

# 6.005.1x Syllabus

## Schedule

Week	Reading/Videos	Assignment
1	1. Static Checking 2. Code Review	Java Tutor (levels 1-3)
2	3. Testing 4. Specifications	Java Tutor (levels 4-6) Problem Set 1 Beta
3	5. Designing Specifications 6. Avoiding Debugging	Problem Set 1 Final
4	7. Mutability & Immutability 8. Debugging	Problem Set 2 Beta
5		Problem Set 2 Beta, continued
6		Problem Set 2 Final
7	9. Abstract Data Types 10. Abstraction Functions & Rep Invariants	Java Tutor (levels 7-9)
8	11. Interfaces 12. Equality	
9		Problem Set 3 Beta
10		Problem Set 3 Beta, continued
11		Problem Set 3 Final
12		Final Exam

## Topics

### 1. Static Checking

- static typing
- the big three properties of good software

### 2. Code Review

- DRY
- fail fast

- magic numbers
- good names

### 3. Testing

- test-first programming
- partitioning
- black box & glass box testing
- automated regression testing
- coverage

### 4. Specifications

- preconditions & postconditions
- exceptions

### 5. Designing Specifications

- underdetermined specs
- declarative & operational specs
- stronger/weaker specs

### 6. Avoiding Debugging

- assertions
- scope minimization

### 7. Mutability & Immutability

- aliasing
- risks of mutation
- iterators

### 8. Debugging

- reducing a bug to a test case
- hypothesis-driven debugging

### 9. Abstract Data Types

- kinds of operations
- representation independence

### 10. Abstraction Functions & Rep Invariants

- invariants
- representation exposure
- abstraction functions
- rep invariants

### 11. Interfaces

- using Java interfaces for abstract data types

## 12. Equality

- equality for immutable types
- equality for mutable types

## Problem Sets

Problem sets are done on your computer. We give instructions for Eclipse, but you can use another Java IDE or command-line tools if you prefer.

Every problem set has two submission points: a **beta** submission and a **final** submission. The initial release of the problem set will include tests for the beta. After the beta deadline passes, additional tests will be released for you to download from edX. You can then run the final tests against your solution, fix any new problems that are found, and then submit for the final deadline.

For the problem sets, all the test cases are given to you, and you'll run the tests on your own machine before uploading your problem set, so you'll always know which tests are passing and which are failing before you submit. There are no hidden tests for the problem sets. The beta submission grade is based only on the beta tests, and the final submission grade is based on the beta + final tests.

## Final Exam

The final exam consists of questions on edX, plus a short Java programming portion that you'll do on your own computer. The edX questions are similar to reading exercise questions. The programming portion is similar to a problem set but much shorter, and with just one submission. Some of the tests will be provided, but some will be hidden and used for grading.

The final exam will be open for four days, from Tue Dec 13 to Fri Dec 16.

During the exam period, the forums will be shut down. You will still be able to read posts but you will not be able to post any questions. The honor code prohibits students from communicating with one another during the exam period in any way whatsoever – so please don't discuss the exam on any other forum, website or in person with anyone else.

## Grading

Reading Exercises (12 readings): 10%  
Java Tutor (3 sets of 3 levels each): 10%  
Problem Set Betas (3): 25%  
Problem Set Finals (3): 20%  
Final Exam: 35%

In order to earn a certificate for 6.005.1x, students must pass the course with a grade of C or better. The following grading breakdown will apply:

$\geq 80\%$ : A

$\geq 65\%$ : B

$\geq 55\%$ : C