Gabe's 1-page Research Guide (adapted from John's intern guide)

A handy summary of things I find myself saying to many students. These are suggestions for how to avoid wasting time and make the most of your research efforts.

Documentation

1. Keep all **rough notes** and a list of each week's **actions** in a bound notebook. Each time we meet, we will review the past actions and decide on new ones.

2. **Maintain a LaTeX document** defining any probabilistic models, energy terms, etc., including all notation. It does not have to be polished and can include alternatives and questions. This can be sent around as a discussion document and will ultimately form the basis of a paper.

3. **Document your code** once it becomes reasonably finalised. You will need to have all code documented by the end of your project, so you might as well do it as you go along.

Experimental technique

1. **VISUALISE EVERYTHING** – your data, your algorithm, your learned parameters, your results. Use images, plots, diagrams – whatever best conveys the state of your code at any time. These will help with understanding the problem, the mathematical model, as well as help finding bugs and communicating your results to others. It's worth spending 10-20% of your time producing good visualisations. High quality visualisations can also be used in presentations and in papers with little extra work.

2. **Do not run an experiment without a clear goal in mind**. The goal might be to visualise the data or the model (early on), or it might be to get some comparative results for a paper (later on). But ensure the goal is clear before you start the experiment.

3. **Keep interesting figures in a PowerPoint document**. If you get a figure that is interesting – cut and paste into PowerPoint. Similarly for image sequences. Use the document like an electronic notebook. You can then show it to me, refer back to it and it will be useful for making presentations.

4. **Keep all experimental results** (unless they are really huge) – there is no shortage of disk space, but there is a shortage of time to re-run experiments.

5. **Don't run big experiments until you have first tried toy data or small data sets**. This may seem obvious but is a surprisingly often omitted step that will save lots of time. If you need more processing power, let me know.

Communication

1. If you're having **problems** let me know! They will often lead to interesting discussions or the questioning of assumptions. This is research – problems are to be expected ☺

2. If you are not happy with your understanding of any aspect of the project, **come and talk to me**. We can then arrange a time to talk over that aspect.

3. If you have **ideas or suggestions**, tell me, and then we can make time to try them out. This is *your* project.

4. The harder you work, the harder I will work to help.