

**GRADUATE PROGRAMS IN SOFTWARE**  
**University of St. Thomas**  
**St. Paul, MN**

**SYLLABUS SPRING 2014**  
**SEIS635s**

Course Title

Software Analysis and Design

Meeting Time/Place

Alternate Saturdays, 8:30 – 3:00 PM, OSS-325

Credit Value

3 semester credits

Prerequisites

SEIS610: Software Engineering and Java Programming Experience (Required)

Instructor

Bradley S. Rubin, Ph.D. (Brad)

E-Mail Address

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Phone Number

651-260-5676 (cell)

651-962-5506 (UST, during office hours)

Office Address

OSS-312

Office Hours

Tuesdays and Wednesdays, 3:30 – 5:30 PM

(Email and phone calls welcome too)

Description

This course covers basic object-oriented techniques for specifying, designing, and implementing software systems. Iterative development methodologies such as the Unified Process are emphasized. The Unified Modeling Language (UML) is used as a notational system for capturing the results of such development. Core diagrams of UML are used, and students will gain experience with a software tool for creating them. Other topics include use cases, class discovery and domain modeling, responsibility-centered design, basic design patterns, software class design, converting designs to code, object-oriented testing, packaging, deployment, along with intermediate Java topics relevant to system implementation. Students will work on an object-oriented team project, applying

appropriate object-oriented concepts and techniques to describe and create a working object-oriented software system.

### Course Objectives

- Gather factual knowledge (terminology, classifications, methods, trends) in software analysis and design
- Learn to apply course material (to improve thinking, problem solving, and decisions)
- Develop specific skills, competencies, and points of view needed by professionals in the field most closely related to software analysis and design

### Texts

- Larman, Craig “Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development”, 3rd edition, 2005 (Required)
- Fowler, Martin “UML Distilled: A brief guide to the standard object modeling language”, 3rd edition, 2004 (Required)

### Grading Policy

- Weekly homework (25%)
  - 10% of the possible points off for each day late (max 1 week late)
  - Assigned Saturday, due following Saturday class at midnight, returned on the 3rd Saturday class (turned in on paper during class (preferred) or emailed to me)
- Midterm (25%)
  - Short answer, closed book/notes
- Team Project (25%)
  - Described later
- Final (25%)
  - Multiple choice, closed book/notes

### Blackboard

- Lecture notes (pdf format), homework assignments/answers, and grades will be available on Blackboard each week (usually 24 hours in advance of class)

### Class Schedule

90 min Lecture	8:30 AM – 10:00 AM
15 min Break	10:00 AM – 10:15 AM
75 min Lecture	10:15 AM – 11:30 PM
45 min Lunch	11:30 PM – 12:15 PM
75 min Lecture	12:15 PM – 1:30 PM
15 min Break	1:30 PM – 1:45 PM
75 min Lecture	1:45 PM – 3:00 PM

## Course Outline

### Week 1

- Course Introduction and Overview
- UML Introduction
- MagicDraw Demo
- Inception
- Requirements Analysis
- Use Cases
- Larman 1-7, Fowler 1-2,9

### Week 2

- Elaboration
- Object-Oriented Analysis
- Domain Models
- Sequence Diagrams
- Operation Contracts
- Object-Oriented Design
- Logical Architecture
- Package Diagrams
- Interaction Diagrams
- Class Diagrams
- Team Assignments
- Larman 8-16, Fowler 3-7

### Week 3

- Requirements Analysis Exercise
- Introduction to Design Patterns
- GRASP
- Software Tools
- Project Kickoff
- Larman 17-18

### Week 4

- Midterm Exam
- OOD Exercise
- Visibility
- Mapping Designs to Code
- Test-Driven Development and Refactoring
- More GRASP
- Larman 19-26

### Week 5

- UML Activity Diagrams
- UML State Machine Diagrams
- Relating Use Cases
- Domain Model Refinement
- Inheritance vs. Composition
- Architectural Analysis
- Larman 27-36, Fowler 10-11

## Week 6

More on Cats and Dogs  
Object Persistence  
UML Deployment Diagrams  
Programming Language Paradigms  
Functional Programming Languages  
Haskell  
Aspect-Oriented Programming and AspectJ  
Larman 37-39, Fowler 8

## Week 7

Project Presentations  
Final Exam  
Projects Due

### Attendance Policy

- Attendance sheet must be initialed each week
- Maximum of one absence expected

### Academic Integrity

Academic integrity is defined as not cheating and not plagiarizing; honesty and trust among students and between students and faculty are essential for a strong, functioning academic community. Consequently, students are expected to do their own work on all academic assignments, tests, projects and research/term papers. Academic dishonesty, whether cheating, plagiarism or some other form of dishonest conduct related to academic coursework and listed in the Student Policy Book under “Discipline: Rules of Conduct” will automatically result in failure for the work involved. But academic dishonesty could also result in failure for the course and, in the event of a second incident of academic dishonesty, suspension from the University.

#### **Here are the common ways to violate the academic integrity code:**

***Cheating*** - Intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise. The term academic exercise includes all forms of work submitted for credit.

***Fabrication*** - Intentional and unauthorized falsification or invention of any information or citation in an academic exercise.

***Facilitating Academic Dishonesty*** - Intentionally or knowingly helping or attempting to help another to violate a provision of the institutional code of academic integrity.

***Plagiarism*** - The deliberate adoption or reproduction of ideas or words or statements of another person as one’s own without acknowledgment. You commit plagiarism whenever you use a source in any way without indicating that you have used it.

### **Cheating**

In cases of cheating, the instructor will impose a minimum sanction of failure of work involved. The instructor will inform the student and the program director in writing of:

1. the nature of the offense,
2. the penalty imposed within the course;
3. the recommendation of the instructor as to whether further disciplinary action by the director is warranted.

