

# Final Exam Review

CS 3398  
Spring 2014

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# Final Exam

- Section 251(MW):Wed, May 7, 2:00PM to 4:30PM
- Section 252(TR):Tues, May 6, 11:00AM to 1:30PM
- Closed book, closed notes, clean desk
- Lectures:
  - System Models, Detailed Design, Implementation,
  - Testing, Evolution
- 25% of your final grade
- I recommend using a pencil (and eraser)
- I will bring extra paper.

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# Exam Format

- Multiple choice: 17 questions
- Problems: 3
  - draw a UML class diagram (or state diagram, or control flow diagram)
  - given a class diagram, decompose it into subsystems (loose coupling, high cohesion)
  - derive some test cases
- Written answers: 3
  - 3 to 5 sentences, generally
  - Define, explain, compare, evaluate
  - Make claims and give support
  - Requires memorization of topics and issues
- Each question will indicate how many points it is worth (out of 100)

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# System modeling

- Simple Context Model (SRS section 2.1)
- UML Models:
  - **class diagram** (SRS section 3.4)
  - **state diagram**
- Control Flow Diagrams (aka Flowcharts)
  
- Be able to
  - Recognize the models
  - Draw simple versions of the models

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## Detailed Design

- Design Processes
  - Functional Decomposition (top down design)
  - Relational Database Design
    - ❖ tables, foreign keys, ER Diagrams
  - Object-oriented design and UML
    - ❖ using class diagrams, state diagrams, etc.
    - ❖ 5 steps (goals & activities):
      1. Requirements elicitation
      2. Object oriented analysis
      3. System Design
      4. Object Design
      5. Implementation

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## Design characteristics and metrics

- Legacy Characteristics:
  - Halstead Complexity
  - McCabe's Cyclomatic Complexity
- Measuring simplicity:
  - Loose **coupling**
  - Strong **cohesion**
- OO Design guideline:
  - Law of Demeter

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## Implementation

- Desired characteristics, and how to achieve them:
  - Readability and maintainability
    - ❖ Programming style and coding guidelines
    - ❖ Using comments well
    - ❖ Refactoring
  - Correctness
    - ❖ Testing and debugging
  - Performance
    - ❖ Optimization
- Other issues:
  - Configuration management: why version control?
  - Open source development: pros/cons, licensing issues

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## Ch 8: Software Testing

- Concepts:
  - Verification and Validation
  - static vs dynamic verification
  - Failure, Fault, Test cases, Testing
  - white box vs black box testing
  - Test stubs and drivers
- Testing process
  - Development Testing
    - \* Unit \* Component \* System
  - Release Testing
  - User Testing
    - \* Alpha \* Beta \* Acceptance

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## Ch 8: Software Testing

Deriving test cases:

- Unit Testing
  - Partition testing (Equivalence Class Partitioning)
  - Boundary value analysis
  - Path testing (Path Analysis)
  - State-based testing
  - Guideline-based testing
- System + Release Testing
  - Use case-based testing
  - Scenario testing
  - Requirements-based testing

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## Ch 9: Software evolution

- Evolution Process
  - Spiral model: maintenance = iterative development
  - Change requests, Impact analysis, Release Planning, Change Implementation
  - Program understanding
  - Handling urgent change requests
- 3 Types of software maintenance
  - Defect fixing, adapting to new environment, new features
- Reengineering
  - What, when, why (why not start over from scratch?)
  - Techniques
- Refactoring
  - What, when, why
  - Bad smells

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## Final advice

- See Assignment 5 and Assignment 6 solutions on TRACS
- See the Sample Final exam on the website
- Note: read multiple choice questions carefully.
- See “How to Study for CS3398” on the website.

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## Office Hours Finals Week

| Day | Date | Time            |
|-----|------|-----------------|
| Th  | 5/1  | 2:30-4:30pm     |
| M   | 5/5  | 12:00-1:00pm    |
| T   | 5/6  | 2:30-3:30pm     |
| W   | 5/7  | 11:00-12:00noon |
|     |      | and by appt.    |

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