

Computational Methods and Uncertainty Quantification for Inverse Problems

SYLLABUS: MATH 514, Topics in Applied Math

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Time and Place: MWF 12:00-12:50, Math 312.

Office Hours: 2:00-3:00pm, MWF.

Final Exam: 8:00-10:00, Monday, December 9.

LEARNING GOALS: By the end of the course you should:

1. understand what characterizes a typical inverse problem;
2. be able to implement methods of regularization and regularization parameter selection for solving inverse problems;
3. be able to solve inverse problems in both one- and two-dimensions, using both direct and iterative methods;
4. understand the relationship between Markov random field priors, Bayes' Law, and classical regularization methods in inverse problems;
5. be able to implement MCMC methods for sampling from the posterior density function in linear inverse problems;
6. be proficient at using MATLAB to do all of the above.

ASSESSMENT: Your course grade will be determined by your performance on the homework, and potentially, by your performance on a final project.

★ Students may work together on the homework, however each student must write-up his or her own solutions to hand in.

STUDENT CONDUCT: Just be honest, and see the above '★' comment. Details of the Student Conduct Code can be found in the "A to Z Index" on the UM home page.

FOR ANY STUDENT WITH A DISABILITY: If you have a disability that has, or might have, an effect on your performance in this class, please let me know. I will do my best to accommodate you.