If the instructor or the director of the program determines that further disciplinary action is warranted, a disciplinary hearing shall be commenced at the request of either the instructor or the director. (If there is a previous offense of this nature on the student’s record, a hearing is mandatory.)

**Here are examples of various kinds of plagiarism.** In each instance, the source is a passage from p. 102 of E.R. Dodd's *The Greek and the Irrational* (Berkeley, 1971; reprinted: Boston: Beacon, 1957). First here is the original note, copied accurately from the book *Functions*, Dodds 12, p. 102: "If the waking world has certain advantages of solidity and continuity its social opportunities are terribly restricted. In it we need as a rule, only the neighbors whereas the dream world offers the chance of intercourse, however fugitive, with our distant friends, our dead and gods. For normal men it is the sole experience in which they escape the offensive and incomprehensible bondage of time and space."

**Here are five ways of plagiarizing this source: (If you have any questions about plagiarism ask the instructor)**

1. *Word-for-word continuous copying without quotation marks or mention of the author's name.*

Dreams help us satisfy another important psychic need - our need to vary our social life. This need is regularly thwarted in our waking moments. If the waking world has certain advantages of solidity and continuity, its social opportunities are terribly restricted. In it we need, as a rule, only the neighbors, whereas the dream world offers the change of intercourse, however fugitive, with our distant friends, our dead, and our gods. We awaken from such encounters feeling refreshed, the dream having liberated us from the here and now...

2. *Copying many words and phrases without quotation marks or mention of the author's name.*

Dreams help us satisfy another important psychic need - our need to vary our social life. In the waking world our social opportunities, for example, are terribly restricted. As a rule, we usually encounter only the neighbors. In the dream world, on the other hand, we have the chance of meeting our distant friends. For most of us it is the sole experience in which we escape the bondage of time and space....

3. *Copying an occasional key word or phrase without quotation marks or mention of the author's name.*

Dreams help us satisfy another important psychic need - our need to vary our social life. During our waking hours our social opportunities are terribly restricted. We see only the people next door and our business associates. In contrast, whenever we dream, we can see our distant friends. Even though the encounter is brief, we awaken refreshed, having freed ourselves from the bondage of the here and now...

4. *Paraphrasing without mention of the author's name.*

Dreams help us satisfy another important psychic need - our need to vary our social life. When awake, we are creatures of this time and this place. Those we meet are usually those we live near and work with. When dreaming, on the other hand, we can meet far-off friends. We awaken refreshed by our flight from the here and now.

5. *Taking the author's idea without acknowledging the source.*

Dreams help us to satisfy another important psychic need - the need for a change. They liberate us from the here and now, taking us out of the world we normally live in....

If you quote anything at all, even a phrase, you must put quotation marks around it, or set it off from your text; if you summarize or paraphrase an author's words, you must clearly indicate where the summary or paraphrase begins and ends; if you use an author's idea, you must say that you are doing so. In every instance, you also must formally acknowledge the written source from which you took the material. **(This includes material taken from the World Wide Web and other Internet sources.)** Reprinted from "Writing: A College Handbook" by James A.W. Herrerman and John E. Lincoln. By Permission W.W. Norton & Co. Inc., Copyright 1982 by W.W. Norton & Co. Inc. Students are encouraged to report incidents of academic dishonesty to course instructors.

**When academic dishonesty occurs, the following procedures will be followed.**

**A.** The instructor will impose a minimum sanction of failure for the work involved. The instructor will notify the student and the appropriate academic dean/director in writing of the nature of the

offense and that the minimum sanction has been imposed. The instructor may recommend to the dean that further penalties should be imposed. If further penalties are imposed, the dean/director will notify the student immediately and the student will have five working days to respond to the intention to impose additional penalties. The student has the right to respond to the charge of academic dishonesty and may request in writing that the dean review the charge of academic dishonesty as fully as possible. If the dean/director determines that no further sanctions will be applied, the instructor's sanction will stand and the instructor's letter to the dean/director and student will be placed in the student's file. If no further charges of academic dishonesty involving the student occur during the student's tenure at St. Thomas, the materials will be removed from the file upon graduation.

**B.** If the student has been involved in a previous incident of academic dishonesty, the dean will convene a hearing, following guidelines listed under "Hearings and Procedures" in the Student Policy Book. During the hearing, all violations of academic integrity will be reviewed. The student and the faculty member charging the most recent incident will be present at the hearing.

**C.** In either situation, A or B, if the dean/director determines that further sanctions are warranted, the student will be informed in writing. Among the sanctions considered by the dean/director will be the following: failure for the course in which the incident occurred; suspension from the university for the following semester; expulsion from the university; community service; a written assignment in which the student explores the principles of honesty and trust; other appropriate action or sanctions listed under "Sanctions" in the Student Policy Book. The materials relating to the incident including the instructor's original letter to the student and dean and the dean's decision following the hearing, will become part of the student's file.

### Students with Disabilities

I want to ensure that the classroom environment is conducive to your learning and ask that you discuss with me any concerns that are interfering with your learning as they arise. Classroom accommodations will be provided for students with documented disabilities. Students must contact the Disability Resources Office about accommodations for this course as early in the semester as possible. Appointments can be made by calling 651-962-6315 or 800-328-6819, extension 6315, or in person in Rm 110 Murray Herrick Center on the St. Paul campus. Further information is available at: [www.stthomas.edu/enhancementprog/](http://www.stthomas.edu/enhancementprog/).

### Recording of Classroom Activities

All recordings of class sessions using any device is expressly prohibited without the written permission of the instructor. (See **Class Session Recording Permission Form.**)