CS 319 Object-Oriented Software Engineering

0 – Introduction

Eray Tüzün, Phd

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

### Education

<table>
<thead>
<tr>
<th>University</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilkent University</td>
<td>Computer Science, B.S.</td>
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<tr>
<td>Case Western Reserve University</td>
<td>Computer Science, M.S.</td>
</tr>
<tr>
<td>Middle East Technical University</td>
<td>Information Systems, PhD</td>
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</tbody>
</table>

### Research interests

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

### Work

- HHMI
- Microsoft
- HAVELSAN

@tuzuneray
@eraytuzun
About You

- Worked in a team >4
- Has heard Design patterns before
- Used Design Patterns
- Used UML
- Performed requirement elicitation

# 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
Software Engineering

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
Effort, Software Size, & Complexity
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
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: Gülden Olgun
– Email: gulden@cs.bilkent.edu.tr
– Office: EA-425
– Questions related to Project groups assignment, HW1, quizzes
– 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>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 319</td>
<td>Object-Oriented Software Engineering</td>
<td>001</td>
</tr>
</tbody>
</table>

**Step 1: Select the spare hour to be changed**

- **Friday 11:40**

**Step 2: Select new spare hour**

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


Grading (Tentative)

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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</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>
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</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, 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
Term Project – This year

* At most 4 teams per each game – First come first serve
Example

- [https://www.youtube.com/watch?v=MfkBntdMUYo](https://www.youtube.com/watch?v=MfkBntdMUYo)
  - You are expected to extend the requirements
  - Adapt the requirements for computer use
  - I am expecting a fully-functional game with proper design
  - Talk to the customer
Every Group Project

Does 99% of the work

Says he's going to help but he's not

Has no idea what's going on the whole time

Disappears at the very beginning and doesn't show up again til the very end

In school you have ever done
Key to Success

Ninety percent of your work's outcome will depend on the team you select to work with.

Find the right people

Be a team player

Be nice!
<table>
<thead>
<tr>
<th>Date</th>
<th>Assignment</th>
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<tbody>
<tr>
<td>?</td>
<td><strong>Final Exam</strong></td>
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<tr>
<td>May 10-17</td>
<td><strong>Project Demos</strong></td>
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<tr>
<td>May 9</td>
<td><strong>Iteration 2 - Final Report and Project Peer Grades</strong></td>
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<tr>
<td>Apr 28</td>
<td><strong>Iteration 2 - Project Design Report</strong></td>
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<tr>
<td>Apr 14</td>
<td><strong>Iteration 2 - Project Analysis Report</strong></td>
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<tr>
<td>Mar 29 – Apr 25</td>
<td><strong>Project Iteration 1 Demos</strong></td>
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<tr>
<td>Mar 28</td>
<td><strong>Iteration 1 - Project Final Report</strong></td>
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<tr>
<td>Mar 17</td>
<td><strong>Iteration 1 - Project Design Report</strong></td>
</tr>
<tr>
<td>March 11-20 (TBD)</td>
<td><strong>Midterm Exam</strong></td>
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<tr>
<td>March 10</td>
<td><strong>Iteration 1 - Project Analysis Report</strong> (soft copy to GitHub by 23:59)</td>
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<tr>
<td>Feb 18</td>
<td><strong>HW 1 due</strong> (submit as hard copy to your TA by 17:00. Gulden Olgun, EA 425)</td>
</tr>
<tr>
<td>Feb 15</td>
<td><strong>GitHub repository created, README.md specifies choice of project with brief description.</strong></td>
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<tr>
<td>Feb 12</td>
<td><strong>Project groups announced</strong></td>
</tr>
<tr>
<td>Feb 10</td>
<td><strong>Project and team member selection</strong> (send an email to your TA by 23:59, Gulden Olgun)</td>
</tr>
</tbody>
</table>
Term Project Groups

Please form your project groups of 5, and email to gulden@cs.bilkent.edu.tr on Feb 10 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.

Three 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. Since these are originally intended to be physical board games, when you are designing the software version, 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.