

## Term Project Information and Suggestions

The term project will be a research project related to one of the topics covered in the course. The project must include some original research that is either analysis, simulation, and/or an experiment. Two people may collaborate on the project if it is of sufficient scope, and the contributions of each person are clearly delineated. Approval for a joint project should be obtained from the professor at least 10 days before the project proposal is due.

### Details and Deadlines:

- A 1-2 page project proposal is due Feb. 1 before midnight. The project proposal should include a fairly detailed description of what you plan to do. Specifically, if you are doing an original analysis you must describe the system you are analyzing, the specific aspects of the system you plan to analyze, and how you plan to do the analysis. If you are doing a simulation you should describe in detail the system that you plan to simulate, how you plan to simulate it, and what specific simulations you plan to run. If you are doing an experiment you should describe in detail the experimental setup and what specific experiments on this setup you plan to do. Your proposal should include 2-3 references and the relevance of these references to the proposed work should be described in your proposal. Do not propose an overly ambitious project that cannot be completed by the end of the quarter. You are strongly urged to meet with the instructor prior to the proposal deadline to get feedback on your project proposal. As part of your project proposal, you must create a web site for your project and post your proposal to the web site. Please email me and the TA your website location. Your site will be linked to the class homepage.

You will receive feedback on your project proposal by Feb. 8 and you must submit a revised proposal by Feb. 13 on your website based on your proposal feedback. Your project proposal (initial and revised versions) will be worth 20% of the project grade (10% of the course grade). The proposal grade will be based on the level of detail and clarity in your description of the proposed work, as well as my assessment as to whether you can complete the proposed work in the available time.

- A 2-3 page progress report on your project will be due Feb. 27 before midnight on your website (25% off per date late). This must introduce the problem being investigated, provide a detailed system description, progress to date, a statement of remaining work, and any changes that have been made to your project from the original proposal. The project progress report will be worth 30% of the project grade (15% of the course grade) and must include the following:
  1. A clear statement of the problem being addressed
  2. A detailed description of the technical approach to solving the problem
  3. A detailed description of the system model
  4. A detailed description of work completed and any preliminary results
  5. An itemized statement of work to be completed in the remaining time
  6. 3-6 relevant references
- A poster session for presentation of projects will be held the last week of classes, i.e. the week of March 12-16.
- The project report is due on March 19 before midnight and must be posted to your project website at that time (25% off per date late). The final report should be written as if you were submitting it to a conference: it should include an abstract describing your main results, an introduction describing the problem being addressed and previous/related work in this area, a description of the system model, a detailed description of the technical approach to the problem, analytical and/or simulation and/or experimental results, possible extensions to the work, and final conclusions. This is worth 50% of the project grade (25% of your course grade).

### Some Suggested Topics:

- Multiuser information theory
- Access techniques and/or routing in wireless networks
- Dynamic resource allocation in wireless networks

- Power control (centralized or distributed).
- Space-time processing, MIMO, and/or smart antennas in multiuser systems and networks
- Multiuser multicarrier/OFDM systems
- Multiuser CDMA systems
- Interference cancellation or multiuser detection in wireless networks
- Base station cooperation in cellular networks
- Hierarchical cellular networks (HetNets)
- Ad-hoc wireless networks
- Sensor networks
- Body-area networks
- Cognitive radio networks
- Green wireless network design
- Cross layer design in wireless networks