CS 319 Object-Oriented Software Engineering

0 – Introduction

Eray Tüzün, Phd

e-mail: eraytuzun@cs.bilkent.edu.tr
About Me

Education

- **Bilkent University**
  - Computer Science, B.S.

- **Case Western Reserve University**
  - Computer Science, M.S.

- **Middle East Technical University**
  - Information Systems, PhD

Research interests

- Software Productivity / Software Analytics
- Application Lifecycle Management
- Agile Methodologies (Scrum)
- Software Product Line Engineering

Work

- **HHMI**
- **Microsoft**
- **Havelsan**

@tuzuneray
@eraytuzun
About You

- Performed requirement elicitation
- Part of a real software project
- Used Design Patterns
- Worked in a team >4

# of Students
My assumptions and expectations

Proficient in any programming language, but you have limited experience in analysis or design of a system

CS 201

Wants to be a Software Engineer /wants to learn

Internship experience?

For Team project
  Being a committed team member
Feedback / Class Participation

Share your thoughts
Ask questions – wave your hand forcefully to get my attention
If there is something you do not understand -- ASK!
    There are no stupid questions!!!!
If you have a relevant comment, experience, anecdote -- SPEAK!
    Participation will make the class better!!!!
During Lecture...
Your Expectations

What are your expectations of the course?
What do you want to learn?
...
...
Granularity of Software

**Trivial:** <1 month, 1 programmer, 500 LOC

Ex: Intro programming assignments

**Very small:** <3 months, 1 programmer, 2000 LOC,

Ex: Course project

**Small:** <1 year, 3 programmers, 50K LOC,

Ex: Mobile App

**Medium:** 3 years, 10s of programmers, 100K LOC

Ex: Optimizing compiler

**Large:** 5 years, 100s of programmers, 1M LOC,

Ex: MS Word, Excel, Linux, Windows

**Very large:** 10 years, 1000s of programmers, 10M LOC

Ex: Air traffic control, Telecommunications, space shuttle
Parnas 1987: “Multi-person construction of multi-version software”

– Your projects so far were (probably) neither multipeople nor multiversion

**Trivial:** 1 month, 1 programmer, 500 LOC

**Very small:** 3 months, 1 programmer, 2000 LOC,

**Small:** 1 year, 3 programmers, 50K LOC,

**Medium:** 3 years, 10s of programmers, 100K LOC

**Large:** 5 years, 100s of programmers, 1M LOC,

**Very large:** 10 years, 1000s of programmers, 10M LOC
Programming != Software Engineering
Analogy with Bridge building

- Over a stream – easy, one person job
- Over river nile ... ? (The techniques do not scale)
Project involves a team of people – need to manage process, people and artefacts

System takes a long-time to build – need to plan

Systems are complex – need powerful tools, methods and technologies

Need to reuse code/designs/process

❖ > 300 Engineers
❖ > 10.000.000 LOC
❖ > 10 years!

❖ > $100.000.000
❖ > 10.000.000 LOC
Effort, Software Size, & Complexity
Course Objectives

• Learn basics of the software engineering (SE) process life cycle.
• Learn what the object-oriented (OO) approach to software development is, through OO principles and design patterns.
• Learn UML (Unified Modeling Language) that is part of most CASE (Computer Aided Software Engineering) tools and the benefits of visual modelling / diagramming.
• Practice the application of principles of object-oriented software development through the course group project.
• Develop teamwork and communication skills through the course group project.
Outline

Intro to SE (Chapter 1)
Modeling w/ UML (Chapter 2)
Project Organization and Communication (Chapter 3 Sections 3.1 - 3.3)
Requirements Elicitation (Chapter 4)
Requirements Analysis (Chapter 5)
System Design (Chapters 6 & 7)
Object Design (Chapters 8 & 9)
Mapping Models to Code (Chapter 10)
Testing (Chapter 11)
Contact Information

TA: Barış Ardıç
– Email: baris.ardic@cs.bilkent.edu.tr
– Office: EA-527, Monday 13:30-15:00
– Questions related to Project groups assignment, HW1
– Direct all your project related questions to your TA

TA: Alperen Çetin
– Email: alperen.cetin@cs.bilkent.edu.tr
– Office: EA-527, Tuesday 13:30-15:00
– Direct all your project related questions to your TA

Check website for TA’s office hours
Contact Information

Eray Tüzün
– email: eraytuzun@cs.bilkent.edu.tr
– Office hours: by arrangement
## Course Schedule

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 319</td>
<td>Object-Oriented Software Engineering</td>
</tr>
</tbody>
</table>

### Step 1: Select the spare hour to be changed
- Friday 8:40
- Friday 14:40

### Step 2: Select new spare hour

<table>
<thead>
<tr>
<th>Day</th>
<th>Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday</td>
<td>10:40</td>
</tr>
<tr>
<td>Tuesday</td>
<td>11:40</td>
</tr>
<tr>
<td>Friday</td>
<td>8:40</td>
</tr>
<tr>
<td>Friday</td>
<td>9:40</td>
</tr>
</tbody>
</table>

### Step 3: Save Changes
- Change Spare Hour

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 319</td>
<td>Object-Oriented Software Engineering</td>
</tr>
</tbody>
</table>

### Step 1: Select the spare hour to be changed
- Friday 14:40

### Step 2: Select new spare hour

<table>
<thead>
<tr>
<th>Day</th>
<th>Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday</td>
<td>15:40</td>
</tr>
<tr>
<td>Tuesday</td>
<td>16:40</td>
</tr>
<tr>
<td>Friday</td>
<td>13:40</td>
</tr>
<tr>
<td>Friday</td>
<td>14:40</td>
</tr>
</tbody>
</table>

