

## Exam #3 (Final) Study Guide

Wednesday, December 10, 5-7PM (Closed books, closed notes)

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The final exam will cover material from the entire semester, with a bit more emphasis on the material since the second exam. This includes all reading assignments, homework assignments (both graduate and undergraduate), extra handouts, lecture slides, and final project. Refer also to the study guides for the first 2 exams. The final exam will be of the same flavor (in terms of question style) as Exams #1 and #2. This exam counts as 20% of your overall grade.

### Evaluating Robot Systems

You should understand the typical steps for evaluating robot algorithms (as discussed in class on Nov. 6 and 13, and as covered in undergraduate homework #6), including the Student's T-test. You should be able to apply these evaluation steps to a new problem.

### Localization and Mapping

You should understand the following:

- Types and sources of noise that affect localization
- (Generally) how sensor and effector noise is modeled
- Alternative approaches to belief representation
- Alternative approaches to map/environment representation
- Topological maps vs. metric maps
- The action/perception update cycle in probabilistic localization
- Definition of Markov property
- Markov localization
- Monte Carlo (or particle filter) localization (MCL)
- Impact of sample size on MCL, and techniques for adapting size dynamically
- Major steps in Kalman Filtering (you don't have to memorize the mathematics, but you should thoroughly understand the concepts)
- Pros and cons to various approaches to localization we have discussed

### Creative use of what you have learned

You might be asked to develop an approach to a robotics problem that makes use of what you have learned. Thus, you should study not just to regurgitate facts, but also to apply what you have learned to a new problem. A good way to prepare for this type of question is to review the material from a high-level perspective, comparing and contrasting alternative approaches so that you can understand the material as a whole, not just as a set of details.