDGE Lecture Videos

Schedule/Slides/HW Assignments

Discussion Board

Some Useful Links

Midterms: We will have two midterms approximately during the 4th and 8th weeks into the term. The midterms will contribute 30% each to the final grade. For off-campus students who plan to take the midterms off-campus, please see http://www.engr.washington.edu/pce/exams.html as you need to identify a proctor at your location for the exams.

Project: The project for the class consists of a 4-5 pages of report using the style file on this page http://control.disp.uniroma2.it/cdc2012/author_info.php (either tex or word). The topic of this report should be on the application or theoretical extension of the material discussed in class, including dynamic programming, optimal control, linear quadratic theory, Riccati equation, algorithms for solving matrix equations, Kalman filtering, learning and games. The project's aim is to provide an opportunity for you to delve into a topic

that is of interest to
you and has a large intersection with the topics discussed in the class. For example, if you like flight control, then
I suggest that you do a search for "flight control LQR" or "flight control Kalman filtering" to get an idea on some of the
research works in these areas. Be aware: there will be a lot of work that you have to browse through so aim for a topic
that rings a tone with you- biomedical, social systems, flight, circuits, algorithms, etc.

The steps are as follows:

1) do an online search on a topic that interests you and has a large intersection with at least one of the topics discussed in class: theory, algorithms, application of optimal/LQR/LQG to various systems in electrical, mechanical, aerospace engineering and social and economic systems.

2) read thru the abstract and the introduction of these papers to make sure you can understand the
contribution if not initially, but at least eventually over the period of next couple of weeks.
3) identify the key steps in the paper: using the material discussed in class, try to see if you can make sense
of the various assumptions, derivations, proofs, simulations, etc.
4) try to replicate some of the steps, simulations, proofs, when applicable.
5) examine the shortcomings, advantages, and implications of the results presented
6) consult other references on the topic to gain a better understanding of the contribution of the paper and
some perspective on what the paper you are writing your report on addresses.
7) write a report summarizing your understanding of the paper, key theoretical/algorithm/ implementation steps
8) provide in your report not only your expert understanding of the paper but your critique of it, and if it makes
sense, your own extension of the idea.

The project report format is:

1) abstract
2) problem setup and assumptions
3) basic results: simulations, proof
4) applications
5) references

Again, the project has to deal with a theoretical or an applied aspect of the topics covered in the course, e.g., theoretical contributions to optimal control and applications. Please consult with the instructor about your project report. The project report is due as a pdf file (no other formats will be accepted), submitted to the catalyst dropbox site.