### Step 3: Save Changes
- Change Spare Hour
Textbooks


Recommended - Textbook: Developing Software with UML, Object-Oriented Analysis and D, Bernd Oestereich, 1999, Addison-Wesley

Recommended - Textbook: Object-Oriented Analysis and Design with Applications, 2nd e, G. Booch, 1994, Benjamin/Cummings


Required - Textbook: Object-Oriented Software Engineering, Using UML, Patterns, and Java, Bernd Bruegge and Allen H. Dutoit, 2010/3rd, Pearson
Grading (Tentative)

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance/Quiz/Assignment</td>
<td>20</td>
</tr>
<tr>
<td>Project</td>
<td>40</td>
</tr>
<tr>
<td>Midterm [closed book &amp; notes] (TBD)</td>
<td>15</td>
</tr>
<tr>
<td>Final [closed book &amp; notes] (TBD)</td>
<td>25</td>
</tr>
</tbody>
</table>

Those students who fail to get a minimum of 30 (out of 75) points from the weighted average of the total grades (attendance/quiz/assignment, project, midterm exam) before the final exam will get the grade FZ. For instance, A/Q/A: 5/10, P: 20/100, M: 40/100 (0.2 * 50 + 0.4 * 20 + 0.15 * 40 = 24) fails, whereas, A/Q/A: 8/10, P: 30/100, M: 40/100 (0.2 * 80 + 0.4 * 30 + 0.15 * 40 = 34) will take the final exam.

20% of the course grade will be based on pop-quizzes given during lecture hours, attendance, active class participation and homework assignments.
Plagiarism

All individual assignments must represent your own work.

No collaboration is permitted during the quizzes, the final examination, the individual labs, and the assignments. Collaboration among team members is permitted for the term project.

Plagiarism is to take and use as one’s own, or copy without acknowledgement, the works of another person. The provider of such material can be ruled equally culpable.
Term Project – Last year

* At most 4 teams per each game – First come first serve
Term Project – This Year

7 Wonders

Defender

Catan
Term Project

You are expected to extend the requirements

– Adapt the requirements for computer use
– I am expecting a fully-functional game with proper design
– Make sure other people

• Tools
  – Documentation: Google docs
  – Source control: Github
EVERY GROUP PROJECT

DOES 99% OF THE WORK

HAS NO IDEA WHAT'S GOING ON THE WHOLE TIME

SAYS HE'S GOING TO HELP BUT HE'S NOT

DISAPPEARS AT THE VERY BEGINNING AND DOESN'T SHOW UP AGAIN TIL THE VERY END

IN SCHOOL YOU HAVE EVER DONE
<table>
<thead>
<tr>
<th>Date</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec ?</td>
<td>Final Exam (17:30 - 20:00, Location: B-Z02, B-Z04)</td>
</tr>
<tr>
<td>Dec ?</td>
<td>Project Demos (May 10 10:30-12:30 EE-01, May 15 8:30-10:30 Mithat Çoruh, May 17 10:30-12:30 EE-01 )</td>
</tr>
<tr>
<td>Dec 15</td>
<td>Iteration 2 - Final Report and Project Peer Grades</td>
</tr>
<tr>
<td>Dec 1</td>
<td>Iteration 2 - Project Design Report</td>
</tr>
<tr>
<td>Nov 24</td>
<td>Iteration 2 - Project Analysis Report</td>
</tr>
<tr>
<td>Nov 11-17</td>
<td>Project Iteration 1 Demos</td>
</tr>
<tr>
<td>Nov 11-17</td>
<td>Midterm Exam (08:40-10:30 Location: EB-101, EB-102, EB-104)</td>
</tr>
<tr>
<td>Nov 10</td>
<td>Iteration 1 - Project Final Report</td>
</tr>
<tr>
<td>Nov 3</td>
<td>Iteration 1 - Project Design Report (soft copy to GitHub by 23:59)</td>
</tr>
<tr>
<td>Oct 25</td>
<td>Iteration 1 - Project Analysis Report (soft copy to GitHub by 23:59)</td>
</tr>
<tr>
<td>Oct 8</td>
<td>GitHub repository created, README.md specifies choice of project with brief description.</td>
</tr>
<tr>
<td>Oct 7</td>
<td>HW1 due (submit as hard copy to your TA by Oct 7 17:00. Bariş Ardic, EA 527)</td>
</tr>
<tr>
<td>Oct 1</td>
<td>Project groups announced</td>
</tr>
<tr>
<td>Sep 29</td>
<td>Project and team member selection (send an email to your TA by 23:59, Bariş Ardiç)</td>
</tr>
</tbody>
</table>
Term Project Groups

Please form your project groups of 5, and email to baris.ardic@bilkent.edu.tr on Sep 29 23:59 at latest. It is sufficient to get group email only from one group member for each group. The ones that do not form groups will be randomly assigned to a group.

State your top 2 choices for the term project subject.

One of the groups will have 6 members. First-come first-serve
Term Project

• In at most 1 page, give a rough description of what you intend to implement. Discussion with the TA about your project is highly recommended.

• You are not expected to design the exact version of the game you have been assigned. You can add and remove components with justifications. Certain changes are welcome and expected.

• Since this is your first project, where you should apply high and low level architectural styles and design patterns, you should not use a library or a framework (e.g. a physics or game engine) that forces a particular design on your project.