# Final Exam Information

As determined by the registrar, the Final Exam will be held on **Monday, May 22nd from 1:30 P.M. to 4:30 P.M** at the **Johnson Track**.

- If you have a conflict with another scheduled final exam at this time, you should have received an email from the registrar with information about a conflict exam. If you have not received such an email, please contact the course staff at *6.046-faculty@mit.edu*.
- You are allowed to bring *three handwritten* double-sided $8\frac{1}{2}$" by 11" crib sheets of your own notes to help you with the exam. You may not use calculators, text books, notes, or any other materials except for your crib sheet during the exam.
- If you need special accommodations for the final exam, please email Debayan Gupta at *debayan@mit.edu* and Bruce Tidor at *tidor@mit.edu* with your SDS letter.
- The final exam will cover materials presented in all problem sets, recitations and lectures (except the last lecture, L24). It will be comprehensive (covering the entire semester) but will largely focus on material covered since quiz 2. As a reminder, the topics covered during the semester are available at the end of this handout.
- Helpful study materials include previous quizzes and finals, which may be found on sites listed at: `http://courses.csail.mit.edu/6.046/` and on the current 6.046 Stellar/LMOD site.

## Practice Problems For Final Exam

- We will be releasing a pool of practice problems for the final exam which will be available on the course website in the next couple of days. To facilitate a healthy method of working through the practice problems, we will be releasing the solutions two days after the problems are released.
- Note that the practice problems should not be taken as a strict gauge of the difficulty level or coverage of the actual exam.

## Review Session

Back by popular request, we will be having two optional review sessions for the final exam held by our TAs.

- The first is a probability review session which will be held on **Friday, May 19th** from 7:00 P.M. to 9:00 P.M in **34-101**. This will be a dedicated session for a review of basic probability theory in the context of the analysis of randomized algorithms.

  **Note:** If you are comfortable with basic probability theory at the level we have been using this semester in 6.046, this session may not be interesting for you.

- The second will be a problem solving review session which will be held on **Saturday, May 20th** from 7:00 P.M. to 9:00 P.M in **34-101**. This session will cover some of the core course materials from the semester by way of solving interesting problems from past exams.

- We will be working with the Audio/Video team to record the sessions and make the videos available on our course website. However, please keep in mind that it is not guaranteed that the videos will be ready before Monday, or even at all. If you are interested in the review sessions and are present on campus, we encourage you to attend in person.

## Exam Taking Instructions

- Please read the problems carefully, and please explain your logic when requested so partial credit may be given. This does not apply to true/false or multiple-choice type questions, for which no partial credit will be given and so no explanation is needed.

- Please arrive on time so we can start the exam promptly.

- You will have 180 minutes to earn a maximum of 180 points. Do not spend too much time on any single problem. Read them all first, and attack them in the order that allows you to make the most progress.

- When the exam begins, write your name on the top of *every* page of the quiz booklet. Write your solutions in the space provided. If you need more space, continue on the back page and leave a reference that you have done so in the original solution space. If you still need more space, write on the scratch pages and attach them at the end of the exam, and refer to the scratch pages in the solution space provided. Pages will be separated and scanned double-sided for grading.

- Budget your time— if a question is worth $x$ points, and you don't know how to solve it after thinking about it for $x/3$ minutes, then it may be time to move on to a different question.

- Please do not remove any pages from the exam booklet. All pages must be available for proper scanning purposes.

- When writing an algorithm, a clear description in English will suffice. Using pseudo-code is not required.
- Try to be concise (but precise). Our model solutions fit into the provided blank space.
- Unless the question specifically asks for it, do not waste time re-deriving facts that we have studied. Simply cite them.
- If something is unclear, raise your hand and someone from the staff will come to help you.

## Material Covered

The following is a list of the topics covered during throughout the semester, in reverse chronological order.

1. Topics since quiz 2:
   - L23 - Distributed Algorithms: Leader Election, Maximal Independent Set
   - L22 - Fixed-Parameter Tractability
   - L21 - Approximation Algorithms
   - L20 - Intractability II: Reductions
   - L19 - Intractability I: P, NP, NP-Completeness
   - L18 - Dynamic Programming II: Edit Distance, Knapsack, Pseudopolynomiality
   - L17 - Dynamic Programming I: Alternating Coins Game, Optimal BST
   - L16 - Continuous Optimization II: Perceptron, Learning From Expert Advice Framework and Multiplicative Weights Update Method
   - L15 - Continuous Optimization I: Gradient Descent Method
2. Topics since quiz 1, before quiz 2:
   - L14 - Streaming Algorithms I: Reservoir Sampling, Distinct Elements Problem
   - L13 - Randomization: Universal and Perfect Hashing
   - L12 - Random Walks and Markov Chain Monte Carlo (MCMC) Methods
   - L11 - Randomized Algorithms: QuickSelect and QuickSort, Matrix Product Verification, Tail Inequalities
   - L10 - Game Theory and the Min-Max Theorem
3. Topics before quiz 1:

- L09 - Linear Programming, LP Duality
- L08 - Network Flows II: Ford-Fulkerson Algorithm, Scaling Algorithm, Bipartite Matchings
- L07 - Network Flows I: Residual Graph, Augmenting Paths, Max-Flow Min-Cut Theorem
- L06 - Greedy Algorithms: Minimum Spanning Tree
- L05 - Amortized Analysis II: Self-organizing Lists and Competitive Analysis
- L04 - Amortized Analysis I: Union-Find
- L03 - Divide and Conquer II: Fast Fourier Transform, Polynomial Multiplication
- L02 - Divide and Conquer I: Median Finding, Integer Multiplication
- L01 - Intro + Interval Scheduling